ORNL/TM-6834

MASTER

Pyrochemical and Dry Processing Methods Program

A Selected Bibliography

H. F. McDuffie
Duane H. Smith
Park T. Owen

OAK RIDGE NATIONAL LABORATORY
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Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road, Springfield, Virginia 22161
Price: Printed Copy $19.00; Microfiche $3.00

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ORNL/TM-6834

Contract No. W-7405-eng-26

Chemistry Division

PYROCHEMICAL AND DRY PROCESSING METHODS PROGRAM
A SELECTED BIBLIOGRAPHY

H. F. McDuffie
Duane H. Smith
Chemistry Division

Park T. Owen
Information Division

March 1979

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ABSTRACT

This selected bibliography was compiled to provide information support to the Pyrochemical and Dry Processing Methods (PDPM) Program sponsored by the Department of Energy and administered by the Argonne National Laboratory through work packages in many locations in the United States. Objectives of the PDPM Program are to evaluate nonaqueous methods of reprocessing spent fuel as a route to the development of proliferation-resistant and diversion-resistant methods for widespread use in the nuclear industry. To limit this bibliography to a manageable size for evaluation by the PDPM Program, emphasis was placed on the literature indexed in the ERDA-DOE Energy Data Base (EDB). If the bibliography is acceptable, similar references from Nuclear Science Abstracts (NSA) and Chemical Abstracts (CA) will be combined to form a PDPM Program computerized data base for further program use. The bibliography includes indexes to authors, subject descriptors, EDB subject categories, and titles.

INTRODUCTION

The ORNL Information Division has been building computerized data bases in the nuclear field for many years, with intensified activity since 1971. The proximity to the DOE Technical Information Center and the availability of strong computer support in the Computer Sciences Division led to the establishment of the RECON national network with its base in Oak Ridge. Many of the DOE's established information analysis centers are located in Oak Ridge where they mutually support one another.

When the ORNL work package of the PDPM Program was activated in February 1978, we discussed whether we might undertake to develop an information support function for the program as a whole, in addition to the literature analysis to which we were committed. This selected bibliography is an example, in hard copy, of what might be assembled and made available to program people, either through computer access on RECON, by a continuing series of hard copy documents, by individualized searches and selective dissemination of information (SDI) profiles, or, in cooperation with the information center, the preparation of critical reviews by experts to supplement specialized bibliographies.

We quickly found that our literature capture net when applied to Nuclear Science Abstracts, Chemical Abstracts, and the Energy Data Base was bringing in many more citations than we could conveniently publish in one hard copy specimen bibliography. We decided to restrict the sample to EDB for two reasons: one, the EDB literature is the most recent (nuclear literature from July 1976 when NSA was discontinued) and hence likely to be less familiar to the experienced program people than is the

older literature; and, two, we would intend to model our PDPM data base on EDB with respect to field identification, subject categories, subject descriptors, etc., and therefore would like our program members to know what type of information might become available in a larger base. (We would expect to convert NSA and CA into the EDB format.) We have already ascertained that the PDPM base can, indeed, be "brought up" on RECON where it will be available for individualized searching and printout in work-package locations that have hard-wired RECON lines or that have telephone dial-up capability for terminal access.

From review of this selected bibliography by PDPM people, we hope to learn whether and how it is useful and how it might be improved with respect to both content and format. The data-base building program we are using is sufficiently flexible to permit incorporation of almost any useful suggestions that arise and to change as the program needs or interests change. Particular deficiencies may be apparent in the materials and fabrication areas, since the programs in those areas are less well known to us at this early stage. If the program response is favorable, we should expect to obtain relevant references that other work-package investigators have already gathered and to add them to our mechanically captured set. Other information support activities would include systematic additions from the important earlier literature referenced via sources such as *Reactor Handbook. Vol. II. Fuel Reprocessing*, 2nd ed., edited by S. M. Stoller and R. B. Richards, 1961, and *Nuclear Metallurgy. Vol. 15. Symposium on Reprocessing of Nuclear Fuels* (CONF-690801), August 1969.

SAMPLE REFERENCE

The following is a list of all the field labels and their three-letter mnemonics being used for the numerical tags in the EDB [*ERDA Energy Information Data Base: Magnetic Tape Description* (TID-4581-R3)].

ABS	950	Abstract (when available)
AFA	170	Affiliation (Author of an Analytic)
AFM	190	Affiliation (Author of a Monograph)
ASI	300	Assignee
AUA	060	Personal Author of an Analytic
AUG	620	Title Augmentation
AUM	070	Personal Author of a Monograph
BIB	550	Source of Bibliographic Information Code
CAC	700	Corporate Code (INIS)
CAN	710	Corporate Author (INIS)
CDN	250	CODEN
CFD	470	Conference Date
CFP	460	Conference Place
CFT	450	Conference Title
CNO	240	Contract Number

CPC	570	Country of Publication Code
CSC	500	COSATI ID Code
CTY	310	Place (City) of Publication
DAV	430	Availability, Price
DBM	XXX	Original Data Base Mnemonic
DBN	XXX	Original Data Base Name
DPN	440	Drop Notes
DSN	001	Original Document File Number
GEN	801	Subject Descriptors, General
LIT	040	Literary Indicator
LWC	560	Country of Affiliation Code
NCC	610	INIS Category Number
NSC	590	INIS Temporary Record Number
OTM	200	Original Title for a Monograph
PAD	380	Patent Filed Date
PCL	230	International Classification Code
PDD	370	Date
PDI	350	Journal Issue
PDL	420	Language
PDP	360	Journal Pages
PDT	260	Abbreviated Journal Title
PDV	340	Journal Volume
PGM	390	Pages of Books, Reports, or Analytics
PNO	220	Patent Number
PTC	020	Type of Item
PUB	320	Name of Publisher
RNA	530	File(s) Selected for Publication
RNO	150	Primary Report Number
RPO	520	Report Origin
SCC	540	Subject Category Codes
SJA	750	Abstract Number (Secondary)
SJI	011	Issue Number (Secondary)
SPL	802	Subject Descriptors, Splits
SRN	210	Secondary Report Number
THS	490	Thesis Statement
TLA	090	Primary Title of an Analytic
TLM	110	Primary Title of a Monograph
TLS	130	Primary Title of a Series
TRN	410	Translation Note

A complete journal citation from our base, printed with the three-letter labels appropriate to this type of publication, is as follows:

```
<DSN      >76:036237
<SEC      >
<SJI      >32
<SJA      >NSA-33:30133;ERA-01:013612;EDB-76:036237
<TTL      >
<TLM      >DIFFUSION COEFFICIENTS IN MOLTEN METALS
<ATI      >
<AUM      >KONONENKO, V.I.; YATSENKO, S.P.
<KEY      >
<GEN      >ACTIVATION ENERGY;ANTIMONY;BISMUTH;CALCULATION
METHODS;GALLIUM;INDIUM: T2;INDIUM ALLOYS: T3;LEAD;LIQUID
METALS;SELF-DIFFUSION: Q1,Q2,Q3,Q4;SILVER;THALLIUM;TIN: T1;TIN ALLOYS:
T4;USSR;VISCOSITY
<SJT      >
<DBN      >ERDA ENERGY DATA BASE
<DBM      >EEDB
<PDD      >1971
<JNL      >
<PDT      >TR. INST. KHIM., AKAD. NAUK SSSR, URAL. FIL.
<CDN      >TKAUA
<PDV      >23
<PDP      >62-67
<PTC      >TJ
<ABS      >THE SELF-DIFFUSION COEFFICIENTS OF INDIUM AND TIN WERE
DETERMINED EXPERIMENTALLY IN NOT ONLY THE PURE METALS BUT A WIDE RANGE
OF BINARY LIQUID INDIUM-TIN ALLOYS OVER THE TEMPERATURE RANGE 800 TO
1100$SUP 0$K. ACTIVATION ENERGIES AND PRE-EXPONENTIAL FACTORS WERE
CALCULATED FOR EACH METAL. A BREAK IN THE ARRHENIUS PLOT WAS FOUND.
COEFFICIENTS OF DIFFUSION FOR AG, IN, TH, SN, PB, SB, AND BI IN LIQUID
GALLIUM WERE CALCULATED FROM VISCOSITY DATA. (GRA)
<SCC      >EDB-060100
<DAV      >NTIS $3.25.
<RNU      >
<RNO      >TT--74-58011
<SRN      >DMDC--14094
<PGM      >10
<BIB      >GRA
<RNA      >EDB;ERA;NSA
<TRN      >TRANSLATED FROM
<RPO      >NP
<LWC      >SU
<CPC      >US
```

For the selected bibliography we chose not to print the entire listing but to show authors, corporate authors, titles, publication description, subject descriptors, abstract, subject categories [*ERDA Energy Information Data Base: Subject Categories* (TID-4584-R2)], and INIS subject categories. The printed citation then looks like the following, with some of the fields concatenated for convenience:

<54>
Besmann, T.M.; Lindemer, T.B. (Oak Ridge National Lab., Tenn. (USA))

Thermodynamic assessment of the conversion of plutonium dioxide to plutonium monocarbide AIX-08:334259;EDB-77:137277; J. Nucl. Mater. (JNUMA) 67:(1):. 77-87 (1977)

SUBJECT DESCRIPTORS: CHEMICAL REACTION YIELD: Q2;EQUILIBRIUM;EVAPORATION;FREE ENERGY;OXYGEN;PHASE DIAGRAMS;PLUTONIUM;PLUTONIUM CARBIDES: T2;PLUTONIUM DIOXIDE: T1;REDUCTION: Q1;S CODES;SOLID SOLUTIONS;VERY HIGH TEMPERATURE

ABSTRACT: The equilibrium thermodynamics of the carbothermic reduction of PuO$sub 2$ to PuCsub(0.88) are reassessed in light of new thermodynamic values for the Pu-C-O system. Analysis of the thermodynamic data indicates that the PuCsub(x)Osub(y) phase can be successfully modeled by an ideal solid solution of PuCsub(0.88) and PuO. Equilibrium calculations show that oxygen-free monocarbide cannot be practically prepared by the direct carbothermic reduction of PuO$sub 2$ because of plutonium vaporization. These results imply that significant plutonium vaporization will occur in similarly reduced UO$sub 2$-PuO$sub 2$ mixtures unless the actinides are initially present as a solid solution. Equilibrium calculations also suggest that PuCsub(0.88) can be successfully prepared by a two-step method: the carbothermic reduction of PuO$sub 2$ to PuCsub(1.5) followed by the hydrogen reduction of PuCsub(1.5) to PuCsub(0.88).

EDB SUBJECT CATEGORY: EDB-050700;360201;400702
INIS CATEGORY: B12

Naturally, we can select to print, sort, or index on any field of interest to the program people.

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ACKNOWLEDGMENTS

Charles H. Bean, PDPM Program Manager, and Kevin M. Myles of the PDPM Program have supported and encouraged this effort so that the program people can evaluate a sample. L. M. Ferris, head of the Inorganic and Organic Section of the ORNL Chemistry Division, assumed a leading role in advocating the information support program and in discussing it with contacts throughout the program.

Many members of the ORNL Information Division and the Union Carbide Corporation-Nuclear Division Computer Sciences Division have been helpful with guidance and advice, as we undertook a very large effort on a very short time scale. In particular, we would like to express our appreciation to Herbert Pomerance, Cathy Fore, Helen Pfuderer, Tim Ensminger, Richard Green, Jackie Gillen, and Allen Singletary for their continuing and patient help. Special thanks must go to Faye Fletcher of the Information Division and Ruth Slusher of the Computer Sciences Division for their outstanding assistance with the management of our data sets and the computer production of this document. The Information Division units concerned with composition, makeup, printing, and distribution, as always, were necessary, efficient, and most cooperative.

<1>
Abdel-Aziz, A.H.K.; Kirshah, M.B. (Alexandria Univ. (Egypt). Faculty of Engineering)

Density and temperature dependence of the surface tension of molten bismuth, lead, and bismuth-lead alloys
ERA-03:012843;EDB-78:021748; Z. Metallkd. (ZEMTA) 68:(6):437-439 (Jun 1977)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;BISMUTH: T1;BISMUTH ALLOYS: T2;DENSITY: Q1,Q2,Q3,Q4;EQUILIBRIUM;HIGH TEMPERATURE;LEAD: T3;LEAD ALLOYS: T4;LIQUID METALS;PHASE DIAGRAMS;SURFACE TENSION: Q1,Q2,Q3,Q4;TEMPERATURE DEPENDENCE;VERY HIGH TEMPERATURE;VOLUME

ABSTRACT: The density and the temperature dependence of the surface tension of molten bismuth, lead, and bismuth-lead alloys were studied in the temperature range 623 to 953K, using a maximum bubble pressure apparatus. In the temperature range covered, the mean density of bismuth is 10,031 kg/m$sup 3$ and that of lead is 10,530 kg/m$sup 3$. The surface tension of bismuth decreases from 0.379 N/m at 653K to 0.359 N/m at 953K, while that of lead decreases from 0.451 N/m at 633K to 0.409 N/m at 923K. The densities of the alloys and the surface tension isotherms are all below the corresponding additive straight lines.

EDB SUBJECT CATEGORY: EDB-360104;360102

<2>
Ackermann, R.J.; Rauh, E.G., Argonne National Lab., Ill. (USA)

In Comparison of the thermodynamic properties and high temperature chemical behavior of lanthanide and actinide oxides ** ERA-03:007179;INS-78:000328;EDB-78:010143; (1977) CONF-770662--3

SUBJECT DESCRIPTORS: ACTINIDE COMPOUNDS: T2;CHEMICAL PROPERTIES: Q1,Q2,Q3;GASES;MOLECULAR IONS;OXIDES: T3;RARE EARTH COMPOUNDS:
T1;SOLIDS;SPECTROSCOPY;STOICHIOMETRY;TABLES;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;VAPORS

ABSTRACT: The thermodynamic properties of the lanthanide and actinide oxides are examined, compared, and associated with a variety of high temperature chemical behavior. Trends are cited resulting from a number of thermodynamic and spectroscopic correlations involving solid phases, species in aqueous solution, and molecules and ions in the vapor phase. Inadequacies in the data and alternative approaches are discussed. The characterization of nonstoichiometric phases stable only at high temperatures is related to a network of

<2>

<2> CONT.
heterogeneous and homogeneous equilibria. A broad perspective of similarity and dissimilarity between the lanthanides and actinides emerges and forms the basis of the projected needs for further study.

EDB SUBJECT CATEGORY: EDB-400702;400201;360204
INIS CATEGORY: B13;B12;B23

<3>
Afanas'ev, Yu.A.; Rayanov, A.P.; Frolov, Yu.A.

Thermodynamic properties of the liquid La--Mg alloys
EDB-76:048717; Izv. Akad. Nauk SSSR, Met. (IZNMA) (1):186-190 (Jan 1975)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;DIAGRAMS;ENTROPY;EQUATIONS;FREE ENTHALPY;LANTHANUM ALLOYS: T1;LIQUID METALS;MAGNESIUM ALLOYS: T2;PRESSURE MEASUREMENT;REACTION KINETICS;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1,Q2;VAPOR PRESSURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<4>
Afinogenov, Yu.P.; Dantseva, V.A. (Voronezhskij Gosudarstvennyj Univ. (USSR))

Thermal analysis of GaCl$sub 3$+3In = InCl+Ga system
EDB-76:036674; Zh. Neorg. Khim. (ZNOKA) 20:(2):516-518 (Feb 1975)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CROSS SECTIONS;DIFFERENTIAL THERMAL ANALYSIS: Q1,Q2;EQUILIBRIUM;GALLIUM;GALLIUM CHLORIDES: T1;INDIUM;INDIUM CHLORIDES: T2;PHASE DIAGRAMS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<5>
Ahmad, U.M.; Murr, L.E.

Variation of the solid--solid--nickel--thoria interfacial free energy with temperature
INS-76:014669;ERA-01:020089;EDB-76:054031; Metallography (MEIJA) 9:(1):33-41 (Feb 1976)

SUBJECT DESCRIPTORS: DISPERSION HARDENING;FREE ENERGY;GRAIN BOUNDARIES;INTERFACES;MATRIX MATERIALS;NICKEL ALLOYS: M1;SURFACE PROPERTIES: Q1,Q2;TEMPERATURE DEPENDENCE;THORIUM OXIDES: M2;VERY HIGH TEMPERATURE

ABSTRACT: The interfacial free energy in the nickel--thoria system was measured by comparing grain-boundary groove profiles at the surface and the interface of nickel-thoria bonded couples equilibrated at temperatures of 1300, 1320, 1337, 1373, 1400, and 1420$sup 0$C. The temperature coefficient of interfacial free energy is positive in the range 1300-1400$sup 0$C and negative above 1400$sup 0$C. Results are indicative of a direct influence of changes of particle-matrix interfacial free energy on the coarsening of thoria particles in thoria-dispersed nickel.

EDB SUBJECT CATEGORY: EDB-360204;360104
INIS CATEGORY: B23;B22

<6>
Alabyshev, A.F.; Morachevskii, A.G.; Kamenetskii, M.V.; Petrov, V.A.; Lisinskii, V.E. (Leningradskii Politekhnicheskij Inst. (USSR))

Thermodynamic properties of diluted solutions of MnCl$sub 2$ in alkali metal chlorides AIX-08:317661;EDB-77:133372; Zh. Prikl. Khim. (ZPKHA) 49:(1):215-217 (Jan 1976)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;DILUTION;ELECTROMOTIVE FORCE;EQUATIONS;HIGH TEMPERATURE;MANGANESE CHLORIDES;POTASSIUM CHLORIDES;QUANTITY RATIO;REACTION KINETICS;SOLUTIONS;THERMODYNAMIC PROPERTIES: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<7>

<7>
Alcock, C.B.; Jacob, K.T.; Zador, S. (Toronto Univ., Ontario (Canada). Dept. of Metallurgy and Materials Science)

1. Thermochemical properties In Zirconium: Physico-chemical properties of its compounds and alloys ** At. Energy Rev., AIX-07:277692;EDB-77:031459; (1976) IAEA

SUBJECT DESCRIPTORS: THERMODYNAMIC PROPERTIES: Q1,Q2;ZIRCONIUM ALLOYS: T2;ZIRCONIUM COMPOUNDS: T1;ZIRCONIUM COMPOUNDS: T1

ABSTRACT: A critical review of thermodynamic properties of Zr-compounds is presented. Binary and ternary Zr-compounds, pure Zr, and binary Zr-alloys are considered. The thermodynamic properties include heat capacity, cuthalpy, gibbs free energy, entropy, vapor pressure, transition heat and heat of solution. Most of the values are given one by one in the text with some comments about its reliability and accuracy.

EDB SUBJECT CATEGORY: EDB-400201;360104
INIS CATEGORY: B12

<8>
Aleksandrovskii, S.V.; Sandler, R.A.; Naumchik, A.N.; Ivanov, I.I. (Leningradskij Gornyj Inst. (USSR))

Standard formation enthalpy of chloride alloys of ZrCl$sub 4$--KCl(NaCl) systems AIX-08:298214;EDB-77:062544; Zh. Fiz. Khim. (ZFKHA) 50:(9):2437 (Sep 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<9>
Alexander, C.A.; Clark, R.B.; Kruger, O.L. (Battelle Columbus Labs., Ohio (USA)); Robbins, J.L. (California Univ., Livermore (USA). Lawrence Livermore Lab.) ** Blank, H.; Lindner, R. (eds.)

Fabrication and high temperature thermodynamic and transport properties of PuN In Plutonium 1975 and other actinides ** AIX-08:309967;ERA-02:041838;EDB-77:094416; (1976) North-Holland

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;DENSITY;ENTROPY;FORMATION HEAT;HOT PRESSING;MACHINING;PLUTONIUM NITRIDES: T1;POWDERS;PRESSURE DEPENDENCE;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;THERMAL

<9> CONT.
CONDUCTIVITY;THERMAL DIFFUSIVITY;THERMAL EXPANSION;THERMODYNAMIC PROPERTIES: Q1;VAPORIZATION HEAT;VERY HIGH TEMPERATURE

ABSTRACT: Plutonium mononitride continues to be a potentially promising constituent nuclear fuel for the liquid metal fast-breeder reactor due to its high thermal conductivity and high melting point relative to other candidate fuels. A program was undertaken to measure thermodynamic properties of fuel at elevated temperatures: specifically, a pressure-composition diagram was generated for the plutonium-nitrogen system. Transport property measurements were also conducted as a function of sample density and temperature; thermal expansion measurements were made as were thermal diffusivity measurements. In the early stages of the program, it was necessary to spend significant effort developing sample fabrication techniques; this effort consisted of powder synthesis, hot pressing, and machining.

EDB SUBJECT CATEGORY: EDB-360204;C50700
INIS CATEGORY: B24

<10>
Alire, R.M.

Transport of hydrogen in liquid lithium
INS-76:019918;ERA-02:001035;EDB-76:081575; J. Chem. Phys. (JCPSA) 65:(3):1134-1137 (1 Aug 1976)

SUBJECT DESCRIPTORS: DIFFUSION: Q1;HIGH TEMPERATURE;HYDROGEN: T1;LIQUID METALS;LITHIUM: T2;LOW PRESSURE;MEDIUM VACUUM;PERMEABILITY: Q2;SOLUBILITY: Q1;THERMONUCLEAR REACTOR COOLING SYSTEMS;THERMONUCLEAR REACTORS;VERY HIGH TEMPERATURE

ABSTRACT: The solubilities and diffusion coefficients of H$sub 2$ in liquid Li contained in cylinders of Nb and Nb/1%Zr were determined in the temperature range 625--905degreeC and pressure range 13--1333 Pa. Simultaneous radial and axial diffusion into a finite solid cylinder adequately described the transport of H$sub 2$ into liquid Li. The diffusion coefficient was expressed by D (cm$sup 2$/sec) =13 +- 1 exp(-2.5 +- 0.2 x 10$sup 4$/RT). (AIP)

EDB SUBJECT CATEGORY: EDB-360104;360603;700201
INIS CATEGORY: B22;B24;A14

<11>

<11>
Allen, C.W.; Liao, K.C.; Miller, A.E. ** Lundin, C.E. (ed.)

Fault structures in rare earth--cobalt intermetallics In Proceedings of the 12th rare earth research conference. Vol. I ** ERA-03:004343;INS-77:019109;EDB-78:004413; (1976) Univ. of Denver

SUBJECT DESCRIPTORS: COBALT ALLOYS: T2;CRYSTAL DEFECTS;MATHEMATICAL MODELS;PHASE TRANSFORMATIONS: Q1,Q2;RARE EARTH ALLOYS: T1;SHEAR PROPERTIES;TRANSITION ELEMENT ALLOYS

ABSTRACT: In dealing with materials which may undergo a shear transformation or which may contain planar compositional faulting, it is valuable to employ a stacking sequence notation, a structural symbolism, which may be developed for any layer-like structure. Such a conventional notation is presented, as far as possible, consistent for all possible phases in rare earth-transition element systems ranging from RCo$sub 2$ through R$sub 2$CO$sub 17$, and application of this notation to shear transformations, shear structure development and the nature of homologous series of phases within such systems is briefly illustrated. (GHT)

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<12>
Allen, G.C.; Crofts, J.A.; Griffiths, A.J. (Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.)

Infrared spectroscopy of the uranium/oxygen system AIX-08:298648;EDB-77:065887; J. Nucl. Mater. (JNUMA) 62:(2-3):273-281 (Nov 1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1,Q2,Q3;ABSORPTION SPECTROSCOPY;BOND LENGTHS;DATA;INFRARED SPECTRA;SOLID SOLUTIONS;URANIUM DIOXIDE: T1;URANIUM OXIDES: T3;URANIUM OXIDES U3O8: T2

ABSTRACT: The infrared absorption spectra of six oxides of uranium, including several interstitial compounds, are presented and discussed. These oxides are: UOsub(2.00), UOsub(2.05), UOsub(2.08), UOsub(2.18), U$sub 4$O$sub 9$ and U$sub 3$O$sub 8$. Attention is drawn to certain features and trends of the spectra which lead to their use in the detection of solid solutions of oxygen in uranium dioxide, and in the analysis of uranium oxides of unknown composition.

<12> CONT.
Some inconsistencies are also discussed, which exist in previously published spectra of uranium oxides.

EDB SUBJECT CATEGORY: EDB-050700;400702
INIS CATEGORY: B24

<13>
Amberger, H.D.; Fischer, R.D.; Rosenbauer, G.G.; Spiegl, A.W. (Erlangen-Nuernberg Univ., Erlangen (F.R. Germany). Inst. fuer Anorganische Chemie)

Electronic structure of highly symmetric complexes of lanthanoids and actinoids. Pt. 3. 'Electronic' Raman spectrum of Cs$sub 2$U(IV)Cl$sub 6$
AIX-07:277954;EDB-77:031790; Ber. Bunsenges. Phys. Chem. (BEPCA) 80:(6):495-499 (Jun 1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;ACTINIDE COMPLEXES;CESIUM CHLORIDES: T1;CRYSTAL FIELD;CRYSTALS;ELECTRONIC STRUCTURE: Q1,Q2;ENERGY LEVELS;MOLECULAR STRUCTURE;RAMAN SPECTRA: Q1,Q2;RARE EARTH COMPLEXES;SYMMETRY;URANIUM CHLORIDES: T2

ABSTRACT: Besides the pure vibrational Raman bands, the low-temperature Raman-spectrum of Cs$sub 2$U(IV)Cl$sub 6$ contains several additional signals. Since their appearance is widely independent of the choice of the stimulating laser line, we ascribe them to 'electronic' Raman effects. This view is supported by the fact that these signals are either close to bands which have been observed directly by absorption spectroscopy or lie within narrow energy ranges of crystal field states, which have been predicted by crystal field theory. The number as well as the relative grouping of the electronic Raman-bands show that the U$sup 4+$-central ion is exposed to an effective crystal field of low symmetry.

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13

<14>
Amberger, H.D.; Fischer, R.D.; Rosenbauer, G.G. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Inst. fuer Anorganische Chemie)

Electronic structure of highly symmetric complexes of lanthanoids and actinoids. Pt. 4. The electronic Raman spectrum of Cs$sub 2$NaEu(III)Cl$sub 6$
AIX-08:324055;EDB-77:146823; Z. Phys. Chem. (Frankfurt) (ZPCFA) 102:(56):279-282 (Oct 1976)

<14>

<14> CONT.
SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;CRYSTAL FIELD;CRYSTALS;ELECTRONIC STRUCTURE: Q1,Q2,Q3;ENERGY LEVELS;EUROPIUM CHLORIDES: T3;LOW TEMPERATURE;RAMAN EFFECT;RARE EARTH COMPLEXES;SODIUM CHLORIDES: T2;SPECTRA;SYMMETRY

ABSTRACT: The low-temperature Raman spectrum of the elpasclite-system Cs$sub 2$NaEu(III)Cl$sub 6$ exhibits five new sharp lines (compared with the room temperature spectrum), which are assigned to crystal field (=CF) Raman transitions between the CF-ground state GAMMA$sub 1$($sup 7$F$sub 0$) and the octahedral CF-states of the free ion terms $sup 7$F$sub 1$,$sub 2$,$sub 3$. A first-order CF-calculation yields: B$sub 4$$sup 0$ = 170 cm$sup -1$ and B$sub 6$$sup 0$ = 3.2 cm$sup -1$.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B13

<15>
Andrew, J.F.; Zocher, R.W.; Kent, R.A., Los Alamos Scientific Lab., N.Mex. (USA)

In Thermal expansion of $sup 238$PuO$sub 2$ **
ERA-01:015780;INS-76:014275;EDB-76:045846; (Feb 1976)
LA--6232-MS

SUBJECT DESCRIPTORS: PLUTONIUM 238: T2;PLUTONIUM DIOXIDE: T1;RADIOISOTOPE HEAT SOURCES: T,Q2;THERMAL EXPANSION: Q1;THERMOELECTRIC GENERATORS

ABSTRACT: The linear thermal expansion of stoichiometric $sup 238$PuO$sub 2$ was measured over the range 25 to 1600$sup 0$. The value of $delta$L/L$sub 0$ per degree C, calculated from the data, is $delta$L/L$sub 0$ = -2.249 x 10$sup -4$ + 9.020 x 10$sup -6$T - 1.130 x 10$sup -9$T$sup 2$ + 1.525 x 10$sup -12$T$sup 3$.

EDB SUBJECT CATEGORY: EDB-070300
INIS CATEGORY: D21

<16>
Andrews, L.

Optical spectra of the difluoride, dichloride, and trichloride ions in the matrix-isolated M$sup +$F$sub 2$$sup -$, M$sup +Clsub 2$$sup -$, and M$sup +Clsub 3$$sup -$ species
ERA-01:020227;EDB-76:054367; J. Am. Chem. Soc. (JACSA) 98:(8):2147-2152 (14 Apr 1976)

<16> CONT.
SUBJECT DESCRIPTORS: ARGON;CESIUM CHLORIDES: M3;CHEMICAL BONDS;CHEMICAL REACTION KINETICS;CHLORIDES: M1;ENERGY-LEVEL TRANSITIONS;FLUORIDES: M2;INTERMEDIATE STRUCTURE;LITHIUM;MATRIX ELEMENTS;PHOTOLYSIS;POTASSIUM;SAPPHIRE;SODIUM;STABILITY;ULTRA IOLET SPECTRA: Q1,Q2,Q3

ABSTRACT: Alkali metal atoms were codeposited with fluorine and chlorine at high dilution in argon on a sapphire plate cooled to 17$sup 0$K. Ultraviolet spectra contained strong absorptions near 300 nm for M$sup +$F$sub 2$$sup -$ and 340 nm for M$sup +$Cl$sub 2$$sup -$ which are assigned to the sigma $Yields$ sigma* transition of the dihalide anion. This transition for Cl$sub 2$$sup -$ occurs at half of the energy known for Cl$sub 2$. The alkali metal effect on the absorption spectra is consistent with an ionic model of polarized ion pairs. In addition, the strong ultraviolet band of the trichloride anion was observed at 250 nm with the metal-chlorine reactions and with the matrix reactions of CsCl and Cl$sub 2$. (auth)

EDB SUBJECT CATEGORY: EDB-400201

<17>
Andrews, L.

Optical spectra of the dibromide and diiodide ions in the matrix-isolated M$sup +$Br$sub 2$$sup -$ and M$sup +$I$sub 2$$sup -$ species ERA-01:020228;EDB-76:054368; J. Am. Chem. Soc. (JACSA) 98:(8):2152-2156 (14 Apr 1976)

SUBJECT DESCRIPTORS: ARGON;BROMIDES: M1;CESIUM BROMIDES: M3;CHEMICAL BONDS;CHEMICAL REACTION KINETICS;DIMERS;ENERGY-LEVEL TRANSITIONS;INTERMEDIATE STRUCTURE;IODIDES: M2;LITHIUM;MATRIX ELEMENTS;PHOTOLYSIS;POTASSIUM;SAPPHIRE;SODIUM;ULTRAVIOLET SPECTRA: Q1,Q2,Q3

ABSTRACT: The products of argon matrix reactions of alkali metal atoms and bromine and iodine have been studied optically in thin films on a sapphire window at 17$sup 0$K. The bromine reaction produced a strong band near 360 and a weak band near 640 nm, depending upon the alkali reagent, and the reactions with iodine gave a strong absorption near 380 and a medium intensity absorption near 680 nm. These bands are due to sigma $Yields$ sigma* and pi $Yields$ sigma* transitions, respectively, of the dihalide anions in the M$sup +$X$sub 2$$sup -$ species. The small alkali metal effect on the transition energies is in accord with an ionic model of polarizable ion pairs, with the exception of cesium, which is capable of inner shell bonding and red-shifting the

<17>

<17> CONT.
transitions from their expected positions. In addition, a very strong 227 nm absorption in bromine and a strong 254, 286 nm doublet in iodine experiments are attributed to molecular halogen aggregates. (auth)

EDB SUBJECT CATEGORY: EDB-400201

<18>
Angelini, P.; Adair, H.L., Oak Ridge National Lab., Tenn. (USA)

In Preparation of $sup 147$Pm metal and the determination of the melting point and phase transformation temperatures **
ERA-01:026076;INS-76:018743;EDB-76:074961; (Jul 1976)
ORNL/TM--4975

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1;DISTILLATION;MELTING POINTS: Q1;PHASE TRANSFORMATIONS: Q1;PROMETHIUM: T1;PROMETHIUM 147;PROMETHIUM OXIDES;QUARTZ;REDUCTION;THORIUM;VERY HIGH TEMPERATURE

ABSTRACT: The promethium metal used in the determination of the melting point and phase transformation temperatures was prepared by reduction of promethium oxide with thorium metal at 1600$sup 0$C and distilling the promethium metal into a quartz dome. The melting point and phase transformation temperatures of promethium metal were found to be 1042 +- 5$sup 0$C and 890 +- 5$sup 0$C, respectively. The ratio for the heat of the high-temperature transformation to the heat of fusion was determined to be 0.415.

EDB SUBJECT CATEGORY: EDB-360104;400703
INIS CATEGORY: B22;D13

<19>
Angerer, G. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik) ** Jaeger, T.A. (comp.)

Computational simulation of cladding motion after melting including resolidification processes In Structural mechanics in reactor technology. Vol. 1 **
AIX-08:287004;ERA-02:024766;EDB-77:049700; (1975)
North-Holland

SUBJECT DESCRIPTORS: COMPUTER CALCULATIONS;DRAG;FLOW BLOCKAGE: Q2;FUEL CANS;FUEL-CLADDING INTERACTIONS;INTERNAL FRICTION;LMFBR TYPE REACTORS: T1;LOSS OF FLOW: M2,Q1;MELTING;MOTION;REACTOR ACCIDENTS;S CODES;SIMULATION;SOLIDIFICATION;VISCOSITY

<19> CONT.

ABSTRACT: During flow coastdown or reactivity accidents in LWRs the reactor core may reach a condition where the cladding of the fuel pin starts to melt. The following cladding relocation influences reactor reactivity and core thermohydraulics. Plugging of coolant channels, e.g., may reduce dramatically the possibility of post accident heat removal in these channels. For this reason it is highly desirable to simulate and analyze cladding relocation. Due to the complexity of the problem a computer program is required. The code CMOT is an attempt to serve this purpose. Results are presented of code applications to an unprotected flow coastdown accident in a LMFBR. They show that due to the sodium vapor distribution in the voided core, upward flow of molten cladding may occur. This agrees with the observations made in experiments. But if the cladding plugs, the cross-section sodium vapor flow is inhibited and downward motion of additional molten cladding takes place.

EDB SUBJECT CATEGORY: EDB-220900;210500
INIS CATEGORY: C52

<20>

Antonov, B.D. (AN SSSR, Sverdlovsk. Inst. Ehlektrokhimii)

X-ray diffraction study into molten bromides and iodides of alkali metals AIX-07:270138;EDB-77:019325; Zh. Strukt. Khim. (ZSTKA) 16:(3):501-503 (May 1975)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS: T1;BROMIDES: T3;CRYSTALLOGRAPHY;IODIDES: T2;ION DENSITY;MOLTEN SALTS;STRUCTURAL CHEMICAL ANALYSIS;X-RAY DIFFRACTION: Q1,Q2,Q3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<21>

Ardashnikova, E.I.; Borzenkova, M.P.; Novoselova, A.V.; Batsanova, L.R.; Chuvaev, V.F. (Moskovskij Gosudarstvennyj Univ. (USSR))

Study of KBe$sub 2$F$sub 5$-DyF$sub 3$ cross-section of KF-BeF$sub 2$-DyF$sub 3$ ternary system and some properties of this cross section glasses AIX-08:320577;EDB-77:113818; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 11:(12):2169-2174 (Dec 1975)

SUBJECT DESCRIPTORS: BERYLLIUM FLUORIDES: T1;DENSITY;DIFFERENTIAL THERMAL ANALYSIS;DYSPROSIUM

<21>

<21> CONT.
FLUORIDES: T2;FLUORINE 19;GLASS;HYGROSCOPICITY;INFRARED SPECTRA;NUCLEAR MAGNETIC RESONANCE;PHASE DIAGRAMS: Q1,Q2,Q3;POTASSIUM FLUORIDES: T3;SOLUBILITY;X-RAY DIFFRACTION

ABSTRACT: A study has been made of the section KBe$sub 2$F$sub 5$-DyF$sub 3$ of the ternary system KF-BeF$sub 2$-DyF$sub 3$ by methods of differential-thermal and X-ray diffraction analyses. Glassy phases were studied by the NMR method, infrared spectroscopy and differential-thermal analysis. The phase diagram of the section was plotted. In the study of the section a wide range of glassy state was found (o-22 mol.% DyF$sub 3$) which corresponds to the lowest temperatures of the liquidus and primary crystallization of phases containing beryllium. Most stable (with respect to crystallization) glasses of the section are in the composition range of 10-20 mol.% DyF$sub 3$. It has been found that the maximum of the dependence of the second momentum of the $sup 19$F-NMR spectrum on the glass composition coincides with the maximum of a similar dependence of the density of glasses. Both maxima correspond to the point with the minimum temperature of the liquidus in the phase diagram of the section. Glasses containing 10-20 mol.%DyF$sub 3$ are most resistant against moisture. Glasses containing agglomerates of KBe$sub 2$F$sub 5$ are more hygroscopic and soluble.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<22>
Arnol'dov, M.N.; Bogdanov, Yu.V.; Ivanovskii, M.N.; Morozov, V.A.

Hydrogen solubility in liquid cesium
AIX-08:283271;EDB-77:043770; Izv. Akad. Nauk SSSR, Met. (IZNMA) (4):30-32 (Jul 1976)

SUBJECT DESCRIPTORS: ACCURACY;CESIUM: T1;COOLING;EQUATIONS;HEATING;HIGH TEMPERATURE;HYDROGEN: T2;LIQUID METALS;LOW PRESSURE;QUANTITY RATIO;SATURATION;SOLUBILITY: Q2;SOLVENT PROPERTIES: Q1;THERMAL ANALYSIS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104;400201
INIS CATEGORY: B22

<23>
Arrance, F.C.; Plizga, M.J., Douglas Aircraft Co., Inc., Newport Beach, Calif. (USA). Astropower Lab.

In Stable inorganic matrix materials for high temperature batteries. Final report No. 1, 2 June 1967--2 February 1968 ** EDB-76:059523; (Aug 1968) AD--676106

SUBJECT DESCRIPTORS: ALUMINATES;ALUMINIUM NITRIDES;BATTERY SEPARATORS: T2,Q1;CALCIUM COMPOUNDS;DESIGN;ELECTRIC CONDUCTIVITY;ELECTRIC-POWERED VEHICLES;HIGH TEMPERATURE;INORGANIC COMPOUNDS;IONIC CONDUCTIVITY;LITHIUM;LITHIUM CHLORIDES;LITHIUM-SULFUR BATTERIES: T1;MAGNESIUM COMPOUNDS;MAGNESIUM OXIDES;MATERIALS: Q2;MOLTEN SALTS;PHYSICAL PROPERTIES;POTASSIUM CHLORIDES;THORIUM OXIDES;ZIRCONATES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250903

<24>
Arsent'ev, P.P.; Vinogradov, B.G. (Moskovskij Inst. Stali i Splavov (USSR))

Viscosity characteristics of the iron-chromium-nickel melts EDB-76:048720; Izv. Vyssh. Uchebn. Zaved., Chern. Metall. (IVUMA) (3):14-17 (Mar 1975)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;CHEMICAL BONDS;CHEMICAL COMPOSITION;CHROMIUM ALLOYS: T1;DENSITY;ENTROPY;FREE ENERGY;IRON BASE ALLOYS: T2;LIQUID METALS;NICKEL ALLOYS: T3;PHASE DIAGRAMS;PHASE TRANSFORMATIONS;QUANTITY RATIO;VISCOSITY: Q1,Q2,Q3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<25>
Asher, R.C.; Davies, D.; Beetham, S.A. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment)

Some observations on the compatibility of structural materials with molten lead AIX-08:332062;ERA-03:012851;EDB-78:021883; Corros. Sci. (CRRSA) 17:(7):545-557 (1977)

SUBJECT DESCRIPTORS: CAST IRON;CERAMICS: T3;COATINGS;COMPATIBILITY;COOLANTS;CORROSION: Q3;CORROSION INHIBITORS;CORROSION PROTECTION;CORROSIVE EFFECTS:

<25>

<25> CONT.
Q1;EMBRITTLEMENT: Q2;FILMS;LEAD: T1;LIQUID METAL COOLED REACTORS;LIQUID METALS;MASS TRANSFER;METALLURGICAL EFFECTS: Q1;MOLYBDENUM: T2;OXIDES;REACTOR COMPONENTS;SOLUBILITY;TITANIUM

ABSTRACT: Exploratory experiments have been carried out relating to the use of molten lead as a coolant in advanced nuclear reactors. It has been found that the attack of molten lead on structural materials is qualitatively related to the solubility of the solid in the lead. The attack can be greatly reduced by the presence of a protective oxide film on the solid, and the ease of formation of such a film depends on the nature of the solid and the oxidizing potential of the lead. The effectiveness as an 'inhibitor' of titanium dissolved in the lead has been confirmed. Mass transfer has been shown to be very inefficient, at least under the experimental conditions used, and reasons for this are discussed. A number of ceramic materials have been shown to be very resistant. A cast iron exhibited 'growth'. With two exceptions a range of coated materials showed unsatisfactory behaviour. An exploratory experiment on the susceptibility of molybdenum to liquid metal embrittlement did not result in failure of the specimen.

EDB SUBJECT CATEGORY: EDB-360105;220300
INIS CATEGORY: B15

<26>
Babayan, G.G.; Mkrtchyan, R.F.; Ter-Arakelyan, K.A. (Erevanskij Gosudarstvennyj Univ. (USSR))

Study of chemical interaction in Pb$sub 3$AlF$sub 6$-LaF$sub 6$-Ca$sub 3$AlF$sub 6$ system AIX-08:285971;EDB-77:043570; Arm. Khim. Zh. (AYKZA) 10::847-849 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM FLUORIDES: T1;CALCIUM FLUORIDES: T2;CHEMICAL REACTIONS: Q1,Q2,Q3,Q4;CRYSTALS;HIGH TEMPERATURE;LANTHANUM FLUORIDES: T4;LEAD FLUORIDES: T3;PHASE DIAGRAMS;THERMAL ANALYSIS;X-RAY SPECTROSCOPY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360101
INIS CATEGORY: B12

<27>
Babikova, T.F.; Sokolovskii, Yu.S.; Sroelova, M.M.

Interaction of uranyl chloride with zirconium tetrachloride in the melt of sodium chloride and potassium chloride AIX-08:324057;EDB-77:146936; At. Energ. (USSR) (AENGA) 40:(5):412 (May 1976)

SUBJECT DESCRIPTORS: CHEMICAL ANALYSIS;CHEMICAL REACTION KINETICS: Q1,Q2;COMPLEXES;HIGH TEMPERATURE;MOLTEN SALTS;POTASSIUM CHLORIDES;QUANTITY RATIO;SODIUM CHLORIDES;SPECTROPHOTOMETRY;URANYL CHLORIDES: T2;ZIRCONIUM CHLORIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<28>
Baer, Y.; Zuercher, C.

Electronic structure of CeN studied by x-ray-photoemission spectroscopy INS-78:000983;EDB-78:016935; Phys. Rev. Lett. (PRLTA) 39:(15):956-959 (10 Oct 1977)

SUBJECT DESCRIPTORS: CERIUM;CERIUM NITRIDES: T1;D STATES;ELECTRONIC STRUCTURE: Q1;F STATES;PHOTOELECTRON SPECTROSCOPY;PHOTOEMISSION;VALENCE;X-RAY SPECTRA

ABSTRACT: The core levels and the valence-band region CeN have been studied by x-ray photoemission. Clear evidence is found that Ce has a mixed valence between 3 and 4 in this compound. A comparison of the 4d spectra of the Ce pnictides and of pure Ce at different temperatures leads to the conclusion that the $alpha$ phase of this metal corresponds very likely to an intermediate valence.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<29>
Baernighausen, H.

In Mixed valence rare-earth halides and their unusual crystal structures ** AIX-07:257159;EDB-77:013440; (1976) AED-Conf--76-033-001

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;COORDINATION NUMBER;CRYSTAL STRUCTURE: Q1,Q2;DYSPROSIUM CHLORIDES: T1;HALIDES;MONOCRYSTALS;RARE EARTH

<29>

<29> CONT.
COMPOUNDS;SOLIDS;VALENCE;YTTERBIUM CHLORIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<30>
Bagai, R.K.; Warrier, A.V.R. (Solid State Physics Lab., Delhi (India))

Optical absorption spectrum of UO$sub 2$2$sup +$ doped LiF AIX-08:338785;EDB-78:022026; J. Phys., C (London) (JPSOA) 10:(5):L437-L439 (14 Aug 1977)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1,Q2;ANIONS;CRYSTAL LATTICES;DOPED MATERIALS;ELECTRONIC STRUCTURE;LITHIUM FLUORIDES: T1;MOLECULAR ORBITAL METHOD;MOLECULAR STRUCTURE;MONOCRYSTALS;URANIUM OXIDES: T2;URANYL COMPOUNDS

ABSTRACT: The absorption spectrum of LiF single crystals doped with UO$sub 2$$sup 2+$ ion is measured in the region extending into the vacuum ultraviolet. It is proposed that the UO$sub 2$$sup 2+$ ion enters the lattice substitutionally at the Li$sup +$ site with the oxygen directed along <111>. The observed spectrum is interpreted on the basis of the molecular orbital scheme given by McGlynn and Smith (J. Molec. Spectrosc.; 6:164 (1961)).

EDB SUBJECT CATEGORY: EDB-360603;360204
INIS CATEGORY: A13

<31>
Balashov, D.B.; Ikhenov, D.A.

Nuclear quadrupole resonance spectra of HgCl$sub 2$ under pressure AIX-08:338791;EDB-78:022016; Fiz. Tverd. Tela (FTVTA) 17:(9):2693-2696 (Sep 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;CHLORINE 35: T1;CRYSTAL-PHASE TRANSFORMATIONS: Q2;LOW TEMPERATURE;MEDIUM TEMPERATURE;MERCURY CHLORIDES: T2;NUCLEAR QUADRUPOLE RESONANCE: Q1;PRESSURE DEPENDENCE;TEMPERATURE DEPENDENCE;VERY HIGH PRESSURE

ABSTRACT: The aim of the paper is to study the spectrum of nuclear quadrupole resonance (NQR) observed on Cl$sup 3$/H5 nuclei in a HgCl$sub 2$ polycrystalline powder. The spectrum has been studied at hydrostalic pressures up to 16.000 kg/cm$sup 2$ and at temperatures of 256.5, 312.0, and 356.0

<31> CONT.
deg K using a previously developed high-pressure apparatus and a stationary NQR spectrometer. The accuracy of the measurements of the NQR frequency has been about 2KHz and of the pressure, about 50 kg/cm$sup 2$. The temperature stabilized within +-0.1 deg K. The spectrum consists of two absorption lines due to the crystallographic nonequivalence of the position of chlorine atoms of each molecule in the lattice. Both frequencies decrease with temperature and decrease linearly with pressure. At pressures 6.500 to 6.900 kg/cm$sup 2$ rising with temperature, the frequency isothermals exhibit a sudden change accompanied by a decrease in slope at higher pressures; this fact points to the existence of a phase transition.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: A13

<32>
Balej, J. (Ceskoslovenska Akademie Ved, Prague)

Standard potential of sodium amalgam at 25$sup 0$C
AIX-08:286395;EDB-77:068512; Electrochim. Acta (ELCAA) 21:(11):953-956 (Nov 1976)

SUBJECT DESCRIPTORS: ELECTROLYTIC CELLS;ELECTROMOTIVE FORCE: Q1,Q2;MERCURY ALLOYS: T1;REACTION KINETICS;SODIUM;SODIUM ALLOYS: T2;THERMODYNAMIC PROPERTIES: Q1,Q2

ABSTRACT: From a set of critically selected literary data on the emf's of concentration cells consisting of sodium metal and sodium amalgam in a sodium salt non-aqueous electrolyte a value of E$sup 0$sub(Na(Hg)/Na+) = -1.9558$sub 4$ V was calculated for the standard equilibrium potential of diluted liquid sodium amalgam at 25$sup 0$C. The standard state of the amalgam was derived from an amalgam at infinite dilution where fsub(Na)$Yields$ 1.0 for xsub(Na)$Yields$ 0. The activity coefficient of sodium in the amalgam at an arbitrary composition, corresponding to this standard state, is obtained from the expression lg fsub(Na(Hg)) = 16.393 xsub(Na).

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<33>

<33>
Balourdet, Marcel; Malmejac, Yves; Desre, Pierre, CEA Centre d'Etudes Nucleaires de Grenoble, 38 (France). Dept. de Metallurgie

In Thermodiffusion measurements in liquid alloys and electron transport heat calculations in the case of almost-free electrons ** AIX-08:292740;EDB-77:074275; (17 Jun 1976) CEA-CONF--3581

ABSTRACT: The thermodiffusion of antimony, indium and silver in pure liquid tin was studied and the transport heat of these tracers was determined. The thermodiffusion of silver in liquid tin presents an inversion at about 600 deg C. This seems to result from the competition between two phenomena; the first one is intrinsic and proportional to the absolute temperature, the other one (electronic) is proportional to the square of this temperature. The thermodiffusion of Ag in liquid Ag-Ge of eutectic concentration was also studied.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<34>
Barbanel', Yu.A.; Kotlin, V.P.; Kolin, V.V. (Radievyj Inst., Leningrad (USSR)) ** AN SSSR, Moscow; Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow

Absorption spectra of curium (3) chloride complexes In All-union conference on chemistry of transplutonium elements (americium, curium, berkelium, californium) ** AIX-08:295437;EDB-77:075240; (1976) INIS-mf--3283

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;AMERICIUM CHLORIDES;CESIUM COMPOUNDS;CHLORIDES;CURIUM COMPLEXES: T1;HIGH TEMPERATURE;LANTHANUM CHLORIDES;LOW TEMPERATURE;SODIUM COMPOUNDS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<35>
Barker, M.G.; Hooper, A.J. (Nottingham Univ. (UK))

Reactions of liquid sodium with transition-metal oxides. VIII. The oxides of chromium-(III), -(IV), and -(VI) and disodium chromium(VI) tetraoxide AIX-07:272368;EDB-77:026444; J. Chem. Soc. (London), Dalton Trans. (JCDTB) (12):1093-1095 (1976)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS: Q1,Q2,Q3;CHROMATES: T2;CHROMIUM OXIDES: T1;CORROSION;HIGH TEMPERATURE;LIQUID METALS;MEDIUM TEMPERATURE;OXYGEN;SODIUM: T3;SODIUM COMPOUNDS;SODIUM OXIDES;STRUCTURAL CHEMICAL ANALYSIS;X-RAY DIFFRACTION

ABSTRACT: The reactions of the chromium oxides CrO$sub 3$, CrO$sub 2$, Cr$sub 2$O$sub 3$, and Na$sub 2$CrO$sub 4$ with liquid sodium have been studied at up to 600$sup 0$C, in some cases using differential thermal analysis. The reaction products have been examined by powder X-ray crystallography. The ternary oxide NaCrO$sub 2$ is formed in each case in which reaction took place, and this compound does not react further with dissolved oxygen in sodium up to the solubility limit. It is shown that the reaction of CrO$sub 3$ with liquid sodium does not yield Na$sub 2$CrO$sub 3$ as previously thought; this error is rationalised in terms of the experimental procedure, and improved techniques are identified.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<36>
Bas'kova, N.A.; Majer, A.A.; Karapet'yants, M.Kh.

Thermodynamic properties of some rare earth carbonates and yttrium carbonates EDB-76:036711; Tr. Mosk. Khim.-Tekhnol. Inst. (TMKIA) (81):8-10 (1974)

SUBJECT DESCRIPTORS: ENTROPY;EQUATIONS;FORMATION FREE ENERGY;FORMATION HEAT;SOLUBILITY;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;THERMODYNAMICS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B12

<37>

<37>
Bauman, H.F., Lockheed Missiles and Space Co., Palo Alto, Calif. (USA). Materials Sciences Lab.

In Lithium anode limited-cycle battery investigation. Quarterly technical progress report No. 5 ** EDB-76:047722; (May 1966) AD--483237

SUBJECT DESCRIPTORS: DESIGN;LITHIUM;METAL-NONMETAL BATTERIES: M1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250901;400201

<38>
Bauman, H.F.; Chilton, J.E.; Mauri, R.E., Lockheed Missiles and Space Co., Palo Alto, Calif. (USA). Materials Sciences Lab.

In Lithium anode limited-cycle battery investigation. Quarterly technical progress report No. 3 ** EDB-76:047821; (Nov 1965) AD--474219

SUBJECT DESCRIPTORS: ANODES: Q1;CARBONIC ACID ESTERS;CATHODES: Q1;COBALT FLUORIDES;COPPER FLUORIDES;ELECTRIC CURRENTS;ELECTRIC POTENTIAL;ELECTROLYTES;FABRICATION;LITHIUM;MATERIALS;METAL-NO METAL BATTERIES: M1;PERFORMANCE;POLARIZATION;REACTION HEAT;TEMPERATURE DEPENDENCE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250903

<39>
Bayanov, A.P.; Frolov, Yu.A.; Afanas'ev, Yu.A.

Investigation into thermodynamic properties of Ce-Mg melts EDB-76:042263; Izv. Akad. Nauk SSSR, Met. (IZNMA) (3):91-95 (May 1975)

SUBJECT DESCRIPTORS: CERIUM ALLOYS: T1;LIQUID METALS;MAGNESIUM ALLOYS: T2;PHASE DIAGRAMS;THERMODYNAMIC PROPERTIES: Q1,Q2;VAPOR PRESSURE;VERY HIGH TEMPERATURE

ABSTRACT: The method of transfer in an argon current was used for studying the pressure of saturated steam over liquid alloys of Ce-Mg of nine concentrations in a temperature range of 1083 to 1133$sup 0$K, for a magnesium content of 0.134 to 0.926 at.%. Calculations are presented of thermodynamic activities of the cerium and magnesium, their partial-molar and integral Gibbs energies, and the enthalpy and entropy of

<39> CONT.
the mixture. The values found show negative deviations from the laws of the behavior of ideal solutions. The minimum of the integral thermodynamic values shows a shift towards magnesium.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<40>
Bayanov, A.P.; Ganchenko, E.N.; Afanas'ev, Y.A. (Kubanskij Gosudarstvennyj Univ., Krasnodar (USSR))

Investigation into neodymium chloride state in equilibrium with metal in eutectic melt of potassium- and lithium chlorides
AIX-08:317665;EDB-77:133380; Zh. Fiz. Khim. (ZFKHA) 49:(9):2452 (Sep 1975)

SUBJECT DESCRIPTORS: CHEMICAL STATE: Q1,Q2,Q3;ELECTRIC BATTERIES;ELECTROMOTIVE FORCE;EQUILIBRIUM;EUTECTICS;HIGH TEMPERATURE;LITHIUM CHLORIDES: T1;MOLTEN SALTS;NEODYMIUM CHLORIDES: T2;POTASSIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<41>
Becker, R.; Lentz, A.; Sawodny, W. (Ulm Univ. (F.R. Germany). Abt. Anorganische Chemie)

Vibrational spectra and force constants of the elpasolites Cs$sub 2$KMF$sub 6$ (M=Sc, Y, La, Gd, Yb)
AIX-07:262488;EDB-77:031452; Z. Anorg. Allg. Chem. (ZAACA) 420:(3):210-218 (1976)

SUBJECT DESCRIPTORS: CESIUM FLUORIDES: T1;CHEMICAL PREPARATION;FLUORIDES;GADOLINIUM FLUORIDES: T2;INFRARED SPECTRA: Q1,Q2,Q3,Q4,Q5,Q6,Q7;LANTHANUM FLUORIDES: T3;LATTICE VIBRATIONS;POTASSIUM FLUORIDES: T6;RAMAN EFFECT;SCANDIUM FLUORIDES: T5;VIBRATIONAL STATES;YTTERBIUM FLUORIDES: T4;YTTRIUM FLUORIDES: T7

ABSTRACT: The vibrational spectra of the elpasolites Cs$sub 2$KMF$sub 6$ (M=Sc, Y, La, Gd, Yb) have been recorded and assigned including the lattice vibrations. The vibrational frequencies thus obtained were used for the calculation of

<41>

<41> CONT.
MVFF force constants. The values of the stretching force constants are discussed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<42>
Behl, W.K., Army Electronics Command, Fort Monmouth, N.J. (USA)

In Electrode reactions in molten sodium nitrate--barium nitrate eutectic at 350 degrees C ** EDB-77:073970; (Feb 1970) AD--703842

SUBJECT DESCRIPTORS: BARIUM NITRATES;ELECTRIC BATTERIES: T1;ELECTROLYTES: Q1;LEAD;MOLTEN SALTS;SILVER;SODIUM NITRATES;VOLTAMETRY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250903

<43>
Belov, S.F.; Gladneva, A.F. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

Density, viscosity, electric conductivity and meltability of Na$sub 3$AlF$sub 6$-La$sub 2$O$sub 3$ and Na$sub 3$AlF$sub 6$-Sm$sub 2$O$sub 3$ systems AIX-08:295259;EDB-77:056159; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (2):110-113 (1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<44>
Belyi, M.U.; Kushnirenko, I.Ya. ** AN Ehstonskoj SSR, Tallin

Spectral properties of impurity molecules of the Csub(3v) symmetry groups in solid solutions of halide salts In 11. european congress on molecular spectroscopy. Abstracts ** EDB-76:060598; (1973) INIS-mf--2069

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;ANIONS;BORATES;CESIUM CHLORIDES: T1;EMISSION SPECTRA;IMPURITIES;LUMINESCENCE;SOLID SOLUTIONS;SPECTROSCOPY: Q1;TELLURATES

<44> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<45>
Beresneva, T.I.; Denisova, L.A.; Fedorova, N.V.; Ketov, A.N. (Permskij Farmatsevticheskij Inst. (USSR))

Me$sub 2$ZrCl$sub 6$--H$sub 2$(Me-Na,K,Rb,Cs) system
EDB-76:036676; Zh. Neorg. Khim. (ZNOKA) 20:(2):377-381 (Feb 1975)

SUBJECT DESCRIPTORS: CHEMICAL ANALYSIS;CHEMICAL REACTION KINETICS;HYDROGEN;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;REDUCTION;TEMPERATURE DEPENDENCE;THERMAL ANALYSIS;X-RAY DIFFRACTION;ZIRCONIUM CHLORIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<46>
Berezhinsky, L.I.; Gnatovskaya, V.N.; Lisitsa, M.P.; Tarasov, G.G.; Khalimonova, I.N. ** AN Ehstonskoj SSR, Tallin

Temperature effect on vibrational spectra of the impurity molecular ions in alkali halides In 11. european congress on molecular spectroscopy. Abstracts ** EDB-76:060599; (1973) INIS-mf--2069

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;CESIUM CHLORIDES: T1;CRYSTAL LATTICES;IMPURITIES;IONS;TEMPERATURE DEPENDENCE;VIBRATIONAL STATES: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<47>

<47>
Berezin, B.Y.; Kats, S.A.; Chekhovskoi, V.Y.

Spectral emissivities of molten refractory metals
ERA-02:022873;EDB-77:043793; High Temp. (USSR) (Engl. Transl.) (HITEA) 14:(3):448-452 (Nov 1976)

SUBJECT DESCRIPTORS: EMISSIVITY: Q1,Q2,Q3,Q4,Q5;LIQUID METALS;MOLYBDENUM: M1;NIOBIUM: M2;RUTHENIUM: M5;TITANIUM: M4;VANADIUM: M3;VISIBLE RADIATION

ABSTRACT: Emissitivity measurements at 0.65 mu have been made for liquid molybdenum, niobium, vanadium, titanium, and ruthenium at their melting points; the specimens were heated by levitation, with the brightness-temperature measurement at the melting point and the calculation of epsilon/sub lambda , 1/ from Wien's formula. (AIP)

EDB SUBJECT CATEGORY: EDB-360104

<48>
Berndt, K.

In Studies of the electronic structure of simple metals and their alloys with the aid of compton scattering and positron annihilation using lithium, magnesium, lithium-magnesium and aluminium-zinc as examples ** AIX-07:243024;EDB-76:071212; (1973) Martin-Luther-Universitaet

SUBJECT DESCRIPTORS: ALUMINIUM BASE ALLOYS: T1;ANNIHILATION;BINARY ALLOY SYSTEMS;COMPTON EFFECT;COMPTON SPECTROMETERS;CROSS SECTIONS;ELECTRONIC STRUCTURE: Q1,Q2,Q3;ELECTRONS;FERMI LEVEL;LITHIUM: T2;MAGNESIUM;MAGNESIUM BASE ALLOYS: T3;VALENCE

ABSTRACT: The results show that the positron annihilation is an appropriate method for receiving information on the Fermi levels of simple metals. Concerning the global electronic structure of alloys, however, its applicability is limited, particularly in the case of Al-Zn, whereas the local electronic structure can be determined. The Compton profiles were calculated for the metals and compared with experimental results. The influence of the potential Fourier components, of the orthogonalization properties and of interactions on the electronic structure was studied. A first insight into the electronic structure of Zn-Al was gained.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<49>
Berndt, U.; Maier, D.; Keller, C.

Phase equilibrium in interlanthanide oxides systems
EDB-76:042336; J. Solid State Chem. (JSSCB) 16:(1-2):189-195 (1 Jan 1976)

SUBJECT DESCRIPTORS: LANTHANUM OXIDES: M1;PHASE STUDIES: Q1,Q2,Q3;RARE EARTH OXIDES: M2;TEMPERATURE DEPENDENCE;VERY HIGH TEMPERATURE;YTTRIUM OXIDES: M3

ABSTRACT: Investigations in the quasibinary systems LaO$sub 1$.$sub 5$--REO$sub 1$.$sub 5$ (Ce--Lu, Y) and YO$sub 1$.$sub 5$--REO$sub 1$.$sub 5$ (La--Lu) at 1250 to 1550$sup 0$C have shown that besides a perovskite compound ABO$sub 3$ (for A = La $Yields$ B = Y, Ho--Lu) mixed oxide phases with hexagonal (A-type), monoclinic (B-type) and cubic (C-type) structures of varying phase widths exist. All four phases are only existent in the LaO$sub 1$.$sub 5$--HoO$sub 1$.$sub 5$ (YO$sub 1$.$sub 5$) and PrO$sub 1$.$sub 5$--LuO$sub 1$.$sub 5$ systems. The mutual solubility of the individual lanthanide oxides strongly depends on the difference of the ionic radii of the elements, in general, increasing with decreasing difference. Maximum phase widths of B-type mixed oxides at 1550$sup 0$C occur at RE = Tb for the LaO$sub 1$.$sub 5$--REO$sub 1$.$sub 5$ systems and at RE = Nd for the YO$sub 1$.$sub 5$--REO$sub 1$.$sub 5$ systems. At 1400$sup 0$C up to 9 mole percent EuO$sub 1$.$sub 5$ may be incorporated in the perovskite compound PrLuO$sub 3$. For the LaYO$sub 3$--LaErO$sub 3$ series a maximum phase width with regard to the La:(Y + Er) ratio is to be observed at the 1:1 composition.

EDB SUBJECT CATEGORY: EDB-360202

<50>
Berndt, U.; Tanamas, R.; Keller, C.

Ternary UO$sub 2$--UO$sub 3$--EuO$sub 1$ $sub 5$(EuO) system and investigation of Eu(II)--actinide(IV)--perovskites
INS-76:013206;EDB-76:042342; J. Solid State Chem. (JSSCB) 17:(1-2):113-120 (Feb 1976)

SUBJECT DESCRIPTORS: BURNABLE POISONS;ELECTROMOTIVE FORCE;EUROPIUM OXIDES: T3;MIXTURES;PHASE DIAGRAMS: Q1,Q2,Q3;THERMODYNAMIC PROPERTIES;URANIUM DIOXIDE: T1;URANIUM TRIOXIDE: T2;VALENCE;VERY HIGH TEMPERATURE

ABSTRACT: At 1250$sup 0$C, the following single-phase regions have been detected in the UO$sub 2$--UO$sub 3$--EuO$sub 1$.$sub 5$ region of the ternary uranium--europium--oxygen system: (a) $beta$--U$sub 3$O$sub 8$: no solubility for

<50>

<50> CONT.
EuO$sub 1$.$sub 5$ could be observed. (b) Fluorite phase: the oxygen limiting compositions are (U,Eu)O$sub 2$.$sub 25$ and (U,Eu)O$sub 1$.$sub 7$$sub 9$, respectively; the range of the stoichiometric composition MO$sub 2$ is between UO$sub 2$ and (U$sub 0$.$sub 36$,Eu$sub 0$.$sub 64$)O$sub 2$, a fluorite phase with U(VI) is only obtainable for the substoichiometric region from (U$sub 0$.$sub 32$, Eu$sub 0$.$sub 6$$sub 8$) O$sub 1$.$sub 9$$sub 8$ to (U$sub 0$.$sub 24$, Eu$sub 0$.$sub 76$)O$sub 1$.$sub 86$. (c) Rhombohedral phase: it extends from UO$sub 3$.6EuO$sub 1$.$sub 5$ on the UO$sub 3$--EuO$sub 1$.$sub 5$ side of the system to the 0.7UO$sub 2$.0.3EuO$sub 1$.$sub 5$--0.6UO$sub 2$.0.4EuO$sub 1$.$sub 5$ line on the UO$sub 2$--EuO$sub 1$.$sub 5$ side, showing an increased phase width with lowering of the uranium valency. (d) Monoclinic B--EuO$sub 1$.$sub 5$: no solubility for UO/sub 2-x/ could be observed. The first lanthanide--actinide perovskite compounds, orthorhombic EuUO$sub 3$, and EuNpO$sub 3$ could be prepared by different methods; attempts to prepare similar ternary oxides containing Th(IV), Pu(IV), and Am(IV), however, failed. EMF measurements have proven that cubic C-EuO$sub 1$.$sub 5$ is the thermodynamically stable EuO$sub 1$.$sub 5$-modification below 1050 +- 20$sup 0$C.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<51>
Bernstein, E.R.; Meredith, G.R., Colorado State Univ., Fort Collins (USA). Dept. of Chemistry

In Vibrational spectra of transition metal hexafluoride crystals. I. Orthorhombic MoF6, WF6, UF6 neat crystals. Technical report ** ERA-03:001204;EDB-77:146753; (Apr 1977) AD-A--039765

SUBJECT DESCRIPTORS: CRYSTALS;MOLECULAR STRUCTURE: Q1,Q2,Q3;MOLYBDENUM FLUORIDES: T1;RAMAN SPECTRA;TUNGSTEN FLUORIDES: T2;URANIUM HEXAFLUORIDE: T3

ABSTRACT: Neat crystal Raman spectra of orthorhombic MoF6, WF6, and UF6 are presented and discussed. The neat crystal spectra are interpreted in terms of an internal-external mode separation and a conventional factor group analysis. In general, these data lead to four essential conclusions concerning hexafluoride crystals: (a) Fermi resonance plays an important role in producing the observed energy and intensity differences in this series; (b) k = 0 exciton structures are remarkably similar in the three crystals; (c) similarities and differences between these solids can be directly correlated with molecular parameters such as dipole

<51> CONT.
derivatives, polarizabilities, etc.; and (d) phonons (external modes) can be neatly separated into rotational and translational normal modes.

EDB SUBJECT CATEGORY: EDB-400201;400702

<52>
Bernstein, E.R.; Meredith, G.R., Colorado State Univ., Fort Collins (USA). Dept. of Chemistry

In Vibrational spectra of transition metal hexafluoride crystals. III. Exciton band structures of MoF$sub 6$, WF$sub 6$, and UF$sub 6$. Technical report ** INS-77:017680;ERA-03:001606;EDB-77:148576; (Apr 1977) AD-A--039793

SUBJECT DESCRIPTORS: BAND THEORY;CRYSTALS;FERMI LEVEL;MOLYBDENUM FLUORIDES: T1;TUNGSTEN FLUORIDES: T2;URANIUM HEXAFLUORIDE: T3;VIBRATIONAL STATES: Q1,Q2,Q3

ABSTRACT: This paper presents the overall vibrational band structure of MF6 crystals based on the previously discussed two-particle, heavily doped mixed crystal, and neat crystal data in addition to dilute mixed crystal studies. Calculations of nu(2) and nu(5) bands based on a quadrupole-quadrupole intermolecular interaction model are determined to be in substantial agreement with the observations. The nu(1) bands are discussed in detail for a series of concentration studies, and it is possible to demonstrate that MoF$sub 6$ and WF$sub 6$ conform to the ideal mixed crystal model whereas crystals containing UF$sub 6$ do not. A consistent picture of gas-to-crystal shifts, resonance interactions, band shapes and structures, densities of exciton states, Fermi resonance, and simple multipolar interaction models emerges from these studies.

EDB SUBJECT CATEGORY: EDB-640302;400201;400702;360603
INIS CATEGORY: A12;B12;B13;B24

<53>
Bernstein, E.R.; Meredith, G.R., Princeton Univ., N.J. (USA). Dept. of Chemistry

In Interactions in inorganic molecular crystals - electronic spectra of ReF$sub 6$ pure and mixed crystals. Technical report, 1 Jul--31 Dec 1975 ** ERA-01:016800;EDB-76:042551; (25 Aug 1975) AD-A--014464

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1,Q2,Q3,Q4;ELECTRONIC STRUCTURE;JAHN-TELLER EFFECT;MAGNETIC PROPERTIES;RHENIUM

<53>

<53> CONT.
FLUORIDES: T1

ABSTRACT: Electronic absorption spectra of ReF$sub 6$ Quintet d1 are obtained for the pure crystal and UF$sub 6$, MoF$sub 6$, and WF$sub 6$ mixed crystals. The observed transition arises from an intra-configurational t2g to t2g promotion. The pure crystal is predicted to undergo a magnetic phase transition below ca. 1.5K. Pair spectra, two-molecule transitions, the ground state Jahn-Teller effect, linewidths, and vibrational assignments are discussed. The major mechanism for pair coupling and magnetic ordering is identified as superexchange through low lying delocalized charge transfer bands. These interactions are qualitatively discussed and energy localizing and delocalizing interactions are separated. (GRA)

EDB SUBJECT CATEGORY: EDB-400201;400702

<54>

Besmann, T.M.; Lindemer, T.B. (Oak Ridge National Lab., Tenn. (USA))

Thermodynamic assessment of the conversion of plutonium dioxide to plutonium monocarbide AIX-08:334259;EDB-77:137277; J. Nucl. Mater. (JNUMA) 67:(1):. 77-87 (1977)

SUBJECT DESCRIPTORS: CHEMICAL REACTION YIELD: Q2;EQUILIBRIUM;EVAPORATION;FREE ENERGY;OXYGEN;PHASE DIAGRAMS;PLUTONIUM;PLUTONIUM CARBIDES: T2;PLUTONIUM DIOXIDE: T1;REDUCTION: Q1;S CODES;SOLID SOLUTIONS;VERY HIGH TEMPERATURE

ABSTRACT: The equilibrium thermodynamics of the carbothermic reduction of PuO$sub 2$ to PuCsub(0.88) are reassessed in light of new thermodynamic values for the Pu-C-O system. Analysis of the thermodynamic data indicates that the PuCsub(x)Osub(y) phase can be successfully modeled by an ideal solid solution of PuCsub(0.88) and PuO. Equilibrium calculations show that oxygen-free monocarbide cannot be practically prepared by the direct carbothermic reduction of PuO$sub 2$ because of plutonium vaporization. These results imply that significant plutonium vaporization will occur in similarly reduced UO$sub 2$-PuO$sub 2$ mixtures unless the actinides are initially present as a solid solution. Equilibrium calculations also suggest that PuCsub(0.88) can be successfully prepared by a two-step method: the carbothermic reduction of PuO$sub 2$ to PuCsub(1.5) followed by the hydrogen reduction of PuCsub(1.5) to PuCsub(0.88).

EDB SUBJECT CATEGORY: EDB-050700;360201;400702
INIS CATEGORY: B12

<55>
Besmann, T.M.; Lindemer, T.B., Oak Ridge National Lab., Tenn. (USA)

In Thermodynamics of the conversion of plutonium dioxide to plutonium monocarbide **
INS-76:019934;ERA-02:001052;EDB-76:087272; (Jul 1976)
ORNL/TM--5510

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q2;EVAPORATION;HYDROGEN;PHASE DIAGRAMS: Q2,Q3;PLUTONIUM CARBIDES: T2;PLUTONIUM DIOXIDE: T1;PLUTONIUM OXIDES: T3;REDUCTION: Q1;THERMODYNAMICS

ABSTRACT: The present study contains an equilibrium thermodynamic analysis of the Pu--C--O system and a discussion from an equilibrium thermodynamic point of view of the direct carbothermic reduction and two-step carbothermic-hydrogen reduction of PuO$sub 2$ to PuC/sub 1-x/. Included are considerations of the partial pressures of the various species in the Pu--C--O and Pu--C--H systems, the process parameters required for conversion of the oxide to the carbide, and the loss of plutonium due to vapor species.

EDB SUBJECT CATEGORY: EDB-360201;050700
INIS CATEGORY: B23

<56>
Bhise, V.S.; Bonilla, C.F. ** Cooper, M.H. (ed.), American Nuclear Society, Hinsdale, Ill.; American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inc., New York; Energy Research and Development Administration, Washington, D.C. (USA); American Nuclear Society, Pittsburgh, Pa. Pittsburgh Section

Experimental vapor pressure and critical point of sodium In Proceedings of the international conference on liquid technology in energy production **
INS-77:015773;ERA-02:059296;EDB-77:138122; (Nov 1976)
CONF-760503--P2

SUBJECT DESCRIPTORS: CRITICAL PRESSURE: Q2;CRITICAL TEMPERATURE: Q2;LMFBR TYPE REACTORS: T1;REACTOR COOLING SYSTEMS: Q1;SODIUM: T2;THERMODYNAMIC PROPERTIES;VAPOR PRESSURE: Q2

ABSTRACT: The pressure tube method employed previously to determine the high temperature vapor pressure and the critical point of cesium, rubidium, and potassium, was improved and used on sodium. The critical pressure was determined directly as 256.4 bars (3719 psia) with a standard deviation of 0.09 percent. Vapor pressure was determined experimentally from 1255 K (1800 F) up to the critical point.

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<56> CONT.
The value selected for the critical temperature was 2503.3 K (4506 R), which is the lowest temperature at which the critical pressure was observed. Regression analysis showed that the data over the full range were slightly better fitted by LnP = 10.627840 to 11936.171/T to 0.03997216 LnT (for P in Bars and T in K) than without the LnT term. This equation has a standard deviation of 1.1 percent from the data points.

EDB SUBJECT CATEGORY: EDB-210500;360104
INIS CATEGORY: E35;B22

<57>
Bishop, E.C.; Ray, W.E. ** Hill, M.R. (comp.), Oak Ridge National Lab., Tenn. (USA)

Westinghouse Advanced Reactors Division In Mechanical properties test data for structural materials. Quarterly progress report for period ending April 30, 1977 **
ERA-03:004356;EDB-78:004438; (Jun 1977) ORNL--5287

SUBJECT DESCRIPTORS: LMFBR TYPE REACTORS;MECHANICAL PROPERTIES: Q1,Q2,Q3;REACTOR MATERIALS

ABSTRACT: Test programs are described involving basic specimen testing and tubular specimen testing of LMFBR type reactor materials. Sodium effects on mechanical properties of structural materials are also reported. (GHT)

EDB SUBJECT CATEGORY: EDB-360103;210500

<58>
Blander, M.; Curtiss, L.A.; Hsu, C.C.; Kucera, G.H.; Marr, J.J.; Papatheodorou, G.N.; Renner, T.A.; Saboungi, M.L.; Cafasso, F.A.; Eurris, L., Argonne National Lab., Ill. (USA)

In Chemical Engineering Division physical inorganic chemistry. Annual report, July 1975--June 1976 **
ERA-03:007120;INS-78:000287;EDB-78:009786; (1976) ANL--76-101

SUBJECT DESCRIPTORS: ANL;RESEARCH PROGRAMS

ABSTRACT: The thermal conductivity of acetonitrile vapor has been measured at temperatures between 338 and 387$sup 0$K and pressures between 100 and 1050 torr. The pressure dependence of the thermal conductivities indicates the presence of dimeric vapor species with an association constant given by RT ln K$sub 2$ (atm$sup -1$) = 5002 - 21.15 T. Molecular orbital studies of hydrogen-bonded methyl alcohol vapor complexes indicate that, the cyclic tetramer is especially stable. Preliminary calculations on trifluoroethanol indicate

<58> CONT.
that its dimer is more stable than that of methanol. Molecular dynamics calculations have been utilized to calculate the second-order coefficient of conformal ionic solution (CIS) theory. The results indicate that the repulsive part of the pair potential most commonly used for calculations on molten salts is inaccurate and that calculation of the CIS coefficient provides a sensitive test of pair potentials. Laser-Raman spectra of molten solutions of YCl$sub 3$ in CsCl, KCl and LiCl were obtained and compared with spectra of solids of known structure. The spectra at low concentrations of YCl$sub 3$ (X/sub YCl$sub 3$/ is less than 0.25) indicate an octahedrally coordinated YCl$sub 6$$sup 3-$ species. Raman and infrared spectra of claudetite and arsenolite were measured and compared with the spectra of vitreous and liquid As$sub 2$O$sub 3$, as well as with the As$sub 4$O$sub 6$ vapor molecules.The spectrum of claudetite has some resemblance to that of vitreous and liquid As$sub 2$O$sub 3$. Raman spectra of arsenous oxide indicate that the dimeric As$sub 2$O$sub 3$ species is present. The Raman spectra of aluminum chloride vapor (AlCl$sub 3$ and Al$sub 2$Cl$sub 6$ vapor molecules), provided nine new bands not observed before and permitted a more complete assignment and analysis of the structure of the species to be made. The Raman spectra of In(I), In(II) and In(III) chlorides indicate the presence of InCl, In(I)In(III)Cl$sub 4$ (In$sub 2$Cl$sub 4$), InCl$sub 3$, and In$sub 2$Cl$sub 6$ species in the vapors. (JRD)

EDB SUBJECT CATEGORY: EDB-400100;360100
INIS CATEGORY: B11;B21

<59>
Blasse, G. (Rijksuniversiteit Utrecht (Netherlands). Fysisch Lab.)

Vibrational fine structure in the uranium emission of Mg$sub 3$TeO$sub 6$ and Y$sub 6$WO$sub 12$
AIX-07:269565;EDB-77:013708; Chem. Phys. Lett. (CHPLB) 41:(2):210-212 (15 Jul 1976)

ABSTRACT: The vibrational fine structure in the emission spectra of the uranium luminescence of Mg$sub 3$TeO$sub 6$-U and Y$sub 6$WO$sub 12$-U at 4 K has been analyzed in terms of internal vibrational modes of the UO$sub 6$$sup 6-$ octahedron and an external mode. It is concluded that uranium in these compounds is in six-coordination.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: A13

<60>

<60>
Bober, M.; Breitung, W.; Karow, H.U.; Schretzmann, K. (Kernforschungszentrum Karlsruhe (F.R. Germany). Inst. fuer Neutronenphysik und Reaktortechnik)

Investigation of fuel vapor pressure for fast breeder safety analysis AIX-07:270780;ERA-02:020150;EDB-77:035931; Atomwirtsch., Atomtech. (AWAKA) 21:(7):365-367 (Jul 1976)

SUBJECT DESCRIPTORS: EQUATIONS OF STATE;EXCURSIONS: Q1;FBR TYPE REACTORS: T1;KERNFORSCHUNGSZENTRUM KARLSRUHE;LASERS;MIXING RATIO;MIXTURES;PLUTONIUM DIOXIDE: T2;REACTOR SAFETY;SOLID FUELS;TRANSIENTS;URANIUM DIOXIDE: T3;VAPOR PRESSURE: Q2,Q3;VERY HIGH TEMPERATURE

ABSTRACT: The investigation of hypothetical over-prompt critical excursions for the safety analysis of fast reactors requires the knowledge of the equation of state of the oxidic fuel in the temperature region up to about 5,000 K. Conventional methods for measuring the vapour pressure, which were applied to oxide fuels up to 3,000 K, fail at higher temperatures. For some time now, experiments have been carried out in the Nuclear Research Centre, Karlsruhe, to measure fuel vapour pressures with open surface evaporation in the temperature region above 3,000 K, where the samples are locally heated without crucible by means of special laser techniques. The evaporation behaviour of (Usub(.80)Pusub(.20)Osub(1.95...2.00)) and of UO$sub 2$ and the connected vapour pressure build-up and its deviation from the sought equation of state were quantitatively investigated.

EDB SUBJECT CATEGORY: EDB-220900;210500
INIS CATEGORY: C52

<61>
Bode, D.D.; Wild, J.F.; Hulet, E.K. (California Univ., Livermore (USA). Lawrence Livermore Lab.)

Moessbauer studies of americium compounds AIX-07:270229;EDB-77:031457; J. Inorg. Nucl. Chem. (JINCA) 38:(7):1291-1297 (1976)

SUBJECT DESCRIPTORS: AMERICIUM 243: T1;AMERICIUM CARBONATES;AMERICIUM COMPOUNDS: M2;AMERICIUM FLUORIDES;AMERICIUM OXIDES;ELECTRONIC STRUCTURE;GAMMA RADIATION;HYPERFINE STRUCTURE;ISOMER SHIFT;LINE WIDTHS;MOESSBAUER EFFECT: Q1;PLUTONIUM 243;STRUCTURAL CHEMICAL ANALYSIS: Q2;VALENCE

ABSTRACT: Moessbauer studies of several compounds of Am were made with $sup 243$Pu as a source and $sup 243$Am as an absorber. Isomer shifts, line widths, and resonance

<61> CONT.
intensities were measured with various sources and absorbers for recoiless emission of the 84- keV $gamma$-ray of $sup 243$Am. The pentavalent Am compounds KAmO$sub 2$CO$sub 3$ and KAmO$sub 2$F$sub 2$ gave five-peak absorption spectra attributable to electric hyperfine interaction. A complex spectrum, interpreted as a result of magnetic hyperfine interaction, as also observed for the system PuFe$sub 2$/AmO$sub 2$. The changes in isomer shifts with the Am oxidation state are attributed to increases in the electron density in the region of the nucleus caused by removal of 5f electrons, and consequently, an increase in the effective Coulombic nuclear attraction for the outer s and p electrons.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B13

<62>
Boivineau, J.C.

In X-ray study of the plutonium--oxygen phase diagram at ambient temperatures up to 1100$sup 0$C **
ERA-02:017802;EDB-77:026211; J. Nucl. Mater. (JNUMA) 60::31-38 (1976) LA-tr--76-30

SUBJECT DESCRIPTORS: PHASE DIAGRAMS: Q1;PLUTONIUM OXIDES: T1;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: A monochromatic x-ray diffraction technique was used to establish several new features in the Pu--O phase diagram, such as a wide stability region for the $alpha$ phase, a narrow ($alpha$ + $gamma$) phase region, a eutectoidal point at 670$sup 0$C for an O/Pu ratio of 1.78$sub 4$ and several $gamma$-type phases, Unfortunately, because of the complexity of the phases and the existence of metastable equilibria, details f the diagram could not be established for low oxygen contents. 4 tables, 5 figs.

EDB SUBJECT CATEGORY: EDB-360202

<63>
Borgstedt, H.U.; Frees, G.; Schneider, H. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung)

Characterisation of the chemical activities of non-metals dissoved in liquid alkali metals AIX-08:334265;EDB-77:141001; Ber. Bunsenges. Phys. Chem. (BBPCA) 80:(8):740-745 (Aug 1976)

SUBJECT DESCRIPTORS: ALKALI METALS;CARBON;CHEMICAL ACTIVATION: Q1;DIAGRAMS;ELECTROCHEMISTRY: T;ELECTROLYTIC

<63>

<63> CONT.
CELLS;ELECTROMOTIVE FORCE;EQUILIBRIUM;LIQUID METALS;OXYGEN: T1;SOLUTIONS;TEMPERATURE DEPENDENCE;THERMODYNAMICS;THORIUM OXIDES;TIME DEPENDENCE;VANADIUM;VANADIUM OXIDES;YTTRIUM OXIDES

ABSTRACT: The oxygen activity in molten alkali metals can be measured by the use of solid electrolyte emf cells. The emf cells use yttria doped thoria as the electrolyte and a gaseous oxygen atmosphere or a solid oxide as the reference system. Unfortunately the emf output of the cells differs from values to be expected from theory. To receive the emf of a well defined oxygen potential in the liquid alkali metals we have used exchange reactions like Na$sub 2$O + V = VO + 2Na, K$sub 2$O + V = VO + 2K. In both cases we have got the same final values of the emf corresponding to the free energy of formation of VO. The analytical determination of the oxygen fixed by the vanadium allows to relate the initial emf values to a known oxygen concentration. The oxygen exchange calibration method enables the emf cells to measure oxygen activities resp. concentrations in liquid sodium or potassium. The exchange of carbon between solid alloys and liquid sodium can be applied to measure carbon activities. At temperatures of 700 to 750$sup 0$C the exchange of carbon between thin foils of 18/8 CrNi steel and sodium reaches equilibrium after 120 hours. By the application of this reaction and analyses of the final carbon concentrations in the steel specimens it could be demonstrated that in sodium circuits constructed of austenitic steels the carbon contents are on a level of lower than one w-ppm. The aim of the work is to enable the analytical techniques to measure these rather small carbon contents in alkali metal circuits.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<64>
Borgstedt, H.U.; Frees, G.; Schneider, H., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung

In Characterisation of the chemical activities of non-metals dissolved in liquid alkali metals **
AIX-07:272374;EDB-77:056343; (1976) AED-Conf--76-087-006

SUBJECT DESCRIPTORS: ALKALI METALS: T3;CALIBRATION: T1;CARBON;CERAMICS;CHEMICAL COMPOSITION;CHEMICAL REACTION KINETICS;CORROSION;DIAGRAMS;DISSOLUTION;ELECTROLYTES;ELECTROMOTIVE FORCE;EQUILIBRIUM;GETTERING;LIQUID METALS;MONITORING: Q1,Q2,Q3;OXIDES;OXYGEN: T2;THORIUM OXIDES;TIME DEPENDENCE;YTTRIUM OXIDES

ABSTRACT: The oxygen activity in molten alkali metals can be

<64> CONT.

measured by the use of solid electrolyte emf cells. The emf cells use yttria doped thoria as the electrolyte and a gaseous oxygen atmosphere or a solid oxide as the reference system. Unfortunately the emf output of the cells differs from values to be expected from theory. To receive the emf of a well defined oxygen potential in the liquid alkali metals we have used exchange reactions like Na$sub 2$O + V = VO + 2 Na and K$sub 2$O + V = VO + 2 K. In both cases we have got the same final values of the emf corresponding to the free energy of formation of VO. The analytical determination of the oxygen fixed by the vanadium allows to relate the initial emf values to a known oxygen concentration. The oxygen exchange calibration method enables the emf cells to measure oxygen activities or concentrations in liquid sodium or potassium. The exchange of carbon between solid alloys and liquid sodium can be applied to measure carbon activities. At temperatures of 700 to 750$sup 0$C the exchange of carbon between thin foils of 18/8 CrNi steel and sodium reaches equilibrium after 120 hours. By the application of this reaction and analyses of the final carbon concentrations in the steel specimens it could be demonstrated that in sodium circuits constructed of austenitic steels the carbon contents are on a level of lower than one w-ppm. The aim of the work is to enable the analytical techniques to measure these rather small carbon contents in alkali metal circuits.

EDB SUBJECT CATEGORY: EDB-400400
INIS CATEGORY: B12

<65>

Borsese, A.; Borzone, G.; Calabretta, A.; Capelli, R.; Ferro, R. ** Lundin, C.E. (ed.)

Advances on thermochemistry of rare earths alloys In Proceedings of the 12th rare earth research conference. Vol. II ** ERA-02:060383;INS-77:017515;EDB-77:140547; (1976) Univ. of Denver

SUBJECT DESCRIPTORS: FORMATION HEAT: Q1;RARE EARTH ALLOYS: T1;REVIEWS

ABSTRACT: The values of the heats of formation so far obtained on alloys of rare earths with V$sup 0$ group elements are summarized. 5 figures, 17 references. (GHT)

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

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<66>
Bougon, R.; Charpin, P.; Desmoulin, J.P.; Malm, J.G.

Structural study and properties of the alkali metal, nitrosyl, and ammonium hepta- and octafluorouranates(VI)
INS-77:005831;EDB-77:044532; Inorg. Chem. (INOCA) 15:(10):2532-2540 (Oct 1976)

SUBJECT DESCRIPTORS: AMMONIUM COMPOUNDS: T8;BOND LENGTHS;CESIUM COMPOUNDS: T4;CHEMICAL PROPERTIES: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;CHEMICAL REACTION KINETICS;FLUORINE COMPOUNDS: T6;HIGH TEMPERATURE;INFRARED SPECTRA;MEDIUM TEMPERATURE;NITROSO COMPOUNDS: T7;NUCLEAR MAGNETIC RESONANCE;POTASSIUM COMPOUNDS: T2;PYROLYSIS;RAMAN SPECTRA;RUBIDIUM COMPOUNDS: T3;SODIUM COMPOUNDS: T1;STRUCTURAL CHEMICAL ANALYSIS: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;SYNTHESIS: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;TEMPERATURE EFFECTS;URANIUM COMPOUNDS: T5;URANIUM FLUORIDES: T9;X-RAY DIFFRACTION

ABSTRACT: The thermal decomposition of the heptafluorouranates(VI) of the alkali metals is shown to take place in two steps. The first step gives the octafluorouranates(VI) and UF$sub 6$, and the decomposition rate is noticeable at temperatures above 100, 130, 150, and 210$sup 0$C for the Na, K, Rb, and Cs salts, respectively. The second step for Na$sub 2$UF$sub 8$ yields pure NaF and UF$sub 6$ above 300$sup 0$C, whereas the decomposition temperatures for the K, Rb, and Cs salts are above 300, 350, and 400$sup 0$C, respectively. Depending on the decomposition conditions, F$sub 2$ and M$sub 2$UF$sub 7$(M = K, Rb, Cs) or F$sub 2$, UF$sub 6$, and M$sub 3$UF$sub 8$ are formed. The heptafluorouranates(VI) of all the cations studied, except for ammonium, were shown to exhibit dimorphism. The parameters of their cubic form were obtained and are as follows: KUF$sub 7$; a = 5.22 A; RbUF$sub 7$; a = 5.385 A; CsUF$sub 7$; a = 5.517 A; NOUF$sub 7$; a = 5.334 A; NH$sub 4$UF$sub 7$; a = 5.393 A; NaUF$sub 7$(fccub), a = 8.511 A, Z = 4. The x-ray pattern of the low-symmetry form of CsUF$sub 7$ just below the solid transition temperature (15 +- 1$sup 0$C) was indexed with a tetragonal cell where a = 5.50 A and c = 5.37 A. The x-ray diagrams of the low symmetry form of the other MUF$sub 7$ salts were not indexed, whereas those of the octafluorouranates were indexed with orthorhombic cells. The vibrational spectra of the hepta- and octafluorouranates were found to be very dependent on the temperature, and for the same temperature on the cation size. Some trends observed in this study, like the thermal decomposition temperatures or the relative symmetries, are thought to arise from the differences in the cation--anion interaction. This interaction is stronger with smaller cations, which results

<66> CONT.
in more distorted anions, less ionic U--F bonds, and paradoxically less stable complexes.

EDB SUBJECT CATEGORY: EDB-400702;400104
INIS CATEGORY: B13;B11

<67>
Bourgeois, M.; Le Bouhellec, J.; Miqual, P.; Sauteron, J.; Boundry, J.C., Kernforschungszentrum Karlsruhe (Germany, F.R.). Internationales Buero/Uebersetzergruppe

In Reprocessing of fast breeder fuels in France **
AIX-07:272604;ERA-02:026001;EDB-77:053617; (Jun 1976)
KFK-tr--471

ABSTRACT: The CEA has for a long time been making considerable efforts in the field of the construction of sodium-cooled fast breeders, in particular regarding the reprocessing of spent fuels from this construction: operation of the plant AT$sub 1$ from the Hague, in which the fuel irradiated in Rapsodie is reprocessed, laboratory investigations and chemical engineering tests in Fontenay-aux-Roses etc. Numerous problems are yet to be solved for the reprocessing to be sufficiently matured for industry: high specific activity, large release of heat, insoluble residues, handling of large quantities of plutonium, waste, treatment etc. An extensive research and development programme is thus being carried out so that these problems can be solved in time (laboratory, chemical engineering, plant AT$sub 1$ pilot plant Marcoule, testing of prototypes true-to-scale, layout studies). The experience gained and the continuous investigations in the following fields are described: the work on the fuel prior to reprocessing (deactivation, handling, sodium extraction, transport), the wet-chemical reprocessing (initial treatment, solvation and preparation of the solution, solvent extractions), the dry reprocessing (vaporization of the hexafluorides), the particular problems of wastes (solid, liquid, gaseous). To conclude, an explanation is given as to why it is still too early to work out a strategy for the reprocessing on industrial scale for this reactor construction.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<68>

<68>
Bouteillon, J.; Barbier, M.J. (Ecole Nationale Superieure d'Electrochimie et d'Electrometallurgie, 38 - Grenoble (France))

Study of the Ni-Ni (II) equilibrium exchange, by radiotracer techniques in fused LiCl-KCl eutectic
AIX-08:298231;EDB-77:062577; Rev. Int. Hautes Temp. Refract. (RIHTA) 13:(1):43-47 (Jul 1976)

SUBJECT DESCRIPTORS: CATIONS;CHEMICAL REACTION KINETICS: Q1;ELECTRODES;ELECTROLYTIC CELLS;EUTECTICS;HIGH TEMPERATURE;ISOTOPIC EXCHANGE: T1;LITHIUM CHLORIDES;NICKEL 65;NICKEL COMPOUNDS;POTASSIUM CHLORIDES;TRACER TECHNIQUES

ABSTRACT: Radiotracer techniques were applied to fused LiCl-KCl eutectic to study the equilibrium kinetics of the Ni-Ni (II) exchange. A relation was established which gives the time dependent thecretical variation of the radioactivity of the solution, containing labelled Ni(II) species, in contact whith an inactive nickel metallic electrode; theoretical curves were compared with the experimental one. This comparison corroborates the velocity of the Ni-Ni (II) electrochemical system previously observed by means of electrical methods; it induces to assume a number of nickel atoms involved in the isotopic interfacial exchange greater than the quantity calculated on the basis of a surface monolayer.

EDB SUBJECT CATEGORY: EDB-400203
INIS CATEGORY: B12

<69>
Bowersox, D.F., Los Alamos Scientific Lab., N.Mex. (USA)

In Review of partitioning proposals for spent nuclear fuels **
INS-77:001898;ERA-02:015896;EDB-77:029158; (Jul 1976)
LA--6442

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;FISSION PRODUCTS;FLUORIDE VOLATILITY PROCESS;PUREX PROCESS;PYROMETALLURGY;RECOVERY;REPROCESSING: Q1;SPENT FUELS: T1

ABSTRACT: The initial phase of a study about recovery of valuable fission products from spent nuclear fuels has been to review various partitioning proposals. This report briefly describes the aqueous Purex process, the salt transport process, melt refining, fluoride volatility process, and gravimetric separations. All these processes appear to be possible technically, but further research will be necessary to determine which are most feasible. This review includes

<69> CONT.
general recommendations for experimental research and development of several partitioning options.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<70>
Brandberg, S.

In Method for recovering uranium from residual solution **
AIX-08:298504;ERA-02:032139;EDB-77:072669; (21 Jun 1976)

SUBJECT DESCRIPTORS: AMMONIA;AQUEOUS SOLUTIONS;CALCIUM CARBONATES;CARBON DIOXIDE;FLUORIDE VOLATILITY PROCESS;FUEL FABRICATION PLANTS: M2;RECOVERY: Q1,Q2;REPROCESSING;URANIUM: M1;URANIUM HEXAFLUORIDE

ABSTRACT: A method is given for recovering uranium from a residual solution provided by an installation for the manufacture of a nuclear fuel from uranium hexafluoride in the presence of ammonia by eliminating the fluorides of the residual solution. The method is characterized by the steps of precipitating the fluorides of the residual solution through adding a powdered alkaline earth carbonate, and of recovering uranium from the residual solution thus free from fluorides.

EDB SUBJECT CATEGORY: EDB-052001;050700
INIS CATEGORY: B16

<71>
Braunstein, J.; Bronstein, H.R.; Cantor, S.; Heatherly, D.; Vallet, C.E., Oak Ridge National Lab., Tenn. (USA)

In Molten carbonate fuel cell research at ORNL **
ERA-02:049055;EDB-77:106734; (May 1977) ORNL/TM--5886

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES;BORON NITRIDES;CARBONATES;COMPATIBILITY;HIGH-TEMPERATURE FUEL CELLS: T1;MASS TRANSFER;MATERIALS;MOLTEN SALTS: T2;RESEARCH PROGRAMS: Q1;THERMODYNAMIC PROPERTIES: Q2

ABSTRACT: The activities at ORNL during the period July 1976 to February 1977 on the molten carbonate fuel cell program, funded by the ERDA Division of Conservation Research and Technology, are summarized. This period marks the initiation of molten carbonate fuel cell research at ORNL, making use of the extensive background of expertise and facilities in molten salt research. The activities described include a literature survey on molten carbonates, design, acquisition

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<71> CONT.
and installation of apparatus for experimental studies of molten carbonates, initial experiments on materials compatibility with molten carbonates, electrolysis experiments for the determination of transference numbers, and theoretical studies of transport behavior and the coupling of mass flows in molten carbonate mixtures. Significant accomplishments were the theoretical prediction of a possibly appreciable change in the alkali ion ratio at molten carbonate fuel cell electrodes, operated at high current densities, as a result of mobility differences of the alkali ions; design, construction and assembly of an electrolysis cell, and initiation of measurements of composition profiles in mixed alkali carbonate electrolytes; initiation of differential scanning calorimetry of pure alkali carbonates for quantitative measurement of transition enthalpies, eventually leading to new, more reliable values of the enthalpies and free energies of formation of the pure and mixed carbonates.

EDB SUBJECT CATEGORY: EDB-300501;300503;300505

<72>
Breitung, W., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik

In Calculation of vapor pressures of oxide fuels up to 5000 K in equilibrium and non-equilibrium evaporation **
ERA-02:000789;EDB-76:086430; (Jun 1975) EURFNR--1283

SUBJECT DESCRIPTORS: EXCURSIONS: Q1;FUEL PINS;LMFBR TYPE REACTORS: T1;MELTDOWN;PLUTONIUM OXIDES: T3;ULTRAHIGH TEMPERATURE;URANIUM DIOXIDE: T2;URANIUM OXIDES: T4;VAPOR PRESSURE: Q2,Q3,Q4;VERY HIGH TEMPERATURE

ABSTRACT: The evaporation kinetics of multi-component systems is studied with UO$sub 2$ as the example. The evaporation, which is generally incongruent, implies that two opposing types of steady-state evaporation must be distinguished: equilibrium evaporation and ''forced congruent'' evaporation. In the first case, a homogeneous composition of the material is maintained despite incongruent evaporation from the surface. This is ensured by sufficiently large diffusion flows towards the evaporating surface within the substance. By contrast, forced congruent evaporation occurring in the case of intensive evaporation gives rise to concentration gradients in the material, which are due to the high evaporation rates. The evaporating surface changes its composition such that congruent evaporation of the material takes place. The two types of evaporation indicated entail different vapor pressures. In some prompt critical reactor incidents forced congruent evaporation must be anticipated. The calculation of

<72> CONT.
the vapor pressures of UO/sub 2+-x/ and (U, Pu)O/sub 2+-x/ for both types of evaporation up to temperature of 5000 K is presented. The calculating procedures are based on the method of Rand and Markin (1967) incorporating the recent thermodynamic data. The agreement between the measured and calculated total pressures is good for the ranges of temperature and stoichiometry for which experimental results are available. This supports the results calculated for higher temperature ranges.

EDB SUBJECT CATEGORY: EDB-220900;210500;360204;400702

<73>
Breitung, W., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe (Germany, F.R.). Projekt Schneller Brueter

In Calculation of vapor pressures of oxide fuels up to 5,000 K for equilibrium and nonequilibrium evaporation **
AIX-07:231065;ERA-02:003044;EDB-76:091352; (Jun 1975)
KFK--2091

SUBJECT DESCRIPTORS: BINARY MIXTURES;CHEMICAL COMPOSITION;COMPARATIVE EVALUATIONS;COMPUTER CALCULATIONS;DATA;DIAGRAMS;ENTHALPY;EQUILIBRIUM;EVAPORATION: Q1;NUCLEAR FUELS: T1;PLUTONIUM DIOXIDE: T2;ULTRAHIGH TEMPERATURE;URANIUM DIOXIDE: T3;VAPOR PRESSURE: Q2,Q3

ABSTRACT: The evaporation kinetics of multicomponent systems is studied with UO$sub 2$ as the example. The evaporation, which is generally incongruent, implies that two opposing types of steady-state evaporation must be distinguished: equilibrium evaporation and forced congruent evaporation. The two types of evaporation indicated entail different vapor pressures. In some prompt critical reactor incidents forced congruent evaporation must be anticipated. Vapor pressures of UOsub(2+-x) and (U,Pu)Osub(2+-x) are calculated for both types of evaporation up to a temperature of 5,000 K. The calculating procedures are based on the method of Rand and Markin (1967) incorporating recent thermodynamic data. The agreement between the measured and calculated total pressures is good for the ranges of temperature and stoichiometry for which experimental results are available. This supports the results calculated for higher temperature ranges.

EDB SUBJECT CATEGORY: EDB-220300;360202
INIS CATEGORY: E23

<74>

<74>
Breitung, W., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe (Germany, F.R.). Projekt Schneller Brueter

In Calculation of the oxygen potential of (U,Pu)O/sub 2+-x/ with defect models and measured oxygen potential data in the temperature range from 1,000 to 1,700 K **
AIX-08:297306;EDB-77:072618; (Oct 1976) KFK--2363

SUBJECT DESCRIPTORS: BINARY MIXTURES;CHEMICAL COMPOSITION;ELECTROCHEMISTRY;FORMATION FREE ENTHALPY;INTERSTITIALS: Q1,Q2;OXYGEN;PLUTONIUM DIOXIDE: T1;URANIUM DIOXIDE: T2;VACANCIES: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: The dominating defects in (U$sub 1$-sub(y)Pusub(y))O$sub 2$sub(+-x) are oxygen vacancies and oxygen interstitials. It is assumed that an oxygen vacancy and an oxygen interstital in the (U,Pu)-mixed oxide, is bound to a Pu$sub 2$O$sub 3$- and U$sub 2$O$sub 5$-complex respectively. The model used to describe the oxygen potential $delta$G(O$sub 2$) is based on the equilibrium between these defects and gaseous oxygen. The equilibrium constants needed, were evaluated from measured $delta$G(O$sub 2$)-data. The calculated oxygen potentials are given as functionof x,y and T. Especially the model provides $delta$G(O$sub 2$)-data of nearly stoechiometric (U,Pu) mixed oxides, for which no measured data are available. For the free energy of formation of oxygen Frenkel defects $delta$G(FO) in (U,Pu) mixed oxides, values between 2.0 and 2.3 eV were determined for y = 0.3 ... 0.1.

EDB SUBJECT CATEGORY: EDB-050700;360202
INIS CATEGORY: A13

<75>
Bresesti, A.M.; Bresesti, M.; Cuypers, M.; D'Adamo, D.; Lezzoli, L.; Bannella, R.; Giuriato, A.; Paoletti Gualandi, M.; Peroni, P., Commission of the European Communities, Ispra (Italy). Joint Research Centre

In Investigations on radioactive fission product correlations: gamma spectrometry measurements on spent fuel assemblies discharged from the Trino Vercellese reactor at the end of the 2nd irradiation cycle ** ERA-01:019092;EDB-76:058135; (Jun 1975) EUR--5334

SUBJECT DESCRIPTORS: B CODES;BURNUP;CESIUM 134;CESIUM 137;CORRELATIONS;EUROPIUM 154;FISSION PRODUCTS;FUEL ASSEMBLIES;FUEL ELEMENTS: Q1;GAMMA FUEL SCANNING;PLUTONIUM;RADIOMETRIC ANALYSIS;SELNI REACTOR:

<75> CONT.
T1;SPENT FUEL ELEMENTS

ABSTRACT: In the framework of a cooperation program between ENEL and EURATOM, gamma spectrometry measurements were performed on 12 fuel assemblies of the Trino Vercellese PWR to study the correlations existing between radioactive fission products and the burnup and plutonium content. A mechanical and collimation system permitted measurements to be performed at different levels on the four corners of the fuel assemblies in the spent fuel pool of the Trino Vercellese plant. Gamma spectrometry measurements were also carried out on solutions of the Trino Vercellese fuel, taken at the input of the Eurochemic reprocessing plant. The gamma ray activities of the fission products were correlated with values of burnup and plutonium content generated by BURSQUID, a two-dimensional diffusion burnup code, and with values of plutonium content determined by means of chemical analyses at the input of the reprocessing plant. A proportionality has been observed between Cs 137 activity and burnup and between Cs 134/Cs 137 activity ratio and Pu/U mass ratio. This result indicates the possibility of non-destructive measurements of burnup and plutonium content distributions in PWR fuel assemblies. The experimental results are supported by theoretical predictions carried out by means of computer code calculations.

EDB SUBJECT CATEGORY: EDB-210200
INIS CATEGORY: E32

<76>
Broadhead, K.G.; Heady, H.H., Bureau of Mines, Reno, Nev. (USA). Reno Metallurgy Research Center

In Radiotracer applications in electrometallurgical processing
** EDE-77:120034; (Sep 1962) BM-RI--6195

SUBJECT DESCRIPTORS: ELECTROMETALLURGY:
T1,Q2;RADIOISOTOPES;TRACER TECHNIQUES: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360101

<77>

<77>
Broers, G.H.J.; Van Ballegoy, H.J.J.

Phase equilibria in Li--Na--K carbonate/aluminate systems In Third international symposium on fuel cells ** ERA-01:019721;EDB-76:053277; (1969) Presses Academiques Europeennes

SUBJECT DESCRIPTORS: ALUMINATES: T3;CARBONATES: T2;ELECTROLYTES: Q1;HIGH-TEMPERATURE FUEL CELLS: T1;LITHIUM COMPOUNDS: T4;MOLTEN SALTS;PHASE DIAGRAMS: Q2,Q3,Q4,Q5,Q6;POTASSIUM COMPOUNDS: T6;SODIUM COMPOUNDS: T5

ABSTRACT: Molten carbonate fuel cells on basis of liquid carbonate/solid aluminate paste electrolytes are far more stable in long term operation than similar cells on basis of carbonate/magnesium oxide pastes. Phase equilibria between the carbonate melt and the (insoluble) solid aluminates of Li, Na and K have been studied both theoretically and experimentally, by means of thermal and electrical conductance analyses.

EDB SUBJECT CATEGORY: EDB-300503;360602

<78>
Bron, J. (Natal Univ., Durban (South Africa). Dept. of Chemistry)

Isotope effect on the thermodynamic quantities of gaseous uranium hexafluoride AIX-07:257165;EDB-77:007647; Can. J. Chem. (CJCHA) 54:(1):160-165 (1 Jan 1976)

SUBJECT DESCRIPTORS: ENTHALPY: Q2;ENTROPY: Q2;FREE ENTHALPY: Q2;GASES;ISOTOPE EFFECTS: Q1;MOLECULAR MODELS;PARTITION FUNCTIONS;QUANTUM MECHANICS;SPECIFIC HEAT: Q2;URANIUM 235: T1;URANIUM 238;URANIUM HEXAFLUORIDE: T2

ABSTRACT: Isotopic effects on thermodynamic properties of gaseous uranium hexafluoride are calculated from the logarithm of the ratio of the partition function. Changes in the molar quantities Gibbs' free energy, enthalpy, specific heat and entropy on substituting $sup 235$U for $sup 238$U in UF$sub 6$ are tabulated as functions of temperature. It is concluded that the approximation known as the first quantum correction has little quantitative value.

EDB SUBJECT CATEGORY: EDB-400702;400202
INIS CATEGORY: B12

<79>
Brown, C.H. Jr.; Hightower, J.R. Jr.; Klein, J.A., Oak Ridge National Lab., Tenn. (USA)

In Measurement of mass transfer coefficients in a mechanically agitated, nondispersing contactor operating with a molten mixture of LiF--BeF$sub 2$--ThF$sub 4$ and molten bismuth ** INS-77:003220;ERA-02:016585;EDB-77:023652; (Nov 1976) ORNL--5143

SUBJECT DESCRIPTORS: BERYLLIUM FLUORIDES;BISMUTH;BREEDER REACTORS;DATA;EXTRACTION APPARATUSES: T2;HIGH TEMPERATURE;LIQUID METALS;LITHIUM FLUORIDES;MASS TRANSFER: Q2,Q3;MOLTEN SALT REACTORS: T1;MOLTEN SALTS;REPROCESSING: T3,Q1;SPENT FUELS;THORIUM FLUORIDES

ABSTRACT: A mechanically agitated, nondispersing contactor in which molten fluoride salt and molten bismuth phases were contacted has been built and operated. The mass transfer performance of the contactor was evaluated over a range of agitator speeds under conditions in which the major resistance to mass transfer was in the salt phase. The measured mass transfer rates were compared with rates predicted by literature correlations. The equipment necessary to contain the salt and bismuth at approximately 600$sup 0$C is described along with the complete set of experimental data obtained during operation. 11 figures, 12 tables.

EDB SUBJECT CATEGORY: EDB-210500;050800
INIS CATEGORY: E35;B16

<80>
Brown, D.; De Paoli, G.; Whittaker, B. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment)

Conversion of protactinium monocarbide to the penta- and tetra-halides AIX-07:274902;EDB-77:019525; J. Chem. Soc. (London), Dalton Trans. (JCDTB) (14):1336-1338 (1976)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1,Q2,Q3;CHEMICAL REACTIONS: Q4;INFRARED SPECTRA;MOLECULAR STRUCTURE;PROTACTINIUM BROMIDES: T1;PROTACTINIUM CARBIDES: T4;PROTACTINIUM CHLORIDES: T2;PROTACTINIUM IODIDES: T3;RAMAN SPECTRA;STRUCTURAL CHEMICAL ANALYSIS;X-RAY DIFFRACTION

ABSTRACT: Protactinium monocarbide has been prepared by carbothermic reduction of the pentaoxide. It reacts with iodine (400$sup 0$C), bromine (350$sup 0$C), and thionyl chloride (200$sup 0$C) in evacuated sealed vessels to yield the appropriate pentahalide. The tetraiodide, PaI$sub 4$, is obtained by interaction of the monocarbide with either protactinium pentaiodide (600$sup 0$C) or mercury(II) iodide

<80>

<80> CONT.
(500$sup 0$C) in vacuo. X-ray powder-diffraction results and vibrational spectral data are reported for the halides.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<81>
Brown, D.; De Paoli, G.; Whittaker, B., UKAEA Research Group, Harwell. Atomic Energy Research Establishment

In Some chemical reactions of uranium hexachloride and the chlorination of uranium tetrachloride **
AIX-07:248008;EDB-77:019508; (Jan 1976) AERE-R--8260

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;CHEMICAL PREPARATION;CHEMICAL REACTIONS: Q1;CHLORINATION;ELECTRONIC STRUCTURE;INFRARED SPECTRA;LATTICE PARAMETERS: Q1;MOLECULAR STRUCTURE;STRUCTURAL CHEMICAL ANALYSIS;TRICLINIC LATTICES;URANIUM CHLORIDES: T1;URANIUM COMPLEXES

ABSTRACT: Uranium hexachloride has been prepared by chlorination of the tetrachloride and its chemical properties investigated. It decomposes slowly in anhydrous, oxygen-free carbon tetrachloride to yield $beta$-UCl$sub 5$ which exhibits triclinic symmetry with a$sub 0$ = 7.09, b$sub 0$ = 9.66, c$sub 0$ = 6.36 angstroms $alpha$ = 88.5$sup 0$, $beta$ = 117.6$sup 0$, $gamma$ = 108.5$sup 0$ in space group P1. Infrared spectra and solid state optical transmission spectra are reported for $beta$-UCL$sub 5$, and electronic transitions are assigned from the $gamma$$sub 7$ ground state. Attempts to prepare uranium hexachloride complexes with donor ligands have yielded pentavalent complexes of the types UCl$sub 5$.2L (L = $alpha$, $alpha$-dipyridyl, benzanthrone and dimethylformamide) and UCl$sub 5$.L (L = triphenylphosphine oxide), and the tetravalent complex UCl$sub 4$.2L (L = anthrone). The hexachloride is immediately reduced to soluble pentavalent species on the addition of anhydrous methyl cyanide; evaporation of the resulting solution yields UCl$sub 5$.2CH$sub 3$CN. Electronic spectra are reported for the solid and for its solutions in CH$sub 3$CN.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<82>
Brown, D.; Hurtgen, C. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment); Fuger, J. (Liege Univ. (Belgium))

Preparation and some properties of actinide(III) and lanthanide(III) oxide halides, and the enthalpies of formation of PuBr$sub 3$(s) and PuI$sub 3$(s)
AIX-08:346226;EDB-78:028028; Rev. Chim. Miner. (RVCMA) 14:(2):189-198 (1977)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8;DYSPROSIUM COMPOUNDS: T6;ENTHALPY;ERBIUM COMPOUNDS: T8;FORMATION HEAT: Q9,Q10;GADOLINIUM COMPOUNDS: T5;LANTHANUM COMPOUNDS: T3;NEODYMIUM COMPOUNDS: T4;NEPTUNIUM COMPOUNDS: T1;OXYBROMIDES;OXYCHLORIDES;OXYIODIDES;PLUTONIUM BROMIDES: T9;PLUTONIUM COMPOUNDS: T2;PLUTONIUM IODIDES: T10;TERBIUM COMPOUNDS: T7

ABSTRACT: Reactions between actinide (Np, Pu) and lanthanide (La, Nd, Gd, Dy, Tb, Er) trihalides and antimony sesquioxide at 400-700 deg C in vacuo yield the corresponding oxide halides, MOX (X=variously Cl, Br, I). Attempts to prepare UOCl and UOI by similar reactions have been unsuccessful, the identified products being uranium dioxide and unchanged trihalide. Infrared spectral data are reported for the oxide halides together with unit cell dimensions for ErOI. Enthalpies of formation determined for PuBr$sub 3$(s) and PuI$sub 3$(s) from solution calorimetry are -793.3+-1.9 kJ mole$sup -1$ and -579.8+-2.7 kJ mole $sup -1$, respectively.

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13

<83>
Browning, P.; Phillips, B.A.; Potter, P.E.; Rand, M.H. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment) ** Blank, H.; Lindner, R. (eds.)

Segregation and vapour pressure studies on the uranium-plutonium-carbon system In Plutonium 1975 and other actinides ** AIX-08:309982;ERA-02:041839;EDB-77:094417; (1976) North-Holland

SUBJECT DESCRIPTORS: CARBON;FORMATION FREE ENTHALPY;LATTICE PARAMETERS;PHASE DIAGRAMS;PLUTONIUM: T3;PLUTONIUM CARBIDES: T2;SEGREGATION: Q1,Q2,Q3,Q4;SOLID SOLUTIONS;URANIUM: T4;URANIUM CARBIDES: T1;VAPOR PRESSURE: Q1,Q2,Q3,Q4;VERY HIGH TEMPERATURE

ABSTRACT: Some experimental studies are reported on the

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<83> CONT.
segregation of U and Pu, and the plutonium vapour pressures, at 1400-1600$sup 0$C, in the MC + M$sub 2$C$sub 3$(M= (U+Pu)) phase field in which mixed uranium-plutonium 'monocarbide' fuels normally lie. Comparison of the segregation results with calculations based on ideal solution behaviour in the MC and M$sub 2$C$sub 3$ phases suggests tha deviations from ideality are quite small. Vapour pressure measurements confirm this, indicating that any deviations are likely to be positive. Regular solution calculations and vapour pressure data are also reported for the phase fields containing graphite and sesquicarbide or dicarbide.

EDB SUBJECT CATEGORY: EDB-360204;360202;050700
INIS CATEGORY: B24

<84>
Browning, P.; Potter, P.E.; Phillips, B.A.; Rand, M.H. **
Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Segregation and vapour pressure studies in the uranium--plutonium--carbon system In 5th international conference on plutonium and other actinides **
AIX-07:233104;EDB-76:087288; (1975) AED-Conf--75-417-019

SUBJECT DESCRIPTORS: PLUTONIUM CARBIDES: T1;SEGREGATION: Q1,Q2;URANIUM CARBIDES: T2;VAPOR PRESSURE: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<85>
Bryan, G.H.; Thompson, J.K.; Van Tuyl, H.H.; Brown, C.L.; Ryan, J.L., Battelle Pacific Northwest Labs., Richland, Wash. (USA)

In Results of research to evaluate solid plutonium nitrate as a safe shipping form **
ERA-02:021786;INS-77:005524;EDB-77:041187; (Nov 1976)
BNWL--1941

SUBJECT DESCRIPTORS: FEASIBILITY STUDIES;PLUTONIUM NITRATES: T1;PYROLYSIS;RADIOLYSIS;SOLUBILITY;TRANSPORT: Q1

ABSTRACT: The results of the research described indicate that the compound Pu(NO$sub 3$)$sub 4$.XH$sub 2$O is a viable material for consideration as a solid shipping form. It meets the criteria set forth to define a suitable solid form of

<85> CONT.
plutonium. Several plutonium compounds were considered for study as a shipping form before selecting Pu(NO$sub 3$)$sub 4$.XH$sub 2$O as having the most desirable characteristics. It is reasonably easy to prepare on a kilogram scale with relatively simple equipment using vacuum evaporation techniques. Plutonium nitrate does begin to thermally decompose at about 100$sup 0$C; however, proper equipment design and instrumentation can overcome this problem. Although Pu(NO$sub 3$)$sub 4$.XH$sub 2$O does produce some radiolytic gases, such as oxygen and nitrogen, an explosive mixture is not produced as only minor amounts of hydrogen are formed except during extended storage. Excessive pressurization in the shipping mode should not be a problem if the transport container is not closed for protracted periods of time. However, some form of thermal insulation would be required to prevent decomposition of the compound and to preclude over-pressurization during a fire. Plutonium nitrate has been found to be completely soluble in nitric acid even after storage for extended periods of time. After the equivalent of 25 years of storage time of first-cycle reactor-grade plutonium from a radiation damage standpoint, Pu(NO$sub 3$)$sub 4$.XH$sub 2$O prepared from 85 percent $sup 238$Pu was found to be completely soluble in 4M HNO$sub 3$. Plutonium nitrate was also found to be soluble in water, but it rapidly converted to plutonium polymer.

EDB SUBJECT CATEGORY: EDB-050900
INIS CATEGORY: E15

<86>
Bukhalova, G.A.; Burlakova, V.M.; Sementsova, D.V.
(Rostovskij-na-Donu Inzhenerno-Stroitel'nyj Inst. (USSR))

Ternary systems from lithium, sodium, strontium and barium chlorides EDB-76:042590; Zh. Neorg. Khim. (ZNOKA) 20:(6):1657-1659 (Jun 1975)

SUBJECT DESCRIPTORS: BARIUM CHLORIDES: T4;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;LITHIUM CHLORIDES: T1;MELTING;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;SODIUM CHLORIDES: T2;SOLID SOLUTIONS;STRONTIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<87>

<87>
Bukhalova, G.A.; Litvinova, G.N.; Berezhnaya, V.T.; Burlakova, V.M. (Rostovskij-na-Donu Inzhenerno-Stroitel'nyj Inst. (USSR))

Phase equilibria in the system of sodium chlorides, cesium chlorides and strontium chlorides EDB-77:003056; Zh. Neorg. Khim. (ZNOKA) 20:(3):837-839 (Mar 1974)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T2;DIFFERENTIAL THERMAL ANALYSIS;EQUILIBRIUM;PHASE STUDIES: Q1,Q2,Q3;SODIUM CHLORIDES: T1;STRONTIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<88>
Bukhalova, G.A.; Litvinova, G.N.; Berezhnaya, V.T.; Burlakova, V.M.

Phase equilibria in the system of sodium chlorides, cesium chlorides and strontium chlorides EDB-77:062251; Zh. Neorg. Khim. (ZNOKA) 20:(3):837-839 (Mar 1974)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T2;DIFFERENTIAL THERMAL ANALYSIS;EQUILIBRIUM;PHASE STUDIES: Q1,Q2,Q3;SODIUM CHLORIDES: T1;STRONTIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602

<89>
Bukhalova, G.A.; Mirsoyanova, N.N.; Yagub'yan, E.S. (Rostovskij-na-Donu Inzhenerno-Stroitel'nyj Inst. (USSR))

Quaternary mutual system from fluorides and chlorides of lithium, sodium and strontium AIX-08:298234;EDB-77:062511; Zh. Neorg. Khim. (ZNOKA) 20:(8):2214-2218 (Aug 1975)

SUBJECT DESCRIPTORS: EUTECTICS;LITHIUM CHLORIDES: T6;LITHIUM FLUORIDES: T1;MIXTURES;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6;SODIUM CHLORIDES: T5;SODIUM FLUORIDES: T3;STRONTIUM CHLORIDES: T4;STRONTIUM FLUORIDES: T2;THERMAL ANALYSIS;THERMODYNAMICS

ABSTRACT: Simplified partition of a prism constituted by a quaternary Li, Na, Sr//F, Cl mutual system has been made. Visual-polythermal and thermograpahic methods were used to study the liquidus surface of three tetrahedron-forming

<89> CONT.
sections. Four points of non-variant equilibria have been found, one of these points being a transition point and the other three are eutectic ones (the lowest melting point being 434$sup 0$C). A phase diagram of the Li, Na, Sr//F, Cl system has been constructed. Thermodynamic calculations have been made for reactions occurring at the center points of the conversion lines.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<90>
Bukhalova, G.A.; Yagub'yan, E.S.; Zaporozhets, E.G.; Buryakov, A.V. (Rostovskij-na-Donu Inzhenerno-Stroitel'nyj Inst. (USSR))

Quaternary system of potassium halogenides EDB-76:036689; Zh. Neorg. Khim. (ZNOKA) 20:(4):1099-1102 (Apr 1975)

SUBJECT DESCRIPTORS: PHASE DIAGRAMS: Q1,Q2,Q3,Q4;POTASSIUM BROMIDES: T1;POTASSIUM CHLORIDES: T2;POTASSIUM FLUORIDES: T3;POTASSIUM IODIDES: T4;THERMAL ANALYSIS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602;400201
INIS CATEGORY: B12

<91>
Bulatova, V.F.; Morachevskii, A.G.; Demidov, A.I. (Leningradskij Politekhnicheskij Inst. (USSR))

Interaction of the lithium-tin alloys with the LiCl-KCl-CsCl melted eutectic mixture AIX-08:280594;EDB-77:037402; Elektrokhimiya (ELKKA) 12:(8):1339 (Aug 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CESIUM CHLORIDES: T4;CHEMICAL REACTION KINETICS;CHEMICAL REACTIONS: Q1,Q2,Q3,Q4,Q5;ELECTROLYSIS;ELECTROLYTES;EUTECTICS;LITHIUM ALLOYS: T1;LITHIUM CHLORIDES: T2;MOLTEN SALTS;POTASSIUM CHLORIDES: T3;QUANTITY RATIO;TIN ALLOYS: T5

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<92>

<92>
Bulatova, V.F.; Morachevskii, A.G. (Leningradskij Politekhnicheskij Inst. (USSR))

Equilibrium between Li-K-Te alloys and LiCl-KCl molten eutectic mixture AIX-08:336897;EDB-78:017302; Zh. Prikl. Khim. (ZPKHA) 50:(1):183-184 (Jan 1977)

SUBJECT DESCRIPTORS: CATHODES;EQUILIBRIUM: Q1,Q2,Q3,Q4;EUTECTICS;HIGH TEMPERATURE;LIQUID METALS;LITHIUM CHLORIDES: T3;LITHIUM TELLURIDES: T2;MOLTEN SALTS;POLARIZATION;POTASSIUM;POTASSIUM CHLORIDES: T4;TELLURIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<93>
Buraya, I.T.; Polyachenok, O.G.; Komshilova, O.M.; Novikov, G.I. (Belorusskij Tekhnologicheskij Inst., Minsk)

Tensimetric study of pressure and composition of saturated vapor in TlCl-InCl$sub 3$ system AIX-08:298235;EDB-77:062547; Zh. Fiz. Khim. (ZPKHA) 50:(9):2441 (Sep 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION: Q1,Q2;EQUATIONS;INDIUM CHLORIDES: T1;MOLECULES;MOLTEN SALTS;SUBLIMATION;THALLIUM CHLORIDES: T2;VAPOR PRESSURE: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<94>
Burch, W.D.; Feldman, M.J.; Groenier, W.S.; Vondra, B.L., Oak Ridge National Lab., Tenn. (USA)

In LMFBR Fuel Reprocessing Program progress report for period April 1 to June 30, 1976 ** ERA-02:004572;EDB-76:095940; (Aug 1976) ORNL/TM--5556

SUBJECT DESCRIPTORS: ADSORPTION;CONTROL SYSTEMS;DESIGN;DISSOLUTION: Q4;ENGINEERING;FUEL REPROCESSING PLANTS: T2;IODINE: T3;IODOX PROCESS: T;LMFBR TYPE REACTORS: T1;MEASURING INSTRUMENTS;NITROGEN OXIDES: T6;OFF-GAS SYSTEMS;PALLADIUM IODIDES: T5;PILOT PLANTS;PLUTONIUM DIOXIDE: T4;RELIABILITY;REMOVAL: Q3;REPROCESSING: Q7;RESEARCH PROGRAMS: Q2;SCRUBBING: Q6;SOLUBILITY: Q5;SPENT FUELS:

<94> CONT.
T7,Q1;VOLOXIDATION PROCESS;ZEOLITES

ABSTRACT: The program is aimed at providing the technology for the design of commercial reprocessing facilities that will be required by the late 1990s. The process and equipment development phase should culminate in a hot pilot-plant process demonstration in 1985-90 for the feed from FFTF and CRBR. Criteria were developed for this hot pilot plant. Laboratory and hot-cell studies included the study of base metal zeolites for I$sub 2$ trapping, dissolution of PuC$sub 2$ in HI, solubilities of PdI$sub 2$, and fixation of iodine waste in concrete. Engineering research studies are being conducted on voloxidation, dissolution, feed preparation (nitrogen oxide scrubbing), fluorocarbon absorption, reliability, Iodox process, and instrumentation and control systems. Component testing was also conducted. The status of the Integrated Prototype Equipment Test Facility is reported. (DLC)

EDB SUBJECT CATEGORY: EDB-050800

<95>
Burmeister, R.A.; Hiskes, R.; Felmlee, T.L., Hewlett-Packard Co., Palo Alto, Calif. (USA)

In Environmental sensitivity of structural metals: liquid metal embrittlement. Annual technical progress report No. 2, 25 Jun 1970--31 May 1971 ** EDB-77:094367; (Jun 1971) AD--885334

SUBJECT DESCRIPTORS: BARIUM FLUORIDES;BARIUM OXIDES;BORON OXIDES;CRYSTAL GROWTH: Q1,Q2,Q3,Q4,Q5,Q6;EPITAXY;MAGNETIC MATERIALS;SOLVENTS

ABSTRACT: A steady-state crystal growth system suitable for both homoepitaxial and heteroepitaxial growth of unixial magnetic rare earth compounds has been constructed and used for the growth of both YFeO$sub 3$ and Eu$sub 2$Er$sub 1$Ga$sub 0$ $sub 7$Fe$sub 4$ $sub 3$O$sub 12$. A very stable solvent, comprised of BaO--B$sub 2$O$sub 3$--BaF$sub 2$ has been developed. This solvent is nonvolatile and nonreactive, and is well suited to the solution growth of magnetic oxides. Arrays of bubbles have been generated in YFeO$sub 3$ and the coercivity and mobility of crystals grown from this solvent have been measured and found to be about 0.05 Oe and about 3500 cm/s-Oe, comparable to the values for crystals grown in the PbO-based solvents. Stable arrays of mobile bubbles have also been generated in heteroepitaxially grown Eu$sub 2$Er$sub 1$Ga$sub 0$ $sub 7$Fe$sub 4$ $sub 3$O$sub 12$. Emission spectrographic analysis indicates that barium

<95>

<95> CONT.
incorporation in the crystals grown from the BaO-based solvent is less than lead incorporated in those grown from the PbO-based solvent. (auth)

EDB SUBJECT CATEGORY: EDB-360201

<96>
Burylev, B.P.; Gershunina, V.Ya. (Krasnodarskij Politekhnicheskij Inst. (USSR))

Investigation into thermodynamic properties of FeCl$sub 2$-CsCl system melts AIX-08:320595;EDB-77:133391; Zh. Fiz. Khim. (ZFKHA) 49:(9):2211-2215 (Sep 1975)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;ELECTRIC BATTERIES;ELECTROMOTIVE FORCE;EQUATIONS;HIGH TEMPERATURE;IRON CHLORIDES: T2;MOLTEN SALTS;QUANTITY RATIO;REACTION KINETICS;THERMODYNAMIC PROPERTIES: Q1,Q2

ABSTRACT: Activities of iron chloride in the melt of the system FeCl$sub 2$-CsCl have been studied by the emf method. Various expressions describing the dependence of the activity on the concentration have been examined. A most general equation has been derived from which all the known relationships can be deduced.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<97>
Burylev, B.P.; Mironov, V.L. (Krasnodarskij Politekhnicheskij Inst. (USSR))

Saturation vapor pressure in iron chloride-alkaline earth metal chlorides systems AIX-07:232716;EDB-76:054341; Izv. Vyssh. Uchebn. Zaved., Chern. Metall. (IVUMA) 12::9-11 (Dec 1974)

SUBJECT DESCRIPTORS: BINARY MIXTURES;EQUATIONS;IRON CHLORIDES: T1;ISOTHERMAL PROCESSES;MOLTEN SALTS;QUANTITY RATIO;SATURATION;STRONTIUM CHLORIDES: T2;TEMPERATURE DEPENDENCE;VAPOR PRESSURE: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: The boiling-point method was used to investigate the temperature and concentration dependence of the saturated vapour pressure in ferrous chloride systems with alkali earth metal chlorides at 1000$sup 0$K. Saturated vapour pressure isotherms were constructed for different solution ratios of these systems. In the FeCl$sub 2$-MgCl$sub 2$ system slight positive deviations from additivity were observed, while in ferrous chloride systems with calcium, strontium and barium

<97> CONT.
chlorides there were negative deviations increasing on transition from calcium to barium, i.e. with increasing cationic radius of the alkali earth metal. The vapour composition of weakly interacting systems is discussed.

EDB SUBJECT CATEGORY: EDB-400201;360603
INIS CATEGORY: B12

<98>
Burylev, B.P.; Mironov, V.L.; Tsemekhman, L.Sh.; Sryvalin, I.T. (Krasnodarskij Politekhnicheskij Inst. (USSR))

Study of saturated vator pressure above salt melts in CoCl$sub 2$-MCl systems EDB-76:042455; Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. (IVUKA) 18:(4):663-665 (1975)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CESIUM CHLORIDES: T1;COBALT CHLORIDES: T2;COMPUTER CALCULATIONS;DIAGRAMS;EQUATIONS;LEAST SQUARE FIT;MOLTEN SALTS;QUANTITY RATIO;VAPOR PRESSURE: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B12

<99>
Buryleva, E.B.; Mironov, V.L.; Garanina, I.A.; Ignat'eva, L.N. (Krasnodarskij Politekhnicheskij Inst. (USSR))

Temperature dependence of vapor pressure of rare earth halides and their alloys AIX-08:289193;EDB-77:069112; Zh. Fiz. Khim. (ZFKHA) 50:(8):2174-2175 (Aug 1976)

SUBJECT DESCRIPTORS: ALLOYS;HALIDES;RARE EARTH COMPOUNDS: T1;TEMPERATURE DEPENDENCE;VAPOR PRESSURE: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

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<100>
Butskii, E.V.; Grigoryan, V.A.; Fillipov, A.F.; Topilin, V.V.; Krasnova, I.A. (Moskovskij Inst. Stali i Splavov (USSR))

Solubility of nitrogen in multicomponent nickel base alloys EDB-76:036267; Izv. Vyssh. Uchebn. Zaved., Chern. Metall. (IVUMA) (1):47-51 (Jan 1975)

SUBJECT DESCRIPTORS: LIQUID METALS;MOLYBDENUM ALLOYS: T1;NICKEL BASE ALLOYS: T2;NIOBIUM ALLOYS: T3;NITROGEN: T5;SOLUBILITY: Q5;SOLVENT PROPERTIES: Q1,Q2,Q3,Q4;TEMPERATURE DEPENDENCE;THERMODYNAMIC MODEL;TUNGSTEN ALLOYS: T4;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<101>
Bykhovskij, A.I.; Pashchenko, A.V. (Ukrainskaya Sel'skokhozyajstvennaya Akademiya, Kiev)

Nonisothermal flow of liquid metals over the surface of solid ones EDB-76:036462; Fiz. Met. Metalloved. (FMMEA) 38:(6):1209-1217 (Dec 1974)

SUBJECT DESCRIPTORS: ABSORPTION HEAT;CAPILLARY FLOW: Q5;DIAGRAMS;DIFFUSION;ENTHALPY;ISOTHERMAL PROCESSES;KINETIC EQUATIONS;MERCURY: T5;SOLUBILITY;TEMPERATURE DEPENDENCE;WETTABILITY: Q1,Q2,Q3,Q4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<102>
Cape, T.W.; Maroni, V.A.; Cunningham, P.T. (Argonne National Lab., Ill. (USA)); Bates, J.B.

Raman and i.r.-emission studies of some tungstate- and molybdate-containing melts AIX-07:262497;EDB-77:069054; Spectrochim. Acta, Part A (SAMCA) 32A:(5):1219-1223 (1976)

SUBJECT DESCRIPTORS: INFRARED SPECTRA: Q1,Q2;MOLECULAR STRUCTURE;MOLTEN SALTS;MOLYBDATES: T1;RAMAN SPECTRA: Q1,Q2;SALTS;SOLUTIONS;STRUCTURAL CHEMICAL ANALYSIS;TUNGSTATES: T2;VIBRATIONAL STATES

ABSTRACT: Melts containing tungstate and molybdave been studied

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using Raman and i.r.-emission spectroscopy. Vibrational data obtained for Mo$sup 16$O$sub 4$$sup 2-$- and Mo$sup 18Osub 4$$sup 2-$- containing melts firmly support a tetrahedral structure for MoO$sub 4$$sup 2-$ (and by implication for WO$sub 4$$sup 2-$as well) and establish the correct assignment of $nu$$sub 2$ and $nu$$sub 4$ for this species. Acidification of these MoO$sub 4$$sup 2-$ and WO$sub 4$$sup 2-$ melts by addition of the corresponding metal trioxides produced no significant change in the observed spectra, although significant solubilities of the trioxides in the WO$sub 4$$sup 2-$ and MoO$sub 4$$sup 2-$ melts were observed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<103>
Cha, Y.S. (Argonne National Lab., IL); Costello, T.J.; Hopenfeld, J.; Miller, R.L. ** Cooper, M.H. (ed.), American Nuclear Society, Hinsdale, Ill.; American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inc., New York; Energy Research and Development Administration, Washington, D.C. (USA); American Nuclear Society, Pittsburgh, Pa. Pittsburgh Section

Experimental investigation of cavitation inception and damage in a flowing sodium environment In Proceedings of the international conference on liquid technology in energy production ** INS-77:015776;ERA-02:059299;EDB-77:138125; (Nov 1976) CONF-760503--P2

SUBJECT DESCRIPTORS: CAVITATION: Q2;DATA;FLUID FLOW;LMFBR TYPE REACTORS: T1;MASS TRANSFER;MOCKUP;PRESSURE DROP;REACTOR COOLING SYSTEMS: M2,Q1;SIMULATION;SODIUM

ABSTRACT: The paper describes the interim results of cavitation inception and damage tests in a flowing sodium loop typical of that encountered in an LMFBR. Venturis were used as the cavitators in both the hot leg (538$sup 0$C) and the cold leg (371$sup 0$C) test sections. Cavitation inception data obtained in the present test showed no significant difference from those in water system reported previously. The venturi throat velocity for the damage test was equal to approximately 1.2 times that at inception for the same downstream pressure. Severe damage was observed in both venturis for a testing duration of 2000 hours with cavitation damage in the cold leg being more severe than that in the hot leg. Weight loss due to mass transfer and other effects was much smaller than that due to cavitation. Pressure drop across the venturis was observed to decrease with time during

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<103> CONT.
the test, presumably due to the increase in venturi throat diameter.

EDB SUBJECT CATEGORY: EDB-210500;420400
INIS CATEGORY: E35;E11

<104>
Chandola, L.C.; Machado, I.J. (Bhabha Atomic Research Centre, Bombay (India). Spectroscopy Div.)

Spectrographic determination of trace impurities in reactor grade aluminium AIX-07:241781;EDB-76:071559; Indian J. Technol. (IJOTA) 13:(10):471-743 (Oct 1975)

SUBJECT DESCRIPTORS: ACCURACY;ALUMINIUM;ALUMINIUM OXIDES: T1;ANTIMONY: T16;BISMUTH: T4;BORON: T3;CADMIUM: T5;CHEMICAL ANALYSIS: Q1;CHROMIUM: T7;COBALT: T6;COPPER: T8;EMISSION SPECTROSCOPY: Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18,Q9,Q20,Q21;GALLIUM: T10;IMPURITIES;INDIUM: T11;IRON: T9;LEAD: T15;MAGNESIUM: T12;MOLYBDENUM: T13;NICKEL: T14;QUANTITATIVE CHEMICAL ANALYSIS;REACTOR MATERIALS;SAMPLE PREPARATION;SENSITIVITY;SILICON: T17;SILVER: T2;TIN: T18;TITANIUM: T19;TRACE AMOUNTS;VANADIUM: T20;ZINC: T21

ABSTRACT: A spectrographic method enabling the determination of 21 trace impurities in aluminium oxide is described. The technique involves mixing the sample with graphite buffer in the ratio 1:1, loading it in a graphite electrode and arcing it for 30 sec. in a dc arc to 10 A current against a pointed graphite cathode. The spectra are photographed on Ilford N.30 emulsion employing a large quartz spectrograph. The aluminium line at 2669.2 A$sup 0$ serves as the internal standard. The impurities determined are Ag, B, Bi, Cd, Co, Cr, Cu, Fe, Ga, In, Mg, Mo, Ni, Pb, Sb, Si, Sn, Ti, V and Zn. The sensitivity varies from 5 to 100 ppm and the precision from +- 5 to +- 22% for different elements. A method for converting aluminium metal to aluminium oxide is described. It is found that boron is not lost during this conversion.

EDB SUBJECT CATEGORY: EDB-400104
INIS CATEGORY: B11

<105>
Chaplygin, G.V. (AN SSSR, Moscow. Inst. Kristallografii)

Experimental determination of formation heat of gaseous Ga$sub 2$O and In$sub 2$O AIX-08:312148;EDB-77:094787; Zh. Fiz. Khim. (ZFKHA) 49:(11):2767-2771 (Nov 1975)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION;CHEMICAL REACTIONS;FORMATION HEAT: Q1,Q2;GALLIUM OXIDES: T2;INDIUM;INDIUM OXIDES: T1;LIQUID METALS;VERY HIGH TEMPERATURE;WATER VAPOR

ABSTRACT: The flow method was used to study the reaction 2Insub((liq.))+Hsub(2)Osubf(gas)) reversible Insub02)Osub((gas))+Hsub(2)Osub((gas)) at temperatures of 1100-1300 deg K. The vapor pressure of water was 6.1x10$sup -3$ atm. The experimental value of the enthalpy of the reaction was determined by taking into account possible errors present in the standard energy function. This made it possible to obtain a more precise value for the standard enthalpy for the formation of gaseous InH$sub 2$O: $delta$Hsub(f 298 deg K)sup(0) = -15.7 +- 1.0 kcal/mole (according to the Third law of thermodynamics) and -14.6 kcal/mole (according to the second law of thermodynamics). These values are close to the corresponding average values reported in literature and calculated according to the Third law of thermodynamics. The use of a simple chemical reaction made it possible to increase the precision of determining the standard enthalpy of Insub(2)Osub((gas)) formation.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<106>
Cheburkov, V.I.; Rozanov, A.N.

In Kinetics of reaction of liquid lithium with oxygen and nitrogen ** ERA-02:049275;EDB-77:107370; Metall. Metalloved. Chist. Met., Sb. Nauchn. Rabot (MMIFA) (7):168-173 (1968) BNWL-tr--247

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;CHEMICAL REACTION KINETICS: Q2,Q3;CHEMICAL REACTIONS;HIGH TEMPERATURE;LIQUID METALS;LITHIUM: M1;LOW PRESSURE;MEDIUM VACUUM;SOLUBILITY;SOLVENT PROPERTIES

ABSTRACT: The kinetics of the reaction of liquid lithium with oxygen was investigated in the temperature range 210 to 640$sup 0$C at pressures of 130 to 1 mm Hg. The kinetics of the reaction of liquid lithium with nitrogen was investigated at temperatures ranging from 295 to 409$sup 0$C at 20 to 0.5 mm Hg. The observed deviations of the kinetic curves of

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<106> CONT.
oxidation and nitriding of liquid lithium from a linear relation are due to the solution of oxygen and nitrogen in the liquid metal. The solubility of oxygen in lithium in the temperature range 210 to 635$sup 0$C (0.003 to 0.57 at. percent respectively) was determined from the kinetic curves. The activation energies of the processes of oxidation (Q/sub lin/ = 15.6 kcal/mole and Q/sub log/ = 15.3 kcal/mole) and nitriding (Q = 23 kcal/mole) of lithium and the heat of solution of oxygen in lithium ($delta$H = 11.7 kcal/mole) were calculated.

EDB SUBJECT CATEGORY: EDB-400201;360105

<107>
Chereau, P.; Dean, G.; de Franco, M. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. d'Etudes des Combustibles a Base de Plutonium); Gerdanian, P.

High-temperature microcalorimetric measurements of partial molar enthalpy of solution, $delta$H(O$sub 2$), in plutonium + oxygen AIX-08:305647;EDB-77:107493; J. Chem. Thermodyn. (JCTDA) 9:(3):211-219 (Mar 1977)

SUBJECT DESCRIPTORS: CALORIMETRY;CHEMICAL COMPOSITION;OXYGEN;PHASE DIAGRAMS: Q1;PLUTONIUM;PLUTONIUM OXIDES: T1;SOLUTION HEAT: Q1;VARIATIONS;VERY HIGH TEMPERATURE

ABSTRACT: Direct measurements of $delta$H(O$sub 2$), the partial molar enthalpy of solution of oxygen, have been performed, at 1373 K, with a high-temperature microcalorimeter, in the plutonium + oxygen system. The variation of $delta$H(O$sub 2$) with composition gives new information, especially in the PuOsub(1.5) to PuOsub(1.75) region, which are in agreement with the new phase diagram proposed by Boivineau (J. Nucl. Mater.; 31:38 (1976)), from high-temperature X-ray studies. This system is similar to cerium + oxygen.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<108>
Chernov, V.S.; Busol, F.I.

Mechanism of metals modifying AIX-07:236361;EDB-76:053654; Izv. Akad. Nauk SSSR, Met. (IZNMA) (2):71-77 (Mar 1975)

SUBJECT DESCRIPTORS: ADSORPTION;BORON;CRYSTAL GROWTH;CRYSTAL-PHASE TRANSFORMATIONS: Q1;CRYSTALLIZATION;DENDRITES;DIFFUSION;EQUATIONS;EUTECTICS;GE MANIUM;INTERFACES;METALS: T1;PHASE

<108> CONT.
DIAGRAMS;POTASSIUM;QUANTITY RATIO;SODIUM;SOLID SOLUTIONS;SOLUBILITY;SURFACE TENSION;TEMPERATURE DEPENDENCE

ABSTRACT: Data from the literature are cited to show that in several cases, the mechanism of modification of metals and alloys by additives soluble in the melt cannot be explained by the adsorption hypothesis based on the surface activity of these additives. It is suggested that the mechanism of modification by soluble additives can be explained by the presence of a layer of liquid enriched (or depleted) in the additives preceding the crystallization front (densification by concentration), formed under actual conditions of crystallization as a result of the different solubilities of the additive in the solid and liquid phases of the base metal, regardless of its surface activity. This densification by concentration leads to the inhibition of crystal growth in the base metal (barrier action) and to concentration overcooling. On the basis of this theory it is suggested that the modifying action of additives can be predicted from some parameters of the phase diagrams.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<109>
Chilton, G.R.; Kirkham, I.A. ** Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Determination of oxygen potentials of hyperstoichiometric U--Pu dioxides in the temperature range 1,500-1,850 K In 5th international conference on plutonium and other actinides. Book of abstracts ** AIX-07:232722;EDB-76:087400; (1975) AED-Conf--75417-013

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION: Q1,Q2;EQUILIBRIUM;PLUTONIUM DIOXIDE: T1;URANIUM DIOXIDE: T2;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400102;050700
INIS CATEGORY: B12

<110>

<110>
Chilton, G.R.; Kirkham, I.A. (UKAEA Reactor Group, Windscale. Reactor Development Labs.) ** Blank, H.; Lindner, R. (eds.)

Determination of oxygen potentials of hyperstoichiometric U-Pu dioxides in the temperature range 1500-1850 K In Plutonium 1975 and other actinides **
AIX-(8:309989;ERA-02:041826;EDB-77:094384; (1976)
North-Holland

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION: Q1,Q2;FREE ENTHALPY;OXYGEN;PHASE STUDIES;PLUTONIUM DIOXIDE: T1;TEMPERATURE DEPENDENCE;THERMODYNAMICS;URANIUM DIOXIDE: T2;VERY HIGH TEMPERATURE

ABSTRACT: Oxygen potentials for Usub(0.85)Pusub(0.15) and Usub(0.69)Pusub(0.31) oxides have been measured at 1518, 1623 and 1823K using a transpiration technique. The results show that the oxygen potentials for the oxide become progressively less negative with increasing plutonium content over the temperature range used. Differences exist between extrapolation of previously published low temperature data and the results of this work.

EDB SUBJECT CATEGORY: EDB-360202;050700
INIS CATEGORY: B24

<111>
Chilton, J.E. Jr., Lockheed Missiles and Space Co., Palo Alto, Calif. (USA)

In Lithium--silver chloride secondary battery investigation. Quarterly technical progress report No. 2 ** EDB-76:047750; (Jul 1964) AD--450428

SUBJECT DESCRIPTORS: ADDITIVES;ALUMINATES;ALUMINIUM;ALUMINIUM CHLORIDES;BROMIDES;CARBONIC ACID ESTERS;CATHODES;CHLORATES;CHLORINE COMPOUNDS;CONTAINERS: Q1;ELECTROCHEMISTRY: Q1;ELECTRODEPOSITION;ETHERS;FABRICATION;GRAPHITE;LITHIUM;LITHIUM CHLORIDES;LITHIUM COMPOUNDS;METAL-NONMETAL BATTERIES: M1;ORGANIC SOLVENTS;ORGANOMETALLIC COMPOUNDS;SEALS;SILVER;SILVER CHLORIDES;SILVER COMPOUNDS;SOLUBILITY;TOLUENE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250902;250903

<112>
Cho, K. (Korea Univ., Kodaira, Tokyo (Japan). Faculty of Engineering)

Study on conductivity, density, and viscosity of molten salt systems AIX-08:300825;EDB-77:089225; Denki Kagaku (DNKKA) 44:(5):335-338 (May 1976)

SUBJECT DESCRIPTORS: CORRELATIONS;DENSITY: Q1,Q2,Q3,Q4,Q5;DYSPROSIUM CHLORIDES: T1;ELECTRIC CONDUCTIVITY: Q1,Q2,Q3,Q4,Q5;GADOLINIUM CHLORIDES: T2;LANTHANUM CHLORIDES: T3;MELTING POINTS;MOLTEN SALTS;NEODYMIUM CHLORIDES: T4;PRASEODYMIUM CHLORIDES: T5;VISCOSITY: Q1,Q2,Q3,Q4,Q5

ABSTRACT: A relation between the equivalent conductivity and density for molten salts is deduced with the aid of significant structures theory, and the solid state density at melting point is evaluated approximately for some rare-earth metal chlorides and the other chlorides. Furthermore, the relation among the equivalent conductivity, density, and viscosity for some molten salts is discussed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<113>
Chudinov, E.G.; Odinov, B.V.

Investigation into reactions between trioctylammonium nitrates and rare earth nitrates by X-ray electron spectroscopy AIX-08:286002;EDB-77:044226; Koord. Khim. (KOKHD) 2:(6):768-771 (1976)

SUBJECT DESCRIPTORS: BINDING ENERGY;CHEMICAL REACTIONS: Q1,Q2,Q3;COMPLEXES;ELECTRON SPECTROSCOPY;NITRATES: T2;NITRIC ACID;RARE EARTH COMPOUNDS: T3;TOA: T1;X-RAY SPECTROSCOPY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201;400301
INIS CATEGORY: B12

<114>

<114>
Chupin, A.N.; Krylov, E.I. ** AN SSSR, Sverdlovsk. Inst. Khimii; Vostochnyj Nauchno-Issledovatel'skij i Proektnyj Inst. Ogneupornoj Promyshlennosti, Sverdlovsk (USSR); Ural'skij Nauchno-Issledovatel'skij Khimicheskij Inst., Sverdlovsk (USSR)

Synthesis and properties of rare earth titanotungstates In Summaries of reports of the all-union meeting on solid body chemistry. 3--5 June 1975. III. Synthesis, phase equilibrium and use of solid oxide compounds **
AIX-08:289196;EDB-77:094481; (1975) INIS-mf--3246

SUBJECT DESCRIPTORS: CALCINATION;CHEMICAL PREPARATION: Q1,Q2,Q3;CRYSTAL STRUCTURE;PHYSICAL PROPERTIES: Q1,Q2,Q3;RARE EARTH COMPOUNDS: T1;TEMPERATURE DEPENDENCE;TITANIUM COMPOUNDS: T3;TUNGSTATES: T2;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360601
INIS CATEGORY: B12

<115>
Chuprikov, G.E.; Epifanova, K.I.; Malyutina, T.M.; Samokhin, G.A.

Compatibility of molten rare earth metals with refractory materials In Nauchnye trudy GIREDMETA. Vol. 52 **
AIX-08:317938;EDB-77:120044; (1974) GIREDMET

SUBJECT DESCRIPTORS: CAVITIES;CHEMICAL COMPOSITION;CHROMIUM: T7;COMPATIBILITY: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;CRYSTALLIZATION;MELTING;METALLOGRAPHY;MICROHARDNESS;MOLYBDENUM: T10;MOLYBDENUM ALLOYS: T6;NIOBIUM: T8;OXYGEN;PLASTICITY;POROSITY;RARE EARTHS: T1;SOLUBILITY: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;TANTALUM ALLOYS: T5;TUNGSTEN: T9;TUNGSTEN ALLOYS: T4;VANADIUM: T3;WEAR;ZIRCONIUM: T2

ABSTRACT: Interaction of rare-earth metal and yttrium melts with Zr, V, Nb, Cr, W, Mo refractory metals as well as alloys of W-Mo, W-Ta systems has been studied. W /2-3%/ Mo alloy proved to be most chemically resistant with respect to the melts under consideration. It is shown that the W /2-3%/ Mo alloy should be used as the crucible material for growing the specimens from the melt intended for precision physical measurements at a temperature of liquid helium since tungsten

<116> CONT.
tantalum which becomes a superconductor at a temperature of 4.5 deg K.

EDB SUBJECT CATEGORY: EDB-360101;360104
INIS CATEGORY: B22

<116>
Clark, R.P.; Blucher, R.L.; Goldsmith, H.J.

Phase diagram of system LiCl--KCl--CaCrO$sub 4$ EDB-77:131934; J. Chem. Eng. Data (JCEAA) 14:(4):465-470 (Oct 1969)

SUBJECT DESCRIPTORS: CALCIUM COMPOUNDS: T4;CHEMICAL COMPOSITION;CHROMATES: T5;ELECTROLYTES: Q1;EUTECTICS;LITHIUM CHLORIDES: T2;MELTING POINTS;PHASE DIAGRAMS: Q2,Q3,Q4,Q5;POTASSIUM CHLORIDES: T3;THERMAL BATTERIES: T1

ABSTRACT: The phase diagram was determined for the system LiCl--KCl--CaCrO$sub 4$. Binary eutectics were located at 60 wt % KCl--40 wt % CaCrO$sub 4$ (mp 651 C) and 62 wt % LiCl--38 wt % CaCrO$sub 4$ (m 638 C); ternary eutectic was found at 41 wt % LiCl--50 wt % KCl-- 9 wt % CaCrO$sub 4$ (mp 342 C). It was verified by x-ray diffraction that LiCl--KCl--CaCrO$sub 4$ is stable diagonal section in quaternary reciprocal system K, Li, CaCrO$sub 4$, Cl. The salt mixture LiCl--KCl--CaCrO$sub 4$, is electrolyte--depolarizer combination used in thermal cells (voltaic cells employing molten salt electrolyte).

EDB SUBJECT CATEGORY: EDB-250903;360602

<117>
Clark, R.P.; Reinhardt, F.W.

Phase diagram for the ternary system CaCl$sub 2$--KCl--CaCrO$sub 4$ ERA-01:016809;EDB-76:042604; Thermochim. Acta (THACA) 14:(1/2):113-129 (1976)

SUBJECT DESCRIPTORS: CALCIUM CHLORIDES: T1;CALCIUM COMPOUNDS: T3;CHROMATES: T4;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;POTASSIUM CHLORIDES: T2;THERMAL BATTERIES;X-RAY DIFFRACTION

ABSTRACT: The phase diagram for the system CaCl$sub 2$--KCl--CaCrO$sub 4$ has been determined using differential thermal analysis in conjunction with x-ray diffraction. CaCl$sub 2$--KCl--CaCrO$sub 4$ has been shown to be a stable diagonal section of the Ca,K//Cl, CrO$sub 4$ reciprocal ternary system. The 3 binary systems are: CaCl$sub 2$--KCl which exhibits a congruently melting compound (CaKCl$sub 3$)

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<117> CONT.
melting at 741$sup 0$C with eutectics at 24.0 mole percent KCl (m.p. 615$sup 0$C) and 74.3 mole percent KCl (m.p. 594$sup 0$C); CaCl$sub 2$--CaCrO$sub 4$ which shows a eutectic at 23.4 mole percent CaCrO$sub 4$ (m.p. 660$sup 0$C); and KCl--CaCrO$sub 4$ with a eutectic at 24.2 mole percent CaCrO$sub 4$ (m.p. 651$sup 0$C). The binary congruently melting compound separates the ternary system into 2 pseudoternary subsystems. A binary eutectic exists in the pseudobinary system CaKCl$sub 3$--CaCrO$sub 4$ at 12.9 mole percent CaCrO$sub 4$ (m.p. 672$sup 0$C). Ternary eutectics exist at 71.8 mole percent CaCl$sub 2$--17.3 percent KCl--10.9 percent CaCrO$sub 4$ (m.p. 575$sup 0$C) and 23.2 mole percent CaCl$sub 2$--71.2 percent KCl--5.6 percent CaCrO$sub 4$ (m.p. 573$sup 0$C). Isotherms are shown for the liquidus surface (primary crystallization) and for the secondary crystallization surface. Isothermal and vertical sections through the phase diagram are also shown. (auth)

EDB SUBJECT CATEGORY: EDB-400201

<118>
Clinton, J.E. Jr.; Conner, W.J.; Cook, G.M.; Holsinger, R.W., Lockheed Missiles and Space Co., Sunnyvale, Calif. (USA)

In Lithium--silver chloride secondary battery investigation. Final report, December 1963--November 1964 ** EDB-77:061339; (Feb 1965) AD--612189

SUBJECT DESCRIPTORS: ALUMINIUM CHLORIDES;CARBONIC ACID ESTERS;CHEMICAL REACTIONS;CONTAINERS;DESIGN;ENTROPY;ETHERS;FABRICATION;FREE ENERGY;LITHIUM;LITHIUM CHLORIDES;METAL-NONMETAL BATTERIES: M1;PERFORMANCE: Q1;POLYETHYLENES;REACTION HEAT;SILVER CHLORIDES;THERMODYNAMIC PROPERTIES;TOLUENE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250901

<119>
Cogley, D.R.; Butler, J.N.; Synnott, J.C., Tyco Labs., Inc., Waltham, Mass. (USA)

In Composition of nonaqueous solutions of potential use in high energy density batteries. Final report, 15 Nov 1969--14 Nov 1972 ** EDB-76:052748; (1972) AD--763140

SUBJECT DESCRIPTORS: DESIGN;DMSO;METAL-NONMETAL BATTERIES:

<119> CONT.
M1;SOLUBILITY: Q2,Q3,Q4,Q5,Q6;STORAGE LIFE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250901;400201

<120>
Collins, J.L.; Osborne, M.F.; Malinauskas, A.P.; Lorenz, R.A.; Manning, S.R., Oak Ridge National Lab., Tenn. (USA)

In Knudsen cell--mass spectrometer studies of cesium--urania interactions ** INS-77:000334;ERA-02:010656;EDB-77:007630; (Jun 1976) ORNL/NUREG/TM--24

SUBJECT DESCRIPTORS: CESIUM;CESIUM CARBONATES: T2;CESIUM HYDROXIDES: T3;CESIUM URANATES: M4;CHEMICAL REACTION YIELD: Q4;CHEMICAL REACTIONS: Q1,Q2,Q3;FISSION PRODUCTS;KNUDSEN FLOW;MASS SPECTROSCOPY;PHASE STUDIES;URANIUM DIOXIDE: M1;VAPOR PRESSURE;VERY HIGH TEMPERATURE

ABSTRACT: Limited Knudsen cell--mass spectrometer studies were made of the partial pressures of cesium-containing species [assumed to be primarily Cs(g)] over Cs$sub 2$CO$sub 3$ and over phase equilibria involving UO$sub 2$ and probable Cs-U-O compounds formed from mixtures that initially contained either Cs$sub 2$CO$sub 3$-UO$sub 2$ or CsOH-UO$sub 2$. Although additional work is required to further define the equilibria involved, the data demonstrate unambiguously a significant reduction in cesium partial pressures due to probable Cs-U-O compound formation and indicate essentially identical behavior with either CsOH or Cs$sub 2$CO$sub 3$ as the starting material with UO$sub 2$.

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13;B12

<121>
Coninck, R. de; Lierde, W. van; Gijs, A. (Centre d'Etude de l'Energie Nucleaire, Mol (Belgium))

Uranium carbide: thermal diffusivity, thermal conductivity and spectral emissivity at high temperatures EDB-76:048840; J. Nucl. Mater. (JNUMA) 57:(1):69-76 (Jul 1975)

SUBJECT DESCRIPTORS: EMISSIVITY;THERMAL CONDUCTIVITY;THERMAL DIFFUSIVITY;THERMODYNAMIC PROPERTIES: Q1;URANIUM CARBIDES: T1;VERY HIGH TEMPERATURE

ABSTRACT: The thermal diffusivity, thermal conductivity, and spectral emissivity at 0.65 mum of uranium carbide have

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<121> CONT.
been measured with the aid of a modulated electron-beam apparatus. For hypostoichiometric samples, a reversible, time-dependent oxidation-reduction of the surface interfered with the measurements between 1100 and 1400$sup 0$C, without affecting the results. Expressions are derived representing the thermal diffusivity, thermal conductivity, and spectral emissivity for stoichiometric and for slightly hypo- and hyperstoichiometric uranium carbide.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B24

<122>
Courths, R. (Freie Univ. Berlin (F.R. Germany). Inst. fuer Atom- und Festkoerperphysik)

Optical absorption Zeeman spectroscopy of rare earth orthochromites. II. Theory AIX-07:261722;EDB-77:019349; Z. Phys., B (ZPBBD) 22:(3):253-259 (Nov 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTROSCOPY;ANISOTROPY;CHROMIUM COMPOUNDS: M1;ELECTRONIC STRUCTURE: Q1,Q2;MAGNETIC FIELDS;MAGNETO-OPTICAL EFFECTS;RARE EARTH COMPOUNDS: M2;RARE EARTHS;TEMPERATURE DEPENDENCE;ZEEMAN EFFECT

ABSTRACT: Using a single ion molecular field model, expressions for the energy of Kramers ion states of rare earths in rare earth orthochromites (RECrO$sub 3$) have been derived as a function of temperature and applied magnetic fields. These microscopic expressions reflect the various RE-RE and RE-Cr coupling constants of the isotropic-symmetric and antisymmetric interactions of an RE ion in the various magnetic states of RECrO$sub 3$.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: A13

<123>
Courths, R.; Huefner, S. (Freie Univ. Berlin (F.R. Germany). Inst. fuer Atom- und Festkoerperphysik)

Optical absorption Zeeman spectroscopy of rare earth orthochromites. I. ErCrO$sub 3$
AIX-07:261721;EDB-77:019348; Z. Phys., B (ZPBBD) 22:(3):245-251 (Nov 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTROSCOPY: Q1,Q2;CATIONS;CHROMIUM COMPOUNDS: T1;ERBIUM COMPOUNDS: T2;MAGNETIC DIPOLES;MAGNETO-OPTICAL EFFECTS;RARE EARTH COMPOUNDS;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;ZEEMAN EFFECT

<123> CONT.

ABSTRACT: The optical absorption spectrum of Er$sup 3+$ in ErCrO$sub 3$ in the phases Gamma$sub 1$, Gamma$sub 2$ and Gamma$sub 4$ has been studied as a function of temperature and applied magnetic field. The experimental data for the Er$sup 3+$ ground doublet splitting are analyzed using a single ion molecular field approach. The analysis shows that the Cr-Er interaction is predominantly antisymmetric exchange, the magnetic dipole-dipole interaction being an order of magnitude smaller. The Er-Er interaction is of exchange as well as of dipolar origin.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: A13

<124>

Cox, D.L.; Cronenberg, A.W. (New Mexico Univ., Albuquerque (USA))

Theoretical prediction of the thermal conductivity of uranium carbide vapor AIX-08:343057;EDB-78:021943; J. Nucl. Mater. (JNUMA) 67:(3):326-331 (Aug 1977)

SUBJECT DESCRIPTORS: CHAPMAN-ENSKOG THEORY;CHEMICAL REACTIONS;DISSOCIATION;ENTHALPY;LMFBR TYPE REACTORS;MOLECULE-MOLECULE COLLISIONS;REACTOR CORE DISRUPTION;THERMAL CONDUCTIVITY: Q1,Q2;URANIUM CARBIDES: T1;VAPORS: T2

ABSTRACT: Theoretical predictions are made for the thermal conductivity of uranium carbide vapor. The calculations take into account collisional, dissociation, and chemical reaction effects.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<125>

Dalvi, A.G.I.; Deodhar, C.S.; Joshi, B.D. (Bhabha Atomic Research Centre, Bombay (India). Radiochemistry Div.)

Chemical separation and spectrographic estimation of rare earths and yttrium in PuO$sub 2$ and (U,Pu)O$sub 2$ AIX-08:312068;EDB-77:094725; Talanta (TLNTA) 24:(2):143-145 (Feb 1977)

SUBJECT DESCRIPTORS: CERIUM: T1;CHEMICAL ANALYSIS: Q15,Q16;DYSPROSIUM: T2;EMISSION SPECTROSCOPY: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14;ERBIUM: T3;EUROPIUM: T4;GADOLINIUM: T5;HOLMIUM: T6;IMPURITIES;LANTHANUM: T7;LUTETIUM: T8;MIXTURES;NEODYMIUM: T9;PLUTONIUM DIOXIDE: T15;QUANTITATIVE CHEMICAL

<125>

<125> CONT.
ANALYSIS;SAMARIUM: T10;SOLVENT EXTRACTION;TERBIUM: T11;THULIUM: T12;TOA;TRACE AMOUNTS;URANIUM DIOXIDE: T16;XYLENES;YTTERBIUM: T13;YTTRIUM: T14

ABSTRACT: An emission spectrographic method for the estimation of rare-earth impurities in plutonium oxide and the mixed oxide (U,Pu)O$sub 2$ (30% PuO$sub 2$ - 70% UO$sub 2$) has been developed. Rare-earth impurities are separated from the matrix by solvent extraction with tri-n-octylamine in xylene and are estimated after concentration. Thulium is used as internal standard and LiF-AgCl as carrier. The spectra are excited in a d.c. arc. The detection limits lie in the range 0.004 to 0.1 mug and the coefficient of variation ranges from 5 to 23%.

EDB SUBJECT CATEGORY: EDB-400104
INIS CATEGORY: B11

<126>
Danan, J. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France))

Specific heat of thorium monocarbide from 2 to 300K
EDB-76:054020; J. Nucl. Mater. (JNUMA) 57:(3):280-282 (Sep 1975)

SUBJECT DESCRIPTORS: DEBYE TEMPERATURE;ELECTRONIC SPECIFIC HEAT;LATTICE VIBRATIONS;LOW TEMPERATURE;SPECIFIC HEAT: Q1;TEMPERATURE DEPENDENCE;THORIUM CARBIDES: T1;ULTRALOW TEMPERATURE;VERY LOW TEMPERATURE

ABSTRACT: The specific heat of ThC has been measured in the range 1.5 to 300$sup 0$K. From the results, the thermodynamic functions were calculated at 298.15$sup 0$K; the Debye and Einstein temperatures are linked with the acoustic and optical branches, respectively, of the lattice vibrations, and the coefficient ($gamma$=2.12mJ/mol.K$sup 2$) of electronic specific heat.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<127>

Dao, N.Q.; Knidiri, M. (Ecole Centrale des Arts et Manufactures, 92 - Chatenay-Malabry (France). Inst. de Chimie)

Study of the compounds M$sub 3$UO$sub 2$F$sub 5$ (M = K, Rb, Cs, NH$sub 4$) by i.r. absorption and Raman diffusion spectrophotometry. III. Effect of cation on vibration frequency of the ion UO$sub 2$F$sub 5$$sup 3-$
AIX-07:262500;EDB-77:019519; Spectrochim. Acta, Part A (SAMCA) 32A:(5):1113-1118 (1976)

SUBJECT DESCRIPTORS: AMMONIUM COMPOUNDS: T1;CATIONS;CESIUM FLUORIDES: T2;CHEMICAL BONDS;INFRARED SPECTRA;MOLECULAR STRUCTURE;POTASSIUM FLUORIDES: T3;RAMAN SPECTRA;RUBIDIUM COMPOUNDS: T4;STRUCTURAL CHEMICAL ANALYSIS;URANYL FLUORIDES: T5;VIBRATIONAL STATES: Q1,Q2,Q3,Q4,Q5

ABSTRACT: Normal coordinate analysis of the UO$sub 2$F$sub 5$$sup 3-$ ion using the Wilson-Decius GF matrix method was carried out. Good agreement with the observed spectra was obtained. Discussions are given on the force constants obtained for U-O and U-F bonds and on the outer-sphere interaction in the series M$sub 3$UO$sub 2$F$sub 5$.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B12

<128>

Davies, B.S.J.; Polley, M.V.; Skyrme, G., Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.

In Physical models of mass transport of iron and nickel in liquid sodium systems ** AIX-07:248041;EDB-77:018848; (Dec 1975) CEGB-RD/B/M--3548

SUBJECT DESCRIPTORS: CORROSION: Q1,Q2;CORROSIVE EFFECTS: Q3;DIFFUSION;IRON: T1;LIQUID FLOW;LIQUID METALS;MASS TRANSFER;NICKEL: T2;SODIUM: T3;SOLUBILITY

ABSTRACT: Experimental observations on corrosion of pure iron and nickel specimens in non-isothermal loops containing flowing sodium have been used to derive values of the concentration of dissolved material at the entrance to the test section and diffusion coefficients of the test material in sodium. The former values differ from the saturation value by only 10$sup -3$ ppm, which is small compared to currently recommended solubility values. The phenomenon cannot be explained in terms of circulating particles. Two other possible explanations are also dismissed. The diffusion coefficient values are consistent with the corroding species being atoms, or molecules containing a few atoms. It is also shown that the observations are better explained in terms of

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<128> CONT.
boundary layer controlled mass transfer, rather than a surface controlled process. A computer model based on an alternative solubility relationship is shown to produce results which describe well the observed variation of corrosion rate with oxygen concentration, sodium velocity and downstream position.

EDB SUBJECT CATEGORY: EDB-360105
INIS CATEGORY: B15

<129>
Davydov, A.D.; Danil'tseva, N.A.; Kamkin, A.N.

Electrochemical machining of the molybdenum VM-1 alloy
AIX-08:295619;EDB-77:055195; Elektron. Obrab. Mater. (EOBMA) (4):8-9 (Jul 1976)

SUBJECT DESCRIPTORS: ALLOY-VM-1: T1;ELECTROCHEMICAL MACHINING: Q1;ELECTROLYTES;METALLOGRAPHY;POTASSIUM BROMIDES;PRODUCTIVITY;QUANTITY RATIO;SODIUM CARBONATES;SODIUM CHLORIDES;SODIUM HYDROXIDES;SODIUM NITRATES;SOLUBILITY;SURFACES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360101
INIS CATEGORY: B21

<130>
de Beer, R.; van Ormondt, D.; Homs, M.H. (Technische Hogeschool Delft (Netherlands)); den Hartog, H.W. (Rijksuniversiteit Groningen (Netherlands))

$sup 139$La ENDOR of LaCl$sub 3$:Gd$sup 3+$
AIX-08:308023;EDB-77:082742; Physica, B, C (PHBCD) 84:(3):367-370 (Oct 1976)

SUBJECT DESCRIPTORS: CATIONS;DOPED MATERIALS;ENDOR: Q2;GADOLINIUM IONS;HAMILTONIANS;HYPERFINE STRUCTURE: Q1;LANTHANUM: T1;LANTHANUM 139: T2;LANTHANUM CHLORIDES;LIGANDS;MAGNETIC FIELDS;MICROWAVE RADIATION;MULTICHARGED IONS;QUADRUPOLES;SPECTRA;SPIN;ULTRALOW TEMPERATURE

ABSTRACT: The magnetic transferred h.f.i. and the electric quadrupole interaction of the two $sup 139$La nuclei nearest to Gd$sup 3+$ in LaCl$sub 3$ have been determined with ENDOR, using Ka-band (34.5 GHz) microwaves. For both lanthanum positions it was found that Asub(s)/Asub(p) approximately 1 and Asub(p)-Asub(d) approximately 0. The ENDOR data give no

<130> CONT.
evidence for significant local distortion around Gd$sup 3+$. This implies that ligand displacements due to the difference in size between Gd$sup 3+$ and La$sup 3+$ cannot account for the disagreement between the cbserved and calculated B$sup 0$$sub 2$ of Gd$sup 3+$.

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: A13

<131>
de Bievre, P.; van Audenhove, J. (Commission of the European Communities, Geel (Belgium). Central Bureau for Nuclear Measurements)

Accurate procedure to safeguard the fissile material content of input and output solutions of reprocessing plants In Safeguarding nuclear materials. Vol. 2 **
AIX-08:284444;ERA-02:019449;EDB-77:035054; (1976) IAEA

SUBJECT DESCRIPTORS: ACCOUNTING: Q2;FISSILE MATERIALS: T2;FUEL REPROCESSING PLANTS: T1;FUEL SCANNING;ISOTOPE DILUTION;MASS SPECTROSCOPY;MATERIAL BALANCE;PLUTONIUM;QUANTITY RATIO;SAFEGUARDS: Q1;SPENT FUELS;URANIUM

ABSTRACT: A procedure is described by which to assay accurately fissile material contents of input and output solutions of reprocessing plants, using well-defined solid spikes and isotope dilution mass spectrometry. The procedure has been used in measurements performed at the request of the Directorate of Euratom Safeguards in the 1972-1975 period and some results are given. The procedure allows the fissile element contents to be guaranteed at the time and place of sample-taking (i.e. of safeguards inspection), which is an improvement over guaranteeing such contents at the time and place of analysis.

EDB SUBJECT CATEGORY: EDB-055001;050800
INIS CATEGORY: F41

<132>
De Coninck, R.; De Batist, R.; Gijs, A. (Centre d'Etude de l'Energie Nucleaire, Mol (Belgium))

Thermal diffusivity, thermal conductivity and spectral emissivity of uranium dicarbide at high temperatures
AIX-08:295891;EDB-77:068695; High Temp. - High Pressures (HTHPA) 8:(2):167-176 (1976)

SUBJECT DESCRIPTORS: ELECTRON BEAMS;EMISSION SPECTRA;EMISSIVITY: Q1;HIGH TEMPERATURE;TEMPERATURE DEPENDENCE;TEMPERATURE

<132>

<132> CONT.
MEASUREMENT;THERMAL CONDUCTIVITY: Q1;THERMAL DIFFUSIVITY: Q1;URANIUM CARBIDES: M1;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: Thermal diffusivity and thermal conductivity between 600 and 2070$sup 0$C, and spectral emissivity at 0.65 and at 2.3 micron between 1000 and 2070$sup 0$C have been determined for UC$sub 2$ samples with C/U approximately equal to 1.8 with a modulated-electron-beam thermal-diffusivity apparatus. Some associated thermophysical properties are discussed in accordance with metallographic microscopic examinations and x-ray diffraction analysis. The transformation of the samples into the (UC + UC$sub 2$) cubic solid-solution phase is clearly observable through the four measured quantities. Formation of U$sub 2$C$sub 3$, between 1100 and 1600$sup 0$C, was accompanied by an increase of the diffusivity and, indirectly, through cracks and holes, of the emissivities, but the conductivity remained unchanged. A simple but reliable procedure for correcting temperature measurements with a two-color pyrometer when the sample cannot be regarded as a gray body, as is the case for UC$sub 2$, is described.

EDE SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B23

<133>
de Franco, M.; Gatesoupe, J.P. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)) ** Blank, H.; Lindner, R. (eds.)

Thermodynamic properties of (U,Pu)Osub(2+-x) described by a cluster model In Plutonium 1975 and other actinides **
AIX-(8:309996;ERA-02:041840;EDB-77:094418; (1976)
North-Holland

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CRYSTAL MODELS;ENTHALPY;ENTROPY;FORMATION FREE ENTHALPY;INTERSTITIALS;MIXTURES;PLUTONIUM OXIDES: T1;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1,Q2;URANIUM OXIDES: T2;VACANCIES

ABSTRACT: A simple model is presented which allows the easy computation of $delta$GO$sub 2$ and $delta$HO$sub 2$, at any temperature and oxygen and plutonium content for UPuOsub(2+-x). Some implications on the nature of the defects

<134> CONT.
are drawn, values for their energy of formation are given and their concentrations may be computed.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B24

<134>
De Keroulas, F.; Calais, D.; Marcon, J.P.

In Distribution coefficient for U and Pu in the system (UPu)C + (UPu)$sub 2$C$sub 3$ ** ERA-01:016692;EDB-76:042331; J. Nucl. Mater. (JNUMA) 44::64-70 (1972) ORNL-tr--4133

SUBJECT DESCRIPTORS: FREE ENERGY;PHASE STUDIES;PLUTONIUM CARBIDES: T2;THERMODYNAMICS: Q1,Q2;URANIUM CARBIDES: T1

ABSTRACT: As part of a research program on mixed uranium/plutonium carbide, which is a possible fuel for fast reactors, a microprobe analyzer was used to examine the distribution of uranium and plutonium between the phases (U, Pu)C and (U, Pu)$sub 2$C$sub 3$. Two types of samples were available, with Pu/(U + Pu) ratios of 0.20 and 0.50. The proportion of (U, Pu)$sub 2$C$sub 3$ varied from 10 to 70 percent. Two equilibria temperatures, 1500 and 1700$sup 0$C, were used. Measurements of the distribution coefficients k/sub U/ = amount of uranium in (U, Pu)C/amount of uranium in (U, Pu)$sub 2$C$sub 3$, k/sub Pu/ = amount of plutonium in (U, Pu)C/amount of plutonium in (U, Pu)$sub 2$C$sub 3$ for each of the 14 samples led to values of the coefficients independent of temperature and proportions of the two phases. It is shown that with the help of two relationships (one defined by the proportion of phases (z and (1 - z)) and by the total ratio GAMMA = U/(U + Pu), GAMMA = xz + y (1 - z), where x/y = k/sub U/ and (1 - x)/(1 - y) = k/sub Pu/; the other defined by the free energies $delta$G of the two phases $Sigma$$delta$G = [$delta$G(UC) - $delta$G(PuC)] - [$delta$G(UC/sub 1.5/) - $delta$G(PuC/sub 1.5)] = RT log [y/(1 - y) x (1 - x)/x]), one can determine a priori values of x and y from a knowledge of GAMMA and z. By using the experimentally determined distribution coefficients and values of x and y = f(x) deduced from the second equation for arbitrary values of the various free energies, one can determine summation$delta$G experimentally. The result is consistent with recent measurement of $delta$G for stoichiometric PuG. (auth) one can determine $Sigma$$delta$G experimentally. The result is consistent with recent measurement of $delta$G for stoichiometric PuC. (auth)

EDB SUBJECT CATEGORY: EDB-360202

<135>

<135>

Dem'yanovich, M.A.; Ivanov, P.M.; Novoselov, G.P.; Prusakov, V.N.; Renard, Eh.V.; Skiba, O.V.; Serov, A.V.; Tsarenko, A.F.; Shevchenko, V.B.; Shmidt, V.S., International Atomic Energy Agency, Vienna (Austria)

In Basic problems of fast reactor fuel reprocessing **
AIX-C8:302956;ERA-02:037117;EDB-77:079691; (1977)
IAEA-CN--36/318

SUBJECT DESCRIPTORS: BOR-60 REACTOR:
T1;CHEMISORPTION;DECLADDING;ENTRAINMENT;FBR TYPE REACTORS:
T3;FLUORIDE VOLATILITY PROCESS;PURIFICATION;RADIATION
PROTECTION;RADIOACTIVITY;REPROCESSING: Q4;SBR-5 REACTOR:
T2;SOLVENT EXTRACTION;SPENT FUEL ELEMENTS: T4;SPENT FUELS:
Q1,Q2,Q3;URANIUM DIOXIDE

ABSTRACT: The paper considers two major directions in the recovery of fuel elements of nuclear power plants operated by fast reactors that are being developed in the USSR: a) aqueous procedures based on dissolution of fast reactor fuel with the following isolation and complete purification of valuable fuel components by a solvent extraction method; b) non-aqueous procedures based on fluorination of valuable fuel components and their purification from fission products by sublimation of higher fluorides. The section of the report dealing with aqueous procedures considers the problems of dissolution, radiation chemistry of aqueous and organic solutions, extraction and separation of uranium and plutonium macroamounts (equilibrium and kinetics), mathematical modelling of extraction process, use of water soluble neutron poisons, valent state of plutonium macroconcentrations, etc. The section of the report dealing with fluorination procedures considers the results of the experimental reprocessing of reactor BOR-60 irradiated uranium fuel with the burn-up above 10% cooled for 3-6 months. The paper gives the results of decladding experiments carried out on BOR-60 and BR-5 reactor fuels by the method of melting, as well as data on the distribution of fission-product elements in the apparatuses of experimental flowsheet and in the products of fuel recovery. The paper also gives data on amounts, corrosionproperties, gas evolution, and activity of wastes and discusses the conditions of their long-term safe storage.

EDB SUBJECT CATEGORY: EDB-C50800
INIS CATEGORY: B16

<136>
Denisova, N.D.; Bystrova, C.N.; Safronov, E.K.

Properties of zirconium and hafnium tetrachlorides and their saturated solutions In Proceedings of GIREDMET ** AIX-08:320603;EDB-77:113887; (1975) GIREDMET

SUBJECT DESCRIPTORS: EQUATIONS OF STATE;HAFNIUM CHLORIDES: T1;PHASE STUDIES: Q1,Q2;TEMPERATURE DEPENDENCE;VAPOR PRESSURE;ZIRCONIUM CHLORIDES: T2

ABSTRACT: The properties of saturated vapor of zirconium tetrachloride and hafnium tetrachloride were determined by investigating the P-V-T-N dependence of these compounds in gas phase. For each compound measurements were made of the molar volume and pressure of saturated vapor and the dependence of these parameters on the temperature. The saturated vapor of zirconium tetrachloride and hafnium tetrachloride obeys the ideal gas law starting with the following values of pressure, molar volume and temperature respectively: 2.5 kg/cm$sup 2$, 20600 cm$sup 3$/mole, 360 deg C and 2.6 kg/cm$sup 2$, 19600 cm$sup 3$/mole, 340 deg C. Phase diagram within P-N coordinates of the ZrCl$sub 4$-HfCl$sup 4$ system, calculated by using the state equation and Biron equation, was approximately the same as repofted in previous papers.

EDB SUBJECT CATEGORY: EDB-360603;400201
INIS CATEGORY: B12

<137>
Deodhar, S.S., Syracuse Univ., N.Y. (USA)

In Thermodynamics and kinetics of the formation of rare earth intermetallics ** INS-76:018149;EDB-76:071210; (1975) Syracuse Univ.

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;BINARY ALLOY SYSTEMS;DIFFUSION;FORMATION HEAT;FORMATION HEAT: Q1,Q2,Q3,Q4;INTERMETALLIC COMPOUNDS;LAVES PHASES;MAGNETIC PROPERTIES;RARE EARTH ALLOYS: T1;THERMODYNAMIC PROPERTIES

ABSTRACT: Heats of reaction of rare earth intermetallics with iron, cobalt and nickel were determined using Differential Thermal Analysis technique. The intermetallic compounds studied were of MgCu$sub 2$ type Laves phases and the rare earth elements studied were praseodymium, gadolinium, dyprosium and erbium. The reactions were exothermic and the heats of reaction were generally high. They varied from the low of -2.5 kcal/g mole for Fe$sub 2$Gd to the high of -35.3 kcal/g mole for Ni$sub 2$Er. The magnitudes of heats of reaction were always greater for the intermetallics of heavy

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<137> CONT.
rare earth elements. The rare earth intermetallics studied were either ferromagnetic or antiferromagnetic. The variations in the magnetic moments and the heats of reaction with respect to the atomic number of the rare earth elements followed certain trends. The similarities were observed in the trends of two properties. Electronic configuration for the MgCu$sub 2$ type rare earth intermetallics is proposed using Engel--Brewer correlation for metallic structures and the structural features of the Laves phase compounds. Kinetics of the reactions between the rare earth elements and iron, cobalt, and nickel was studied. The rate of reaction was diffusion controlled in each case. The Valensi--Carter equation for the diffusion mechanism satisfactorily described the kinetic behavior. The magnitudes of activation energies and frequency factors were determined. The reactions can be characterized by their reaction temperatures since they always begin at definite temperatures. It was observed that the reaction began at a higher temperature if the activation energy for the reaction was high.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<138>
Dergacheva, M.B.; Kozin, L.F.; Imangaziev, E.K. (AN Kazakhskoj SSR, Alma-Ata. Inst. Organicheskogo Kataliza i Ehlektrokhimii)

Determination of vibrational contribution into excessive mixing entropy of liquid amalgams. Alkali metal amalgams
AIX-08:337211;EDB-77:140518; Zh. Fiz. Khim. (ZFKHA) 51:(2):500-503 (Feb 1977)

SUBJECT DESCRIPTORS: CESIUM ALLOYS: T3;COMPUTER CALCULATIONS;COORDINATION NUMBER;ENTROPY: Q1,Q2,Q3;LIQUID METALS: T1;MERCURY ALLOYS: T2;MIXING HEAT: Q1,Q2,Q3;QUANTITY RATIO

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<139>
Desyatnik, V.N.; Dubinin, B.V.; Mel'nikov, Yu.T.; Raspopin, S.P.

Interaction of uranium trichloride with alkaline earth metal chlorides EDB-76:037147; Zh. Neorg. Khim. (ZNOKA) 20:(4):1085-1087 (Apr 1975)

SUBJECT DESCRIPTORS: BARIUM CHLORIDES: T5;BINARY MIXTURES;CALCIUM CHLORIDES: T3;CHEMICAL REACTIONS: Q1,Q2,Q3,Q4,Q5;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;MAGNESIUM CHLORIDES: T2;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;STRONTIUM CHLORIDES: T4;URANIUM CHLORIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<140>
Desyatnik, V.N.; Dubinin, B.V.; Kurbatov, N.N.

Thermographic investigation into ternary systems containing sodium and potassium chlorides, uranium trichloride and thorium tetrafluoride AIX-07:277958;EDB-77:031784; Zh. Neorg. Khim. (ZNOKA) 21:(2):575-578 (Feb 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13

<141>
Desyatnik, V.N.; Katyshev, S.F.; Raspopin, S.P.; Chervinskii, Yu.F.

Density, surface tension, and viscosity of uranium trichloride-sodium chloride melting AIX-07:262686;EDB-77:031122; At. Energ. (USSR) (AENGA) 39:(1):70-72 (Jul 1975)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;DATA;DENSITY;MELTING;PHYSICAL PROPERTIES: Q1,Q2;QUANTITY RATIO;SODIUM CHLORIDES: T1;SURFACE TENSION;TEMPERATURE DEPENDENCE;URANIUM CHLORIDES: T2;VERY HIGH TEMPERATURE;VISCOSITY

<141>

<142> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B22

<142>
Desyatnik, V.N.; Katyshev, S.F.; Raspopin, S.P.; Chervinskii, Y.P. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR))

Density, surface tension and viscosity of melts of uranium trichloride-lithium chloride AIX-09:349320;EDB-78:028043; Zh. Prikl. Khim. (ZPKHA) 50:(4):765-769 (Apr 1976)

SUBJECT DESCRIPTORS: COMPLEXES;DENSITY: Q1,Q2;LITHIUM CHLORIDES: T1;MOLTEN SALTS;QUANTITY RATIO;SURFACE TENSION: Q1,Q2;TEMPERATURE DEPENDENCE;URANIUM CHLORIDES: T2;VISCOSITY: Q1,Q2

ABSTRACT: The results are presented of studying the density, viscosity, and surface tension of the melts of the system UCl$sub 3$-LiCl in a wide temperature (888-1282$sup 0$K) and concentration ranges. For all the melts of the system in the studied temperature range, linear dependences of density and surface tension and exponential dependence of viscosity on temperature have been obtained. It has been established that at 1123$sup 0$K the density of the melts increases monotonously when passing from LiCl to UCl$sub 3$. In the whole concentration range the density isotherm has a positive deviation from linearity. The surface tension isotherm deviates from linearity towards the negative side in the whole concentration range. In the region 20-40 mol% of UCl$sub 3$, a minimum is observed on the isotherm due to the formation of complexes surface-active with respect to both components. The isotherms of molar viscosity and a change in the activation energy of viscous flow depending on the composition of melted mixtures also point to the complex formation in the system.

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13

<143>
Desyatnik, V.N.; Kurbatov, N.N.; Raspopin, S.P. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR). Kafedra Metallurgii Redkikh Metallov)

Phase diagram of the ThCl$sub 4$-LiCl-PbCl$sub 2$ system AIX-07:274976;EDB-77:031759; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (3):137-138 (1975)

<143> CONT.
SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS;LEAD CHLORIDES: T1;LITHIUM CHLORIDES: T2;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3;THORIUM CHLORIDES: T3;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B16

<144>
Desyatnik, V.N.; Raspopin, S.P.

Interaction cf uranium- and thorium tetrachlorides with sodium- and potassium chlorides EDB-76:037150; Zh. Neorg. Khim. (ZNOKA) 20:(5):1385-1388 (May 1975)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B16

<145>
Desyatnik, V.N.; Raspopin, S.P.; Trifonov, K.I. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR). Kafedra Metallurgii Redkikh Metallov)

Viscosity of UCl$sub 3$--MgCl$sub 2$ binary system melts AIX-07:272483;EDB-77:031758; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (4):168-170 (1975)

SUBJECT DESCRIPTORS: BINARY MIXTURES;MAGNESIUM CHLORIDES: T1;MCLTEN SALTS;QUANTITY RATIO;TEMPERATURE DEPENDENCE;URANIUM CHLORIDES: T2;VISCOSITY: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<146>
Desyatnik, V.N.; Raspopin, S.P.; Trifonov, K.I.

Viscosity of molten CaCl$sub 2$-UCl$sub 3$ mixtures AIX-07:270244;EDB-77:031760; Zh. Prikl. Khim. (ZPKHA) 48:(5):1157-1158 (May 1975)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;BINARY MIXTURES;CALCIUM CHLORIDES: T1;CHEMICAL COMPOSITION;MOLTEN SALTS;QUANTITY RATIO;TEMPERATURE DEPENDENCE;URANIUM CHLORIDES: T2;VISCOSITY:

<146>

<146> CONT.
Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<147>
Desyatnik, V.N.; Trifonov, K.I.; Raspopin, S.P.

Calculation of thermodynamic activity and liquidus lines of components in binary systems of plutonium trichloride with alkali and alkaline earth metal chlorides
AIX-08:334409;EDB-77:133658; Radiokhimiya (RADKA) 18:(1):105-108 (Jan 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;COMPARATIVE EVALUATIONS;CRYSTALLIZATION;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;PLUTONIUM CHLORIDES: T1;THERMODYNAMICS

ABSTRACT: Comparison of experimental crystallization lines for plutonium trichloride and chlorides of alkaline and alkaline-earth metals (Na, K, Cs, and Sr) with theoretical ones has shown a possibility of forming complex ions of different composition in melts. As the ionic radii of alkaline and alkaline-earth metals increase so does the deviation of activity of components from ideal.

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13

<148>
Desyatnik, V.N.; Vorobei, M.P.; Kurbatov, N.N.

Phase diagrams of ternary systems containing sodium and potassium chlorides, thorium tetrachloride and plutonium trichloride AIX-07:272482;EDB-77:031408; At. Energ. (USSR) (AENGA) 38:(3):173-174 (Mar 1975)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201;400702
INIS CATEGORY: B13

<149>

Dewally, D.; Perrot, P. (Lille-1 Univ., 59 - Villeneuve-d'Ascq (France))

Contribution to the thermodynamic study of uranium and nickel mixed oxides AIX-08:317692;EDB-77:132977; Rev. Chim. Miner. (RVCMA) 13:(6):605-613 (1976)

SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS: Q1,Q2;ENTROPY;FREE ENTHALPY;NICKEL OXIDES: T1;PHASE DIAGRAMS;THERMAL GRAVIMETRIC ANALYSIS: Q1,Q2;URANIUM OXIDES: T2

ABSTRACT: The study by differential thermal analysis and by thermogravimetric analysis under controlled atmospheres of UO$sub 3$, U$sub 3$O$sub 8$ and the mixed oxides NiU$sub 3$O$sub 10$ and NiU$sub 2$O$sub 6$ have led to the enthalpy of formation and to the standard entropy. $delta$Hsub(f)sup(0) = - 942150 et - 610820 cal. S$sup 0$ = 85,6 and 48,5 cal/mole. deg. respectively for NiU$sub 3$O$sub 10$ and NiU$sub 2$O$sub 6$. The free enthalpy of formation of NiU$sub 3$O$sub 10$ from its oxides (NiO + 3 UO$sub 3$) is given by the expression $delta$G$sup 0$ = - 7350 - 2.3T. The oxygen potential-temperature diagrams relative to the system U-Ni-O has been established and also the nature of phases in equilibrium. From the eleven monovariant equilibriums, four have been determined by experience, four extracted from the literature and three calculated. Domains of stability of oxides have been precised.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B12

<150>

dos Santos, A.M., Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Chemische Technologie; Technische Hochschule Aachen (Germany, F.R.)

In Formation of actinides in irradiated HTGR fuel elements ** AIX-07:270367;ERA-02:021774;EDB-77:041176; (Mar 1976) Juel--1284

ABSTRACT: Actinide nuclide concentrations of 11 spent AVR fuel elements were determined experimentally. The burnup of the spheres varied in the range between 10% and 100% fifa, the Th:U ratio was 5:1. The separation procedures for actinide isolation were tested with highly irradiated ThO$sub 2$. Separation and decontamination factors are presented. Actinide nuclide formation can be described by exponential functions of the type ln msub(nuclide) = A + B x % fifa. The empirical factors A and B were calculated performing a least squares analysis. Build-up of $sup 232$U was discussed.

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<150> CONT.
According to the experimental results, $sup 232$U is mainly produced from $sup 230$Th, a certain amount (e.g. about 20% at a 10$sup 5$ MWd/t burnup) originated from a (n,2n) reaction of $sup 233$U; a formation from $sup 233$Th by a (n,2n) followed by a (n,$gamma$) reaction was not observed. The AVR breeding rate was ascertained to be 0.5. The hazard potential of high activity waste was calculated. After a 1,000 years' storage time, the elements Pa, Am and Cm will no longer influence the total hazard index. Actinide recovery factors were proposed in order to reduce the hazard potential of the waste by an actinide removal in consideration of the reprocessing technology which is available presently.

EDB SUBJECT CATEGORY: EDB-050800;400103
INIS CATEGORY: B16

<151>
Drobasheva, T.I.; Skoropad, T.S. (Rostovskij-na-Donu Inzhenerno-Stroitel'nyj Inst. (USSR))

Binary system of sodium, rubidium and cesium tungstates
AIX-08:292292;EDB-77:069063; Zh. Fiz. Khim. (ZFKHA) 50:(4):1044 (Apr 1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CESIUM TUNGSTATES: T1;EUTECTICS;PHASE DIAGRAMS: Q1,Q2,Q3;RUBIDIUM TUNGSTATES: T3;SODIUM;TUNGSTATES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<152>
Drotning, W.D., Sandia Labs., Albuquerque, N.Mex. (USA)

In Thermal expansion of molten materials by the gamma attenuation technique **
INS-78:000262;ERA-03:008785;EDB-78:009351; (1977)
SAND--77-0626C

SUBJECT DESCRIPTORS: ABSORPTION;ACCURACY;LIQUID METALS: T1;LIQUIDS: T2;MEASURING METHODS: Q3;RESOLUTION;THERMAL EXPANSION: T3,Q1,Q2

ABSTRACT: An apparatus was constructed for measurement of the density and volumetric thermal expansion of high temperature molten materials using the gamma attenuation technique. It was found that significant improvements in overall experimental precision could be realized by employing an

<152> CONT.

automatic gain control in the linear section of the gamma counting system. This device reduced errors due to system gain shifts and thereby increased the precision of the gamma counting. Corrections were also made for the dead time of the electronics system. A preliminary experimental investigation of the precision of the method was made by measuring small dimensional steps of a tool steel block at a single temperature. A fractional length increment $delta$l/l of 1% was determined to 1%, equivalent to a length change precision of 10$sup -4$ cm/cm. In addition, the precision of the experimental technique was analytically examined for both absolute and relative density determinations. Three analytical expressions used to reduce data for liquid density determinations were evaluated for their precision. Each allows use of a different set of input data parameters, which can be chosen based on experimental considerations. Using experimentally reasonable values for the precision of the parameters yields a similar resultant density precision from the three methods, on the order of 0.2%.

EDB SUBJECT CATEGORY: EDB-360104;360204
INIS CATEGORY: B22;B23

<153>

Dudareva, A.G.; Bogatov, Yu.Eh.; Lityagov, V.Ya.; Molodkin, A.K. (Universitet Druzhby Narodov, Moscow (USSR))

Investigation into interaction of indium tribromide with dibromides of manganese, cobalt and nickel in melt

AIX-08:292295;EDB-77:069045; Zh. Neorg. Khim. (ZNOKA) 20:(9):2566-2567 (Sep 1975)

ABSTRACT: State diagrams of InBr$sub 3$-MnBr$sub 2$, InBr$sub 3$-CoBr$sub 2$, InBr$sub 3$-NiBr$sub 2$ were studied with differential thermal analysis, roentgenophase and crystalloptical methods. Indium tribromide and manganese dibromide produce limited solid solutions. InBr$sub 3$-CoBr$sub 2$ and InBr$sub 3$-NiBr$sub 2$ are the systems with simple eutectics. The eutectic mixture containing 14 molar % of CoBr$sub 2$ and 86 molar % of InBr$sub 3$ melts at 408 deg C. In the system InBr$sub 3$-NiBr$sub 2$ the eutectic point is sharply shifted towards InBr$sub 3$ and corresponds to 98 molar % of InBr$sub 3$ and 2 molar % of NiBr$sub 2$. The data of thermal analysis were confirmed by crystalloptical and roentgenophase analysis.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

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<154>
Dumoulin, E.; Tinelli, G.; Hatterer, A. (Ecole Superieure de Chimie, 68 - Mulhouse (France). Lab. de Chimie Minerale Appliquee)

Solubility of sodium iodide in liquid sodium between 140 and 500$sup 0$C AIX-08:280610;EDB-77:030802; J. Inorg. Nucl. Chem. (JINCA) 38:(10):1876-1877 (1976)

SUBJECT DESCRIPTORS: HIGH TEMPERATURE;LIQUID METALS;SODIUM: T2;SODIUM IODIDES: T1;SOLUBILITY: Q1;SOLUTIONS;SOLVENT PROPERTIES: Q2

ABSTRACT: Results are presented for the solubility of sodium iodide in liquid sodium between 140 and 500$sup 0$C. The results are discussed.

EDB SUBJECT CATEGORY: EDB-360104;400201
INIS CATEGORY: B12

<155>
Dutchak, Ya.I.; Klym, N.M.; Prenchko, V.S. (L'vovskij Gosudarstvennyj Univ. (Ukrainian SSR))

Atomic structure of melts of complex system with eutectic transformations AIX-08:335890;EDB-78:021663; Izv. Vyssh. Uchebn. Zaved., Fiz. (IVUFA) (7):88-92 (1976)

ABSTRACT: Short-range order structure of compound eutectic melts In-Sb-Sn, In-Sb and Al-Sb-Bi is considered. The investigations are carried out with a high-temperature X-ray diffractometer. The intensity curves of X-ray coherent scattering are used for obtaining functions of radial distribution of atoms (FRDA). The analysis of FRDA is performed for different structural models. It has been established that a most appropriate structural model of the In-Sb-Sn melt is a complex ''quasieutectic'' distribution corresponding to atom coordination in melted InSb and in liquid In and Sn. In a eutectic alloy of the In-Sb system in the range of complete melting there are microinhomogeneous regions enriched with InSb atom complexes and pure Sb. The structure of the Al-Sb-Bi melt is that typical for doped structures. The melts studied with temperature increasing tend to formation of a homogeneous solution.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<156>
Dybkov, V.I.; Eremenko, V.H.; Natanzon, Ya.V.

Mclybdenum and tungsten interaction with liquid aluminium
AIX-08:292770;EDB-77:061999; Izv. Akad. Nauk SSSR, Met. (IZNMA) (6):124-128 (Nov 1975)

SUBJECT DESCRIPTORS: ALUMINIUM: T1;BIMETALS;CHEMICAL REACTION KINETICS: Q1,Q2,Q3;DIFFUSION;DISSOLUTION: Q2,Q3;LIQUID METALS;MOLYBDENUM: T2;QUANTITY RATIO;SOLUBILITY;SOLVENT PROPERTIES: Q1;TUNGSTEN: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104;400201
INIS CATEGORY: B22

<157>
Eagles, D.M.

Revised model for 5d-electrons in the heavy rare-earth metals
EDB-76:065323; Z. Phys., B (ZPBBD) 21B:(1):69-78 (1975)

SUBJECT DESCRIPTORS: BAND THEORY;ELECTRONIC STRUCTURE: Q1;ELECTRONS;FERROMAGNETISM;RARE EARTHS: T1;STRUCTURAL MODELS;WAVE FUNCTIONS

ABSTRACT: A revised version of a recently published model for 5d-electrons in the ferromagnetic state of the heavy rare-earth metals is described. The model involves the broadening cf local 5d-states into overlapping bands with individual widths, W. In the new approach it is assumed that the local 5d-wave functions lie at some point between those for atomic 4f/sup n/5d6s$sup 2$ configurations and those calculated for such configurations subject to the restriction that the 4f-shell is kept with its moment rigidly fixed in some given direction. The admixture of nonaligned 4f-states as in the atom lowers the local energy, but it also lowers the 5d-bandwidth due to misfit of the 4f-states which occur with and without the presence of a 5d-electron. This second effect raises the energy of the low-lying states in the band. The best lccal states are determined by minimizing the total electronic energy of the system, using approximations which are most suitable for 4f-shells with large excitation energies. Bandwidths are found by fitting the observed saturation magnetic moments in Gd and Tm, and satisfy W is approximately equal to 1 eV.

EDB SUBJECT CATEGORY: EDB-360102

<158>

<158>
Eckert, E.R.G.

Heat transfer bibliography EDB-76:049391; Int. J. Heat Mass Transfer (IJHMA) 18::319-327 (Feb 1975)

SUBJECT DESCRIPTORS: BIBLIOGRAPHIES: Q1;FLUID FLOW;FLUIDIZED BED;HEAT TRANSFER: T1;LIQUID METALS;MAGNETOHYDRODYNAMICS;MASS TRANSFER;THERMODYNAMIC PROPERTIES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-420400

<159>
Eder, O.J.; Kunsch, B.; Pressl, G.

Structure factor of liquid aluminum and calculation of transport coefficients EDB-77:043630; Aluminium (Duesseldorf) (ALUMA) 52:(5):2-6 (1976)

SUBJECT DESCRIPTORS: ALUMINIUM: T1;ATOM TRANSPORT;DIFFUSION;FOURIER TRANSFORMATION;LIQUID METALS;MOLECULAR STRUCTURE: Q1;PAIRING ENERGY;SCATTERING;SLOW NEUTRONS;VERY HIGH TEMPERATURE;VISCOSITY

ABSTRACT: The structure factors measured by slow neutron scatter in liquid aluminum in the temperature range around 750$sup 0$C are compared with the hard core structure factor. The statistical pair distribution function for liquid aluminum are determined by Fourier transformation, and the nearest neighbor coordination numbers are calculated. The hard core model is then used for approximating transport coefficients such as the diffusion and viscosity coefficients for several metals and metalloids. The results are compared with experimental data. A demonstration is given how the macroscopic transport coefficients are related to microscopic variables.

EDB SUBJECT CATEGORY: EDB-360102

<160>
Efremov, V.A.; Trunov, V.K. (Moskovskij Gosudarstvennyj Univ. (USSR))

Phase diagrams of Li$sub 2$MoO$sub 4$--ZnMoO$sub 4$, K$sub 2$MoO$sub 4$--ZnMoO$sub 4$ and K$sub 2$WO$sub 4$--ZnWO$sub 4$ systems AIX-08:298250;EDB-77:062513; Zh. Neorg. Khim. (ZNOKA) 20:(8):2200-2203 (Aug 1975)

SUBJECT DESCRIPTORS: BINARY MIXTURES;DIFFERENTIAL THERMAL

<160> CONT.
ANALYSIS;MOLTEN SALTS;PHASE DIAGRAMS:
Q1,Q2,Q3,Q4,Q5,Q6,Q7;X-RAY DIFFRACTION

ABSTRACT: Phase diagrams of Li$sub 2$MoO$sub 4$-ZnMoO$sub 4$, K$sub 2$MoO$sub 4$-ZnMoO$sub 4$, and K$sub 2$WO$sub 4$-ZnWO$sub 4$ systems have been plotted from the results of X-ray phase and differential thermal analyses. All the double molybdates and tungstates formed in these systems melt incongruently. General regularities as to the type of the phase diagrams of Me$sub 2$EO$sub 4$ (Me-Li, Na, K; E-Mo, W)-ZnEo$sub 4$ system are considered, as well as some features of the structure and properties of the intermediate compounds formed in these systems.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<161>
Egorov, R.F.; Kuznetsov, E.V.; Shirokovskij, V.P.; Ganin, G.V. (AN SSSR, Sverdlovsk. Inst. Fiziki Metallov)

Electron spectrum of light alkali metals EDB-76:042257; Fiz. Met. Metalloved. (FMMEA) 39:(2):241-249 (Feb 1975)

SUBJECT DESCRIPTORS: ALKALI METALS: T2;BRILLOUIN ZONES;CRYSTAL FIELD;D STATES;ELECTRON DENSITY;ELECTRONIC STRUCTURE: Q1,Q2;ENERGY SPECTRA;FERMI LEVEL;GREEN FUNCTION;LITHIUM: T1;MUFFIN-TIN POTENTIAL;POISSON EQUATION;POTASSIUM;S STATES;SLATER METHOD;SODIUM;TABLES;VALENCE;WAVE FUNCTIONS;WIGNER-SEITZ METHOD

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<162>
Ehllert, G.V.; Slovyanskikh, V.K. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

On interaction in U--S--Te system EDB-76:048904; Zh. Neorg. Khim. (ZNOKA) 20:(2):504-508 (Feb 1975)

SUBJECT DESCRIPTORS: CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;PHASE DIAGRAMS: Q1,Q2;SULFUR;TELLURIUM;TELLURIUM SULFIDES: T1;TERNARY ALLOY SYSTEMS;URANIUM;URANIUM SULFIDES: T2;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

<162>

<162> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B13

<163>
Elliott, G.R.B., Los Alamos Scientific Lab., N.Mex. (USA)

In Some considerations in establishing thermodynamic activities from high temperature EMF measurements **
ERA-01:020203;EDB-76:054333; (1976) LA-UR--76-1070

SUBJECT DESCRIPTORS: ELECTROMOTIVE FORCE;ERRORS;MEASURING METHODS;MOLTEN SALTS: M1;THERMODYNAMIC PROPERTIES: Q1

ABSTRACT: Various sources of uncertainty and error in establishing thermodynamic properties from experimental data are discussed and evaluated. These problems reflect experimental difficulties, the frequent absence of necessary data, some dubious assumptions in the absence of data, certain fallacies when simple models are combined with thermodynamic manipulations to correlate limited or imprecise data, and some ill-chosen methods of describing data. Effects of metal solubility in molten salts, of reactions between electrolyte and metal, of experimental errors, and of poor models are considered.

EDB SUBJECT CATEGORY: EDB-400201

<164>
Elovskikh, E.M.; Krylov, E.I.; Kasimov, G.G. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR))

Stability of rare earth metaniobates in hydrogen atmosphere
AIX-08:282855;EDB-77:037336; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 11:(8):1524 (Aug 1975)

SUBJECT DESCRIPTORS: CALCINATION;CERIUM NITRATES: T2;CONTROLLED ATMOSPHERES;ELECTRIC CONDUCTIVITY;ELECTRONIC STRUCTURE;HYDROGEN;LANTHANUM NITRATES: T1;NEODYMIUM NITRATES: T4;NIOBATES: T;PHASE DIAGRAMS;PRASEODYMIUM NITRATES: T3;STABILITY: Q1,Q2,Q3,Q4;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<165>
Eren, A., Technische Univ. Darmstadt (Germany, F.R.)

In Zeeman effect and satellite carrier structure in absorption spectra of pure and doped praseodymium and europium double nitrates ** EDB-77:007299; (27 Jan 1975) N--75-27933

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;CHARGE CARRIERS;COBALT CARBIDES: T3;ELECTRONIC STRUCTURE;EUROPIUM NITRATES: T1;MIXTURES;MONOCRYSTALS;PRASEODYMIUM NITRATES: T2;ZEEMAN EFFECT: Q1,Q2,Q3

ABSTRACT: Absorption spectra of the mixed crystals Pr$sub 2$Mg$sub 3$(1-x)Co$sub 3$C-(NO$sub 3$)$sub 12$x24H$sub 2$O exhibited secondary lines from impurity ion spins. PrZn(Co)-DN-, Pr(Eu)Mg-Dn, and Pr(Bi)Mg-DN-crystals showed only minor crystal field defects. Zeeman spectra for the transformations of 7Fo yields a,b, 5D1; a,b,a 5D2 in single EuMg-DN crystals were obtained; magnetic dipole radiation was found in the 7Fo yields 5Do transfer, and temperature- and additive-dependent oscillator strength changes were observed in the transfers 7Fo yields 5Do; a,b 5D1; a,b,c 5D2.

EDB SUBJECT CATEGORY: EDB-360602

<166>
Esin, Yu.O.; Valishev, M.G.; Gel'd, P.V. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR))

Formation enthalpy of liquid tin-vanadium alloys AIX-08:337219;EDB-77:140520; Zh. Fiz. Khim. (ZFKHA) 51:(2):471-472 (Feb 1977)

SUBJECT DESCRIPTORS: ENTHALPY: Q1,Q2,Q3;FORMATION HEAT: Q1,Q2,Q3;LIQUID METALS: T3;QUANTITY RATIO;TIN ALLOYS: T2;VANADIUM ALLOYS: T1;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<167>
Evans, R.; Kumaravadivel, R. (Bristol Univ. (UK). H.H. Wills Physics Lab.)

Thermodynamic perturbation theory for the surface tension and ion density profile of a liquid metal AIX-07:262688;EDB-77:030819; J. Phys., C (London) (JPCFA) 9:(10):1891-1906 (28 May 1976)

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<167> CONT.
SUBJECT DESCRIPTORS: ALUMINIUM: T1;FREE ENERGY;INTERATOMIC FORCES;ION DENSITY;IONS;LIQUID METALS;MATHEMATICAL MODELS;PERTURBATION THEORY;POTASSIUM: T2;SODIUM: T3;SURFACE TENSION: Q1,Q2,Q3

ABSTRACT: A simple scheme for determining the ion density profile and the surface tension of a liquid metal is described. Assuming that the interaction between metallic pseudo-ions is of the form introduced by Evans, an approximate expression for the excess free energy of the system is derived using the thermodynamic perturbation theory of Weeks, Chandler and Anderson. This excess free energy is then minimized with respect to a parameter which specifies the ion density profile, and the surface tension is given directly. From a consideration of the dependence of the interionic forces on the electron density it is predicted that the ions should take up a very steep density profile at the liquid metal surface. This behaviour is contrasted with that to be expected for rare-gas fluids in which the interatomic forces are density-independent. The values of the surface tension calculated for liquid Na, K and Al from a simplified version of the theory are in reasonable agreement with experiment.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<168>
Evdokimov, A.A.; Trunov, V.K. (Moskovskij Gosudarstvennyj Univ. (USSR). Kafedra Neorganicheskoj Khimii)

Phase relations in PbWO$sub 4$-TR$sub 2$(WO$sub 4$)$sub 3$ systems AIX-08:336916;EDB-77:146841; Zh. Neorg. Khim. (ZNOKA) 21:(1):200-203 (Jan 1976)

SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS;LATTICE PARAMETERS;LEAD COMPOUNDS: M4;LITHIUM COMPOUNDS;PHASE DIAGRAMS: Q1,Q3,Q4;PRASEODYMIUM COMPOUNDS;PYROLYSIS;RARE EARTH COMPOUNDS: M1;TEMPERATURE DEPENDENCE;TERBIUM COMPOUNDS;TUNGSTATES: M3;X-RAY DIFFRACTION

ABSTRACT: Phase ratios in the systems PbWO$sub 4$-TR$sub 2$(WO$sub 4$)$sub 3$ (TR=Pr-Lu) have been studied and phase diagrams of the systems PbWO$sub 4$-Pr$sub 2$(WO$sub 4$)$sub 3$ and PbWO$sub 4$-Tb$sub 2$(WO$sub 4$)$sub 3$ have been plotted using the methods of X-ray phase and differential-thermal analysis. The study of the systems PbWO$sub 4$-TR$sub 2$(WO$sub 4$)$sub 3$ has shown that in the series of rare-earth ele ents the phase ratios are close in the following three groups of elements: TR=La; TR/ /;=Pr-EuG Tr=d-Lu. Between the components with the structure of

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scheelite and tungstate of europium the intermediate phases are formed with wide homogeneity regions. The fact that the phase Pbsub(0.5)Lasub(3)(WOsub(4))sub(5) is isostructural to the phase LiLa$sub 3$(WO$sub 4$)$sub 5$ has been proved by the monocrystal study. In the systems PbWO$sub 4$-TR$sub 2$(WO$sub 4$)$sub 3$ (TR=Pr-Eu) highly temperature intermediate phases are isostructural to BaLa$sub 4$(WO$sub 4$)$sub 7$ since the lines on the X-ray patterns of these samples are satisfactorily induced in the assumption of the cell BaLa$sub 4$(WO$sub 4$)$sub 7$. The compounds of the composition PbTR$sub 2$(WO$sub 4$)$sub 4$ are formed in the systems PbWO$sub 4$-TR$sub 2$(WO$sub 4$)$sub 3$ (TR=Pr-Lu). They all crystallize in one structural type, have no noticeable homogeneity regions, and decompose irreversibly in a solid phase with increasing temperature. The decomposition temperature for the compounds PbTR$sub 2$(WO$sub 4$)$sub 4$ is given as a function of the order number. Interplanar spacings in the sample of the composition PbTb$sub 2$(WO$sub 4$)$sub 4$ are presented.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<169>
Ewart, F.T.; Taylor, R.G. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment); Horspool, J.M.; James, G. (UKAEA Reactor Group, Sellafield)

Chemical effects of composition changes in irradiated oxide fuel materials. II. Fission product segregation and chemical equilibria AIX-07:279173;ERA-02:019367;EDB-77:034973; J. Nucl. Mater. (JNUMA) 61:(3):254-270 (Sep 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL RADIATION EFFECTS: Q1,Q2;CORROSION;ELECTRON MICROPROBE ANALYSIS;FISSION PRODUCTS;FUEL CANS;FUEL PINS;FUEL-CLADDING INTERACTIONS: Q1,Q2;IRRADIATION;NEUTRON FLUX;PLUTONIUM OXIDES: T1;URANIUM OXIDES: T2

ABSTRACT: Four miniature fuel pins containing uranium/plutonium oxide, covering a wide range of oxygen-to-metal ratios, have been irradiated in a thermal reactor. These pins were subjected to a detailed examination, by electron probe microanalysis and ceramography. The results of this analysis have been interpreted in the light of the results of a computer model of the pin behaviour. The widely different fuel chemistry in each of the fuel pins produced different fission-product phases and different clad corrosion phenomena. The phases found are in general agreement with the model which predicts increasing oxygen-to-metal ratio with increasing burn-up and oxygen redistribution in the

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<169> CONT.
temperature gradient. Clad corrosion is seen to be inhibited at low oxygen potentials but the distinction between intergranular and 'broad front' corrosion is not attributable simply to the local oxygen potential.

EDB SUBJECT CATEGORY: EDB-050700;220300;360206;400702
INIS CATEGORY: E23

<170>
Ezhov, V.K.

Some properties of hydrogen fluoride compounds with group 5 metal pentafluorides AIX-08:282857;EDB-77:037408; Zh. Neorg. Khim. (ZNOKA) 21:(8):2263-2264 (Aug 1976)

SUBJECT DESCRIPTORS: COMPLEXES;HYDRIODIC ACID;NIOBIUM FLUORIDES: T1;TANTALUM FLUORIDES: T2;TEMPERATURE DEPENDENCE;VAPOR PRESSURE: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<171>
Fahey, J.A. (Bronx Community Coll., New York (US)); Turcotte, R.P.; Chikalla, T.D.

Decomposition, stoichiometry and structure of neptunium oxides AIX-07:241900;EDB-76:092570; J. Inorg. Nucl. Chem. (JINCA) 38:(3):495-500 (1976)

ABSTRACT: The neptunium-oxygen system for 2.00 < O/Np < 2.7 was studied between room temperature and 900$sup 0$C and under controlled oxygen pressure. Thermogravimetry, gas manometry and X-ray diffraction were applied to decomposition of Np(V) and Np(VI) hydroxides and Np(V) nitrate. The oxide region of apparent stoichiometry 2.50 < O/Np < 2.67 was emphasized, and evidence is presented showing that the only higher oxide in this region is monclinic Np$sub 2$O$sub 5$. Decomposition to the dioxide is achieved by heating to above 700$sup 0$C, for which the O$sub 2$ pressure dependence is given. Oxide having the Np(VI) hydroxide as a precursor is shown to decompose through an additional intermediate near Np$sub 4$O$sub 9$.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B13

<172>
Fedorchenko, V.I.; Averin, V.V.

Kinetic peculiarities of nitrogen dissolving in iron-chromium and iron-chromium-nickel melts EDB-76:036457; Izv. Akad. Nauk SSSR, Met. (IZNMA) (3):57-63 (May 1974)

SUBJECT DESCRIPTORS: CHROMIUM ALLOYS: T3;IRON ALLOYS: T2;LIQUID METALS;NICKEL ALLOYS: T4;SOLVENT PROPERTIES: Q1,Q2,Q3,Q4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B21

<173>
Fedorov, N.F.; Mel'nikova, O.V.; Saltykova, V.A. (Leningradskij Tekhnologicheskij Inst. (USSR))

Physicochemical investigation of rare earth titanoniobates, LnTiNbO$sub 6$ AIX-08:320614;EDB-77:113937; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 12:(4):773-774 (Apr 1976)

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE: Q1,Q2,Q3;CRYSTALLIZATION;DENSITY;LATTICE PARAMETERS;MELTING POINTS: Q1,Q2,Q3;NIOBATES: T1;RARE EARTH COMPOUNDS: T2;REFRACTIVITY: Q1,Q2,Q3;TITANIUM COMPOUNDS: T3;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603;400201
INIS CATEGORY: B12

<174>
Fedorov, P.I.; Malova, N.S.; Petrova, G.K.; Vorob'eva, G.V. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

Interaction of lower indium chlorides with chloride and chloroindates of potassium EDB-76:048906; Zh. Neorg. Khim. (ZNOKA) 20:(3):637-640 (Mar 1975)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS;INDIUM CHLORIDES: T1;PHASE DIAGRAMS: Q1,Q2;POTASSIUM CHLORIDES: T2;SOLID SOLUTIONS

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<175> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<175>
Fee, D.C.; Johnson, I.; Davis, S.A.; Shinn, W.A.; Staahl, G.E.; Johnson, C.E., Argonne National Lab., Ill. (USA)

Tn Cs--U--O phase diagram and its application to uranium--plutonium oxide fast reactor fuel pins **
NTS-78:001713;ERA-03:011718;INS-78:002138;EDB-78:025371; (Aug 1977) ANL--76-126

SUBJECT DESCRIPTORS: BREEDING BLANKETS;CESIUM;DEFORMATION;DIFFUSION;FAST REACTORS;FISSION PRODUCTS;FUEL CANS: T1;FUEL PINS;HIGH TEMPERATURE;OXYGEN;PHASE DIAGRAMS;PLUTONIUM DIOXIDE: T3;STABILITY;THERMODYNAMIC PROPERTIES: Q2,Q3,Q1;URANIUM;URANIUM DIOXIDE: T2;VERY HIGH TEMPERATURE

ABSTRACT: Portions of the cesium-uranium-oxygen system have been investigated between 873 and 1273$sup 0$K and a phase diagram has been constructed using our data and the data of other workers in the field. Thermodynamic and kinetic data have been used to examine the reactions that occur in fast-reactor fuel pins between fission-product cesium and the uranium oxide blanket. It was concluded that at the low oxygen potentials existing at the interface between the uranium-plutonium mixed-oxide and the uranium oxide blanket, Cs$sub 2$UO$sub 4$ is the only Cs-U-O compound expected to be formed in the uranium oxide blanket.

EDB SUBJECT CATEGORY: EDB-050700;360202
INIS CATEGORY: B23

<176>
Ferris, L.M. ** McNeese, L.E., Oak Ridge National Lab., Tenn. (USA)

Chemistry In Molten-salt reactor program. Semiannual progress report for period ending February 29, 1976 **
INS-77:003086;ERA-02:015877;EDB-77:029145; (Aug 1976) ORNL--5132

SUBJECT DESCRIPTORS: BERYLLIUM FLUORIDES;BORON COMPOUNDS: A4;BORON FLUORIDES: A6;CHEMISTRY: Q1,Q8;CHROMIUM COMPOUNDS;DECOMPOSITION: Q2;DENSITY: Q6;ELECTROCHEMISTRY;EQUILIBRIUM;FLUORINE COMPOUNDS: A5;HYDROGEN;HYDROLYSIS: Q4,Q5;LITHIUM FLUORIDES;LITHIUM

<176> CONT.
TELLURIDES: A2;MOLTEN SALT REACTORS: A1;MOLTEN SALTS: A8;OXYGEN COMPOUNDS;REDUCTION: Q3;SODIUM COMPOUNDS;SOLUBILITY: Q2;TELLURIDES;TELLURIUM COMPOUNDS;THORIUM FLUORIDES;TRITIUM;URANIUM COMPOUNDS: A7;URANIUM TETRAFLUORIDE: A3;VALENCE: Q7;VAPORS;ZIRCONIUM FLUORIDES

ABSTRACT: The chemistry of Te in molten salts was studied (solubility of Li$sub 2$Te, Te species in LiF--BeF$sub 2$, decomposition pressure of LiTe$sub 3$, UF$sub 4$ + H$sub 2$ reversible UF$sub 3$ + HF equilibrium in molten fluorides). Work on coolant-salt chemistry was continued (hydrolysis of Na$sub 3$B$sub 3$F$sub 6$O$sub 3$, vapor density in BF$sub 3$--H$sub 2$O). Monitoring of the U$sup 4+$/U$sup 3+$ ratio in loops and creep-test machines was continued. Data were obtained during the third tritium injection experiment at the Coolant-Salt Technology Facility. Electrochemical studies indicated that LiTe$sub 3$ and Cr$sub 3$Te$sub 4$ are insoluble in MSBR fuel salt. The species Te$sup -1$/sub n/ and oxide species were studied. (DLC)

EDB SUBJECT CATEGORY: EDB-050700;400702;210500;400201
INIS CATEGORY: B13;E35;B12

<177>
Filippov, E.S. (Moskovskij Inst. Stali i Splavov (USSR))

Discrete variation of the structure and texture of liquid metals formed by components with discrete packing
AIX-08:289572;EDB-77:043637; Izv. Vyssh. Uchebn. Zaved., Chern. Metall. (IVUMA) (3):125-132 (1976)

SUBJECT DESCRIPTORS: BCC LATTICES;CRYSTAL STRUCTURE: Q1,Q2,Q3,Q4;DENSITY: Q1,Q2,Q3,Q4;EUTECTICS;FCC LATTICES;INDIUM: T1;INDIUM ALLOYS: T2;LIQUID METALS;MELTING POINTS;PHASE DIAGRAMS: Q2,Q4;QUANTITY RATIO;TEMPERATURE DEPENDENCE;TEXTURE;TIN: T3;TIN ALLOYS: T4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<178>

<178>
Finch, A.; Gates, P.N.; Peake, S.J. (Royal Holloway Coll., London (UK))

Thermochemistry of polyhalides. Pt.1. Caesium and rubidium dichlcroiodates(I) AIX-08:305594;EDB-77:133353; J. Chem. Soc. (London), Dalton Trans. (JCDTB) (4):397-400 (1977)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;CESIUM IODIDES: T2;CRYSTALS;FORMATION HEAT: Q1,Q2,Q3,Q4;RUBIDIUM CHLORIDES: T3;RUBIDIUM IODIDES: T4

ABSTRACT: The standard enthalpies of formation of crystalline Cs[ICl$sub 2$] and Rb[ICl$sub 2$] have been determined as -511.1 +-4.1 and - 491.4 +- 4.1 kJ mol$sup -1$ respectively, based on enthalpies of reaction with aqueous silver(I) nitrate. The results are discussed in relation to various thermodynamic parameters.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<179>
Fischer, D.F.; Leibowitz, L. (Argonne National Lab., Ill. (USA))

Enthalpy of uranium-plutonium carbide from 298K to the melting point AIX-08:340257;EDB-78:016962; J. Nucl. Mater. (JNUMA) 67:(3):244-248 (Aug 1977)

SUBJECT DESCRIPTORS: CALORIMETERS;ENTHALPY: Q1,Q2;HIGH TEMPERATURE;MEDIUM TEMPERATURE;NUCLEAR FUELS;PLUTONIUM CARBIDES: T2;PYROMETERS;SPECIFIC HEAT;URANIUM CARBIDES: T1;VERY HIGH TEMPERATURE

ABSTRACT: An induction-heated drop-calorimetric system was used to measure the enthalpy of (Usub(0.8)Pusub(0.2))C from 1039 to 2421 K. By combining the measured enthalpy values with previously estimated low-temperature enthalpy data (900 K and below), an equation was derived that is applicable over the temperature range from 298 to 2548 K. Thermodynamic functions of (Usub(0.8)Pusub(0.2))C as a function of temperature are also given.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<180>
Fischer, E.A. (Kernforschungszentrum Karlsruhe (F.R. Germany). Inst. fuer Angewandte Systemanalyse); Kinsman, P.R.; Ohse, R.W. (Commission of the European Communities, Karlsruhe (F.R. Germany). European Inst. for Transuranium Elements)

Critical assessment of equation of state data for UO$sub 2$
AIX-07:243897;ERA-02:007618;EDB-77:003016; J. Nucl. Mater. (JNUMA) 59:(2):125-136 (Feb 1976)

SUBJECT DESCRIPTORS: CRITICAL PRESSURE;CRITICAL TEMPERATURE;ENTHALPY;EQUATIONS OF STATE: Q1;FREE ENERGY;GASES;LIQUIDS;SOLIDS;URANIUM DIOXIDE: T1;VAPOR PRESSURE

ABSTRACT: A new equation of state for UO$sub 2$ has been derived using the theory of significant liquid structures, which predicts a critical temperature of 7560K, a critical pressure of 1210 atm, and a critical density of 1.66 g/cm$sup 3$. The resulting critical compressibility of 0.316 is in good agreement with the values predicted by the theory of corresponding states. Consistency between literature data on enthalpy of solid UO$sub 2$, recent vapour pressure measurements over liquid UO$sub 2$, and the pressure data over solid UO$sub 2$ could only be obtained by the inclusion of an electronic excitation term in the gaseous partition function. A new set of free energy functions for gaseous and solid UO$sub 2$ is presented.

EDB SUBJECT CATEGORY: EDB-360202;050700
INIS CATEGORY: B12

<181>
Fisher, S.B. (Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.)

Atomic diffusion in alloys exposed to liquid sodium
AIX-08:295720;EDB-77:055608; J. Nucl. Mater. (JNUMA) 62:(2-3):247-256 (Nov 1976)

ABSTRACT: Reasons for the observed enhancement of atomic diffusion coefficient in alloys exposed to sodium are explored. The diffusion coefficient in the presence of a chemical potential gradient is derived from a simple atomistic model. It is concluded that two mechanisms could contribute to the enhancement. (a) A non-zero gradient of partial molar enthalpy. (b) An increase in the atomic mobility due to the presence of high diffusivity paths. It is shown that the effect of (a) is not of sufficient magnitude to account for the increase in coefficient. However the results can be analysed successfully in terms of grain boundary diffusion and the coefficients are determined for iron in Ni/Cr (1.2x10$sup -9$cm$sup 2$/s) at 650$sup 0$C and

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<181> CONT.
nickel in iron (5x10$sup -8$cm$sup 2$/s) at 730$sup 0$C. The total absorbed diffusant is also calculated for the case of iron into Ni/Cr, and a general expression for the absorbed diffusant is given.

EDB SUBJECT CATEGORY: EDB-360105;360104
INIS CATEGORY: B22

<182>
Fitzner, K.; Jacob, K.T. (Toronto Univ., Ontario (Canada). Dept. of Metallurgy and Materials Science)

Solubility and activity of oxygen in liquid indium and copper-indium alloys AIX-08:324210;EDB-77:132606; J. Less-Common Met. (JCOMA) 52:(2):279-291 (Apr 1977)

SUBJECT DESCRIPTORS: COPPER ALLOYS: T1;ELECTROMOTIVE FORCE;FORMATION FREE ENERGY;HIGH TEMPERATURE;INDIUM: T2;INDIUM ALLOYS: T3;INDIUM OXIDES;LIQUID METALS;OXYGEN: T4;PHASE STUDIES;SOLUBILITY: Q1,Q2,Q3,Q4;SOLUTION HEAT;TEMPERATURE DEPENDENCE;VERY HIGH TEMPERATURE

ABSTRACT: The solubility of oxygen in liquid indium in the temperature range 650-820$sup 0$C and in liquid copper-indium alloys at 1100$sup 0$C in equilibrium with indium sesquioxide has been measured by a phase equilibration technique. The solubility of oxygen in pure indium is given by the relation log(at.%O)=-4726/T+3.73(+-0.08). Using the recently measured values for the standard free energy of formation of In$sub 2$O$sub 3$ and assuming that oxygen obeys Sievert's law up to saturation, the standard free energy of solution of molecular oxygen in liquid indium is calculated. The effect of indium additions on the activity coefficient of oxygen dissolved in liquid copper was measured by a solid oxide galvanic cell. The experimentally determined variation of the activity coefficient of oxygen in dilute solution in Cu-In alloys is in fair agreement with that predicted by a quasichemical model in which each oxygen atom is assumed to be interstitially coordinated to four metal atoms and the nearest neighbour metal atoms are assumed to lose approximately half their metallic cohesive energies.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<183>
Fleury, P.A.; Lyons, K.B. ** Lucovsky, G. (ed.)

Anomalous quasielastic light scattering from metal oxide glasses In Structure and excitations of amorphous solids ** INS-77:000264;ERA-02:010523;EDB-77:007242; (1976) American Inst. of Physics

SUBJECT DESCRIPTORS: ANOMALOUS DIMENSION;BORON OXIDES: T3;EXCITATION: Q1,Q2,Q3,Q4,Q5,Q6;GLASS;LANTHANUM OXIDES: T6;LIGHT SCATTERING: Q1,Q2,Q3,Q4,Q5,Q6;NIOBIUM OXIDES: T4;OXIDES;RARE EARTHS;TANTALUM OXIDES: T2;TERBIUM OXIDES: T1;THORIUM OXIDES: T5;TRANSITION ELEMENTS

ABSTRACT: An anomalous quasielastic component has been observed in the light scattering spectra of several heavy metal oxide glasses. This component consists of a depolarized central peak of frequency width less than approximately 0.5 cm$sup -1$, depending on temperature and composition. Observations are reported for eight different compositions, all containing either transition metal or rare earth oxides. The integrated intensity for glasses whose major constituent is Tb$sub 2$O$sub 3$ correlates well with Tb concentration, while the linewidth is insensitive to Tb concentration as well as host composition.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<184>
Flotow, H.E.; Osborne, D.W.; Fried, S.M.; Malm, J.G.

Heat capacity of $sup 242$PuO$sub 2$ from 12 to 350degreeK and of $sup 244$PuO$sub 2$ from 4 to 25degreeK. Entropy, enthalpy, and Gibbs energy of formation of PuO$sub 2$ at 298.15degreeK INS-76:019939;ERA-02:001078;EDB-76:081660; J. Chem. Phys. (JCPSA) 65:(3):1124-1129 (1 Aug 1976)

SUBJECT DESCRIPTORS: ENTHALPY: Q1;ENTROPY: Q1;FORMATION FREE ENERGY: Q1;LOW TEMPERATURE;MEDIUM TEMPERATURE;PLUTONIUM 242;PLUTONIUM 244;PLUTONIUM DIOXIDE: T1;SPECIFIC HEAT: Q1;VERY LOW TEMPERATURE

ABSTRACT: Heat capacity measurements have been made on a 22.5 g sample of $sup 242$PuO$sub 2$ from 12 to 350degreeK and on a 3.6 g sample of $sup 244$PuO$sub 2$ from 4 to 25degreeK. The heat capacity curve has the normal sigmoid shape. At 298.15degreeK the heat capacity Cdegree/subp/, entropy Sdegree, enthalpy Hdegree-Hdegree$sub 0$, and tempered Gibbs energy (Gdegree-Hdegree$sub 0$)/T are, respectively, (66.25 +- 0.26) J degreeK$sup -1$xmole$sup -1$, (66.13 +- 0.26)J degreeK$sup -1$xmole$sup -1$, (10 784 +- 43) J mole$sup -1$,

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<184> CONT.
and -(29.96 +- 0.12) J degreeK$sup -1$xmole$sup -1$. This value of the entropy is significantly lower than the one previously derived from heat capacity measurements on $sup 239$PuO$sub 2$. At 298.15degreeK the standard entropy of formation and the standard Gibbs energy of formation are -(195.2 +- 0.4) J degreeK$sup -1$xmole$sup -1$ and -(998.0 +- 0.7) kJ mole$sup -1$, respectively. (AIP)

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<185>
Fomichev, V.V.; Alikeev, B.D.; Reznik, E.M.; Ivanova, M.M.; Petrov, K.I. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

Vibration spectra of rare earth oxytungstates-Ln$sub 2$WO$sub 6$ composition AIX-08:295289;EDB-77:069089; Zh. Neorg. Khim. (ZNOKA) 21:(7):1733-1737 (Jul 1976)

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE;FREQUENCY MEASUREMENT;FREQUENCY RANGE;INFRARED SPECTRA;OXYGEN COMPOUNDS;RARE EARTH COMPOUNDS: T1;TABLES;TUNGSTATES: T2;VIBRATIONAL STATES: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<186>
Forney, J.J. (Ecole Polytechnique Federale, Lusanne, Switzerland); Quattropani, A.; Bassani, F. ** Pilkuhn, M.H. (ed.)

Structure of the biexciton molecule and optical transition selection rules in zincblende and wurtzite materials In Physics of semiconductors ** ERA-01:016804;EDB-76:042565; (1974) B. G. Teubner

SUBJECT DESCRIPTORS: BINDING ENERGY: Q1,Q2;CADMIUM SULFIDES: T2;COPPER CHLORIDES: T1;ELECTRON EXCHANGE;HOLES;SELECTION RULES

ABSTRACT: The states of the biexciton molecules are related to the band structure of the crystal and effects due to

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electron-hole exchange are taken into account. For biexcitons in CdS and CuCl optical selection rules are derived and the electron hole exchange corrections to the energy is computed.

EDB SUBJECT CATEGORY: EDB-400201

<187>
Foster, M.S.; McCloud, G.H.; Cairns, E.J.

Electrochemical studies of the sodium--bismuth system
EDB-77:043222; Am. Chem. Soc., Div. Fuel Chem., Prepr. (ACFPA) 11:(1):276-281 (1967)

SUBJECT DESCRIPTORS: BISMUTH BASE ALLOYS;ELECTRIC POTENTIAL: Q1;FREE ENERGY;METAL-METAL BATTERIES: M1;SODIUM;SODIUM ALLOYS;SODIUM CHLORIDES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250901

<188>
Fournier, J.M. (CEA Centre d'Etudes Nucleaires de Grenoble, 38 (France). Dept. de Recherche Fondamentale)

Bonding and the electronic structure of the actinide metals
AIX-07:236376;EDB-76:092474; J. Phys. Chem. Solids (JPCSA) 37:(2):235-244 (1976)

SUBJECT DESCRIPTORS: ACTINIDES: M1;ACTINIUM;AMERICIUM;BERKELIUM;BINDING ENERGY;CALIFORNIUM;CURIUM;EINSTEINIUM;ELECTRONIC STRUCTURE: Q1;FERMIUM;LAWRENCIUM;MELTING POINTS;MENDELEVIUM;NEPTUNIUM;NOBELIUM;PLUTONIUM;PROTACTINIUM; UBLIMATION HEAT;THORIUM;URANIUM

ABSTRACT: The electronic configurations of the 15 actinide metals from actinium to lawrencium have been determined using a phenomenological model based on the metallic radius, the crystal structure, the melting temperature and the enthalpy of sublimation. The above properties can be related to the electronic configuration which accounts for their anomalies. It can be shown that transberkelium metals are divalent and that from protactinium to plutonium, 5f electrons are band

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<189> CONT.
electrons. The hitherto unknown values of the enthalpies of sublimation and melting temperatures have been calculated.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<189>
Freeman, A.J. (Northwestern Univ., Evanston, Ill. (USA). Dept. of Physics); Koelling, D.D. (Argonne National Lab., Ill. (USA))

Electronic structure and properties of the actinides
AIX-08:332145;ERA-03:012847;EDB-78:021808; Physica, B, C (PHBCD) 86-88::16-25 (1977)

SUBJECT DESCRIPTORS: ACTINIDE ALLOYS: T1;ACTINIDES: T2;BAND THEORY;CORRELATIONS;COULOMB FIELD;DE HAAS-VAN ALPHEN EFFECT;ELECTRONIC STRUCTURE: Q1,Q2;F STATES;FERMI LEVEL;INTERMETALLIC COMPOUNDS;MAGNETIC PROPERTIES: Q1,Q2;REVIEWS;WAVE FUNCTIONS

ABSTRACT: The authors review the present state of understanding of the electronic structure and physical properties of actinide metals and intermetallic compounds as derived from relativistic APW energy band studies of some of the light (Th, U, Np and Pu) and heavy (Am, Bk and Cm) metals, the intermetallics URh$sub 3$ and UIr$sub 3$ and (NaCl structure compounds such as) UC. Emphasis is placed on the importance of Coulomb correlation and the role of actinide-actinide separation in determining the itinerancy (as in the light metals) or localization (as in the heavy metals) of the 5f electrons and in turn their resulting magnetic and other properties. The UX$sub 3$ systems considered are significant because the uranium sites are sufficiently separated to fall in the local moment f orbital range of the Hill superconductivity/magnetism plot but show no magnetic ordering. Comparisons to recent optical, de Haas-van Alphen and other data are given when available. The contrasting cases of the transition and rare-earth systems make it clear that the 5f electrons are a unique species which offer exciting challenges to both experimentalists and theorists.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<190>
Freyland, W.; Steinleitner, G., Marburg Univ. (Germany, F.R.). Fachbereich Physikalische Chemie

In Magnetic susceptibility and electronic structure in metallic and non-metallic liquid cesium-gold and cesium-antimony alloys ** AIX-07:263989;EDB-77:036694; (1976) AED-Conf--76-087-013

SUBJECT DESCRIPTORS: ANTIMONY ALLOYS: T3;BINARY ALLOY SYSTEMS;CESIUM ALLOYS: T1;CHEMICAL COMPOSITION;COMPARATIVE EVALUATIONS;DIAGRAMS;ELECTRONIC STRUCTURE;EQUATIONS;GOLD ALLOYS: T2;INTERMETALLIC COMPOUNDS;LIQUID METALS;MAGNETIC SUSCEPTIBILITY: Q1,Q2,Q3;METALS;NONMETALS;QUANTITY RATIO;TEMPERATURE DEPENDENCE

ABSTRACT: Measurements of the concentration and temperature dependence of the magnetic susceptibility kappa of liquid Cs-Au and Cs-Sb alloys are reported. At the stoichiometric compositions CsAu and Cs$sub 3$Sb, respectively, kappa exhibits a pronounced diamagnetic minimum of -81 x 10$sup -6$ emu x mole$sup -1$ for CsAu and -85 x 10$sup -6$ emu x mole$sup -1$ for Cs$sub 3$Sb. It is shown that magnetic susceptibility provides a good means for the study of chemical bonding and electronic structure in these liquids. In the nonmetallic electrical transport regime the data are discussed in terms of various models for the electronic structure of metal atoms dissolved in a more ionic or more semiconducting liquid alloy. In the case of Cs-Au alloys a complete description of the change of the nature of electronic states from nonmetallic to metallic behaviour can be deduced from the measured kappa-values. The temperature dependence of kappa for Cs-Sb alloys near the composition Cs$sub 3$Sb gives indication for a transport mechanism typical of liquid semiconductors.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<191>
Friederich, E.; Sittig, L.

In Production and properties of high-melting lower oxides ** ERA-02:060439;EDB-77:140654; Z. Anorg. Allg. Chem. (ZAACA) 145:(1/2):127-140 (1925) UCRL-Trans--11251

SUBJECT DESCRIPTORS: CERIUM OXIDES: T5;CHEMICAL PREPARATION: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8;COLOR: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8;ELECTRIC CONDUCTIVITY: Q1,Q3,Q4,Q5,Q6,Q7,Q8;HARDNESS: Q1,Q3,Q4,Q5,Q6;MELTING POINTS: Q1,Q3,Q4,Q5,Q6,Q8;MOLYBDENUM OXIDES: T7;NIOBIUM OXIDES: T4;TITANIUM OXIDES: T1;TUNGSTEN OXIDES: T6;URANIUM OXIDES:

<191>

<191> CONT.
T8;VANADIUM OXIDES: T3;ZIRCONIUM OXIDES: T2

ABSTRACT: A number of lower oxides were produced, and their properties, such as color, hardness, melting point, and electrical conductivity, were investigated. No lower oxides with a specific formula could be obtained from the elements titanium and zirconium by reduction of the saturated oxides TiO$sub 2$ and ZrO$sub 2$ with hydrogen or carbon. A dark blue, current-conducting product with a maximum weight increase of 7.7% on calcining in air was produced by annealing TiO$sub 2$ in hydrogen. ZrO$sub 2$ was not reduced by hydrogen, but with coal it could be reduced to a bluish-white product which was far removed from the zirconium content of Zr$sub 2$O$sub 3$ and formed a carbide when heated further with an excess of coal. It oxidized to white ZrO$sub 2$ in the presence of concentrated sulfuric oxide. The lower vanadium oxide V$sub 2$O$sub 3$ was formed by heating V$sub 2$O$sub 5$ in hydrogen; V$sub 2$O$sub 4$ was obtained by calcining V$sub 2$O$sub 5$ in nitrogen with the amount of coal necessary for reduction. Nb$sub 2$O$sub 3$ and Ce$sub 2$O$sub 3$ were obtained by reduction of Nb$sub 2$O$sub 5$ and CeO$sub 2$ with hydrogen. Ta$sub 2$O$sub 5$ could not be reduced to lower oxides with hydrogen or carbon. It is doubtful whether lower tantalum oxides with the formulas Ta$sub 2$O$sub 4$ and Ta$sub 2$O$sub 3$ can be produced at all. The tungsten and molybdenum oxides WO$sub 2$, W$sub 2$O$sub 5$, MoO$sub 2$, and Mo$sub 2$O$sub 5$ were obtained by reduction of the corresponding acids WO$sub 3$ and MoO$sub 3$ with coal or tungsten and molybdenum metal in a stream of nitrogen. The blue uranium oxide UO$sub 2$ was produced by annealing U$sub 3$O$sub 8$ in a nitrogen stream, and the brown modification of UO$sub 2$ was obtained in a hydrogen stream. U$sub 3$O$sub 8$ itself was obtained by calcining UO$sub 3$ in air. The resistance of all these oxides had a negative temperature coefficient. (RWR)

EDB SUBJECT CATEGORY: EDB-360201;360204

<192>

Fromm, E.; Jehn, H.; Hoerz, G. (Max-Planck-Institut fuer Metallforschung, Stuttgart (Germany, F.R.). Inst. fuer Werkstoffwissenschaften)

In Gases and carbon in metals (thermodynamics, kinetics, and properties). I. Alkali metals, alkaline earth metals, light metals (Li, Na, K, Rb, Cs; Ca, Sr, Ba; Be, Mg, Al) ** Physik Daten/Physics Data, AIX-08:298559;EDB-77:068253; (1976) ZAED

SUBJECT DESCRIPTORS: ALKALI METALS: T1;ALKALINE EARTH METALS: T2;DATA: Q1,Q2,Q3;GASES;METALS: T3

<192> CONT.

ABSTRACT: This issue is part of a series of data on 'Gases and Carbon in Metals' which supplements the data compilation in the book 'Gase und Kohlenstoff in Metallen' (Gases and Carbon in Metals), edited by E. Fromm and E. Gebhardt, Springer-Verlag, Berlin 1976. The present survey includes results from papers published after the copy deadline and recommends critically selected data. Furthermore it comprises a bibliography of relevant literature. Each part of this series refers to metals belonging to one or several groups of the periodic table of elements and compiles data and references on the interaction of the metals with hydrogen, carbon, nitrogen, and oxygen.

EDB SUBJECT CATEGORY: EDB-360100
INIS CATEGORY: B22

<193>

Fromm, E.; Kirchheim, R. (Max-Planck-Institut fuer Metallforschung, Stuttgart (F.R. Germany). Inst. fuer Werkstoffwissenschaften)

Electronic conductivity and polarization effects of solid ThO$sub 2$-Y$sub 2$O$sub 3$ electrolytes and of oxygen containing Va-metal electrodes AIX-07:262512;EDB-77:019311; Z. Metallkd. (ZEMTA) 66:(4):196-202 (Apr 1975)

SUBJECT DESCRIPTORS: DOPED MATERIALS;ELECTRIC CONDUCTIVITY; Q1,Q2,Q3;ELECTRODES;ELECTROLYTES;ELECTROMOTIVE FORCE;ELECTRON TRANSFER;INTERSTITIALS;MASS TRANSFER;OXYGEN ADDITIONS;POLARIZATION;QUANTITY RATIO;SOLIDS;SURFACE PROPERTIES;TANTALUM;TEMPERATURE DEPENDENCE;THORIUM OXIDES: T1;TIME DEPENDENCE;VANADIUM: T3;YTTRIUM OXIDES: T2

ABSTRACT: An apparatus for e.m.f.-measurements, using a solid state electrolyte, is described and results of galvanostatic measurements are presented. Electrodes of Va-metals with interstitially dissolved oxygen produce overvoltages of some mV when only small current desities of some muA/cm$sup 2$ are applied. The dependence of the overvoltage upon time, oxygen concentration, and temperature was determined. It can be concluded that the oxygen transfer through the surface of the electrodes and the roughness of the surface cause the polarization. Diffusion effects can be neglected for short times. A remarkable influence of the electronic conductivity of the ThO$sub 2$-Y$sub 2$O$sub 3$ electrolyte on the e.m.f. appeared at oxygen activities of 10$sup -28$ to 10$sup -29$ atm. The effect of polarization on the determination of electronic transference numbers is discussed and a mean value

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<193> CONT.
to tsub(e) = 0.01 is estimated for a vanadium electrode
(p$sub 02$ = 10$sup 29$ atm.)

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<194>
Fronczek, F.R.; Halstead, G.W.; Raymond, K.N. (California Univ., Berkeley (USA). Dept. of Chemistry)

Actinide metallocarbaborane complex; synthesis and x-ray structure determination of the bis[n$sup 5$-(3)-1,2-dicarbollyl]dichlorouranium(IV) dianion AIX-07:257230;EDB-77:007650; J. Chem. Soc. (London), Chem. Commun. (JCCCA) (8):279-280 (21 Apr 1976)

SUBJECT DESCRIPTORS: BORANES;CHEMICAL PREPARATION: Q1,Q2;CHEMICAL REACTIONS;CRYSTAL STRUCTURE: Q1,Q2;FURANS;LATTICE PARAMETERS;LIGANDS;LITHIUM COMPOUNDS;MOLECULAR STRUCTURE;ORGANIC BORON COMPOUNDS: T2;URANIUM CHLORIDES;URANIUM COMPLEXES: T1;X-RAY DIFFRACTION

ABSTRACT: The first actinide metallocarbaborane complex, [U(C$sub 2$B$sub 9$H$sub 11$)$sub 2$Cl$sub 2$]$sup 2-$, has been obtained by reaction of the 1,2-dicarbollide ion with UCl$sub 4$ in tetrahydrofuran (THF), and a crystal structure determination of its lithium salt has shown the complex anion to have a distorted tetrahedral geometry with pentahapto-bonded dicarbollide ligands.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<195>
Fukushima, Y.; Suzuki, K. (Tohoku Univ., Sendai (Japan). Research Inst. for Iron, Steel and Other Metals)

Structure of NO$sub 3$$sup -$ radical in molten monovalent metal nitrates AIX-08:294245;EDB-77:068745; Kakuriken Kenkyu Hokoku (KKYHB) 8:(2):288-295 (Dec 1975)

SUBJECT DESCRIPTORS: DISTRIBUTION FUNCTIONS;LITHIUM NITRATES: T1;MOLECULAR STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6;MOLTEN SALTS;NEUTRON DIFFRACTION;NITRATES: T6;POTASSIUM NITRATES: T2;RADICALS;RUBIDIUM NITRATES: T3;SILVER NITRATES: T4;SODIUM NITRATES: T5;STRUCTURAL CHEMICAL ANALYSIS;TEMPERATURE DEPENDENCE

ABSTRACT: The T-O-F pulsed neutron diffraction was experimentally studied on various kinds of monovalent metal

<195> CONT.

nitrates in the liquid state near the melting point. The T-O-F neutron diffractometer installed on the 300 MeV Tohoku University electron linac was used to measure the total structure factors for molten MNO$sub 3$, where M represents Li, Na, K, Rb or Ag. Samples were sealed in vacua in silica tubes with 0.3 mm thick wall and 10 mm inner diameter. Before sealing, all samples were dried at 120 deg C to 150 deg C in vacua for 24 to 72 hours. During the measurements, the temperature of liquid samples were kept by an electric furnace at 280, 340, 390 and 260 deg C for Li-, Na-, K-, Rb- and AgNO$sub 3$, respectively. As a result of the experiment, there was big difference in the structure factors in the range of Q 5 A$sup -1$. In this region, a lot of informations must be included about M$sup +$-NO$sub 3$$sup -$ correlations. On the other hand, the structure factors in high Q region still showed that oscillatory behavior was very similar with one another. The radial distribution functions for the molten nitrates are illustrated. Least-squares analysis, the effect of intra-radical vibration, and the correction for the superposition of a close next peak for O-O separation are discussed. Discussion are focused on the behavior of the structure factors in high Q region.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: A13

<196>

Gamanovich, N.M.; Glybin, V.P.; Dobrotin, R.B. (Belorusskij Tekhnologicheskij Inst., Minsk)

Study of lanthanum, yttrium and erbium oxychlorides in melts of alkali metal chlorides AIX-08:339889;EDB-78:017320; Zh. Neorg. Khim. (ZNOKA) 22:(1):193-197 (Jan 1977)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;COMPARATIVE EVALUATIONS;ERBIUM COMPOUNDS: T6;EUTECTICS;LANTHANUM COMPOUNDS: T7;LITHIUM CHLORIDES: T2;MOLTEN SALTS;OXYCHLORIDES;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8;POLYMERIZATION;POTASSIUM CHLORIDES: T4;RADIUM CHLORIDES: T3;RUBIDIUM CHLORIDES: T5;YTTRIUM COMPOUNDS: T8

ABSTRACT: The system MeCl-(La,Y)OCl (Me=Li,Na,K,Rb,Cs) and MeCl-ErOCl (Me=Li,Rb,Cs) have been studied by the methods of differential-thermal and X-ray phase analyses. The system NaCl-LaOCl has been studied by cryoscopic method as well. It has been established that the systems refer to the type of fusibility diagrams with a simple eutectics. A comparison of the fusibility diagrams with calculations for ideal systems, under the assumption that the association degree of ions is different, makes it possible to assume a considerable

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<196> CONT.
polymerizations degree of oxychloride in the melts MeCl-(Y,Er)OCl.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<197>
Garashina, L.S.; Vishnyakov, Y.S.

Structural changes in the series LnFeO$sub 3$ and LnF$sub 3$
ERA-03:008820;EDB-78:009638; Sov. Phys. - Crystallogr. (Engl. Transl.) (SPHCA) 22:(3):313-315 (May 1977)

SUBJECT DESCRIPTORS: ANISOTROPY;COORDINATION NUMBER;CRYSTAL STRUCTURE: Q1;INTERATOMIC DISTANCES;IONIC CRYSTALS;LATTICE PARAMETERS;RARE EARTH COMPOUNDS: M1

ABSTRACT: A structural analogy is established between two classes of rare earth compounds: fluorides LnF$sub 3$ (Ln=Sm--Lu) and oxides LnFeO$sub 3$ (Ln=Pr--Lu). A reduction in the coordination number of the Ln$sup 3+$ cation takes place in these compounds as a result of the displacement of the O or F atoms, leading to an increase in certain cation--anion distances. Anisotropy in the changes of individual interatomic distances is responsible for the nonmonotonic nature of the curve representing the crystal lattice parameters in the LnF$sub 3$ and LnFeO$sub 3$ series.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B24

<198>
Gavrilin, I.V.; Ershov, G.S.

Self-diffusion in liquid metals AIX-08:286424;EDB-77:043780; Izv. Akad. Nauk SSSR, Met. (IZNMA) (5):87-94 (Sep 1976)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;BCC LATTICES;CADMIUM: T1;CLUSTER MODEL;FCC LATTICES;LIQUID METALS: T2;MELTING POINTS;SELF-DIFFUSION: Q1,Q2,Q3;TUNGSTEN: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<199>
Gawel, W.; Terpilowski, J. (Akademia Medyczna, Wroclaw (Poland). Instytut Chemii i Technologii Srodkow Leczniczych)

Cryometric studies of the system CdCl$sub 2$-UCl$sub 4$
AIX-08:337064;EDB-77:141211; Rocz. Chem. (ROCHA) 48:(10):1683-1686 (1974)

SUBJECT DESCRIPTORS: CADMIUM CHLORIDES: T1;ENTHALPY;EUTECTICS;FORMATION FREE ENERGY;PHASE STUDIES: Q1,Q2;PHASE TRANSFORMATIONS;URANIUM CHLORIDES: T2

ABSTRACT: The phase equilibria in the system CdCl$sub 2$-UCl$sub 4$ have been examined. On the basis of liquidus curve, a thermodynamic description of the liquid phase in this system has been given.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<200>
Gee, R.; Shelton, R.A.J.

Thermodynamic properties of Cr, Mn, Co and Ni dichlorides from emf measurements on cells with solid electrolytes
EDB-77:128149; Inst. Min. Metall., Trans., Sect. C (TMEMA) 85::C208-C210 (Dec 1976)

SUBJECT DESCRIPTORS: CHROMIUM CHLORIDES: T1;COBALT CHLORIDES: T2;ELECTROLYTIC CELLS;ELECTROMOTIVE FORCE;MANGANESE CHLORIDES: T4;NICKEL CHLORIDES: T3;ORE PROCESSING;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3,Q4

ABSTRACT: Emf measurements on solid electrolyte cells were used to determine thermodynamic properties of chromium, cobalt, manganese, and nickel dichlorides.

EDB SUBJECT CATEGORY: EDB-360603;320303

<201>
Gel'd, P.V.; Esin, Yu.O.; Petrushevskii, M.S.; Ryss, G.M.; Stroganov, A.I. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR); Chelyabinskij Politekhnicheskij Inst. (USSR))

Enthalpies of formation of melts of yttrium with aluminium
AIX-08:283293;EDB-77:068481; Dokl. Akad. Nauk SSSR (DANKA) 228:(2):386-388 (11 May 1976)

SUBJECT DESCRIPTORS: ALUMINIUM ALLOYS: T1;BINARY ALLOY SYSTEMS;ENTHALPY: Q1,Q2;LIQUID METALS;QUANTITY RATIO;VERY

<201>

<201> CONT.
HIGH TEMPERATURE;YTTRIUM ALLOYS: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<202>
Giacchetti, G.; Sari, C.

Behavior of molybdenum in mixed-oxide fuel
INS-77:000020;ERA-02:009200;EDB-77:005582; Nucl. Technol. (NUTYB) 31:(1):62-69 (Oct 1976)

SUBJECT DESCRIPTORS: BARIUM: T3;BARIUM OXIDES;CHEMICAL REACTIONS: Q2,Q3,Q4,Q5,Q6,Q7;FISSION PRODUCTS: Q1;MIXTURES;MOLYBDENUM: T2;MOLYBDENUM ALLOYS;MOLYBDENUM OXIDES;NUCLEAR FUELS: T1;OXIDATION;PALLADIUM ALLOYS;PLUTONIUM OXIDES: T7;RHODIUM ALLOYS;RUTHENIUM ALLOYS;SOLUBILITY;TEMPERATURE GRADIENTS;TUNGSTEN: T5;TUNGSTEN OXIDES;URANIUM OXIDES: T6;VAPORS;ZIRCONIUM: T4

ABSTRACT: Metallic molybdenum, Mo--Ru--Rh--Pd alloys, barium, zirconium, and tungsten were added to uranium and uranium--plutonium oxides by coprecipitation and mechanical mixture techniques. This material was treated in a thermal gradient similar to that existing in fuel during irradiation to study the behavior of molybdenum in an oxide matrix as a function of the O/(U + Pu) ratio and some added elements. Result of ceramographic and microprobe analysis shows that when the overall O/(U + Pu) ratio is less than 2, molybdenum and Mo--Ru--Rh--Pd alloy inclusions are present in the uranium--plutonium oxide matrix. If the O/(U + Pu) ratio is greater than 2, molybdenum oxidizes to MoO$sub 2$, which is gaseous at a temperature approximately 1000$sup 0$C. Molybdenum oxide vapor reacts with barium oxide and forms a compound that exists as a liquid phase in the columnar grain region. Molybdenum oxide also reacts with tungsten oxide (tungsten is often present as an impurity in the fuel) and forms a compound that contains approximately 40 wt percent of actinide metals. The apparent solubility of molybdenum in uranium and uranium--plutonium oxides, determined by electron microprobe, was found to be less than 250 ppM both for hypo- and hyperstoichiometric fuels.

EDB SUBJECT CATEGORY: EDB-050700;220300
INIS CATEGORY: E23

<203>
Gilbert, B. (Univ. of Tennessee, Knoxville); Mamantov, G.; Begun, G.M.

Raman spectra of Al$sub 2$O$sub 3$ solutions in molten cryolite and other aluminum fluoride containing melts
ERA-03:012892;EDB-78:022305; Inorg. Nucl. Chem. Lett. (INOCA) 12::415-424 (1976)

SUBJECT DESCRIPTORS: ALUMINIUM FLUORIDES: T1;ALUMINIUM OXIDES: T2;CHEMICAL ANALYSIS: Q1;RAMAN SPECTRA: Q2

ABSTRACT: Experimental results are reported that show that oxide concentrations as low as 2 mole % can be detected in aluminum fluoride melts using Raman spectroscopy. Results of attempts to obtain further information on the complex species observed on dissolution of Al$sub 2$O$sub 3$ were not definitive, but species involving nonbridging Al--O bonds have been eliminated from consideration in concentrated Al$sub 2$O$sub 3$ solutions in aluminum fluoride containing melts. All new bands observed associated with the oxide were below 600 cm$sup -1$. (ELM)

EDB SUBJECT CATEGORY: EDB-400201;400104

<204>
Gilbert, B.; Mamantov, G. (Univ. of Tennessee, Knoxville); Begun, G.M.

Simple Raman cell and furnace usable at temperatures higher than 1000$sup 0$ for corrosive melts ERA-01:013809;EDB-76:036965; Appl. Spectrosc. (APSPA) 29:(3):276-278 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM FLUORIDES: T1;DESIGN;FURNACES;MOLTEN SALTS: T3;RAMAN SPECTRA: Q1,Q2,Q3;SODIUM FLUORIDES: T2;SPECTROSCOPY;VERY HIGH TEMPERATURE

ABSTRACT: An extremely simple experimental setup was designed which can be built in a few days. A windowless cell was chosen; it was comprised of graphite. The furnace and cell were built in such a way that no surface capable of emitting thermal radiation can be seen by the spectrometer. To illustrate the performance possible, Raman spectra are presented for AlF$sub 3$--NaF at 740$sup 0$C and molten cryolite at 1015$sup 0$C. (DLC)

EDB SUBJECT CATEGORY: EDB-400201

<205>

<205>
Girifalco, L.A.

Criteria for solid solution formation in NFE alloys
ERA-02:022819;INS-77:005719;EDB-77:043652; Acta Metall. (AMETA) 24:(8):759-791 (Aug 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;DENSITY;ELECTRONIC STRUCTURE: Q1;ELECTRONS;METALS;MIXING HEAT;RARE EARTH ALLOYS: T1;SOLID SOLUTIONS;VALENCE;VEGARD LAW

ABSTRACT: The first order, nearly free electron (NFE) theory of metals is applied to homovalent, random, binary alloys. It is found that the volume dependent energy of mixing for such alloys can never be negative, though it can be quite small. The fundamental parameter that determines the volume dependent properties of metals and alloys is an ionic core radius (related to the cut-off radius of the empty core potential) which can be computed from the density of the pure metals. It was found that systems for which the theoretical energy of mixing was less than 10$sup -3$ Rydbergs per valence electron form solid solutions, while others do not. This result is easily expressed as a requirement that the ion core radii differ by less than approximately 13% for divalent alloys and approximately 20% for monovalent alloys. Application of these criteria to a large number of alloys shows that they predict whether or not extensive solid solution will take place with reasonable success. The theory also shows that Vegard's law is very nearly valid in NFE random alloys. This is in general agreement with experiment.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<206>
Glushkova, V.B.; Panova, T.I.; Keler, Eh.K.; Fedorov, N.F. (AN SSSR, Leningrad. Inst. Khimii Silikatov)

Thermodynamics of reactions of rare earth oxides with niobium oxide AIX-08:292317;EDB-77:050536; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 12:(9):1596-1599 (Sep 1976)

SUBJECT DESCRIPTORS: ALLOTROPY;CHEMICAL PREPARATION;CHEMICAL REACTIONS: Q1,Q2;FORMATION HEAT: Q1,Q3;FREE ENERGY;NIOBATES: T3;NIOBIUM OXIDES: T2;OXIDES;RARE EARTH COMPOUNDS: T1;SPECIFIC HEAT;TEMPERATURE DEPENDENCE

<207> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360204;400201
INIS CATEGORY: B12

<207>
Golub, A.M.; Perepelitsa, A.P.; Slobodyanik, N.S.; Popel', P.P.
(Kievskij Gosudarstvennyj Univ. (Ukrainian SSR))

Binary molybdates of rare earths and silver (I)
AIX-08:289228;EDB-77:050844; (ZNOKAZh. Neorg. Khim.)
21:(4):1142-1144 (Apr 1976)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1,Q2,Q3;CRYSTAL STRUCTURE: Q1,Q2,Q3;LATTICE PARAMETERS;MELTING POINTS;MOLYBDATES: T1;RARE EARTH COMPOUNDS: T2;SILVER COMPOUNDS: T3;THERMAL GRAVIMETRIC ANALYSIS;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<208>
Golubin, M.A.; Khajmenov, A.P. (AN SSSR, Sverdlovsk. Inst. Ehlektrokhimii)

High-temperature unit to the IKS-21 spectrometer for the detection of molten salts absorption spectra
AIX-08:322633;EDB-77:121461; Prib. Tekh. Eksp. (PRTEA)
18:(4):231 (Jul 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;FOCUSING;FURNACES;INFRARED SPECTROMETERS: T;LENSES;MOLTEN SALTS: T1;SPECTROPHOTOMETERS: T;VERY HIGH TEMPERATURE

ABSTRACT: A high-temperature attachment to the batch-manufactured IKS-21 infrared spectrometer is described. The instrument is equipped with a heating oven that is placed between the illuminator and monochromator in such a way that the flux of light energy from the globar lamp is focused at the center of the cell. An additional collecting lens is used to focus the beam onto the monochromator slit.

EDB SUBJECT CATEGORY: EDB-440300
INIS CATEGORY: E42

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<209>
Gomozov, L.I.; Dedjurin, A.J.; Titov, S.G.; Ivanov, O.S. (AN SSSR, Moscow. Inst. Metallurgii) ** Blank, H.; Lindner, R. (eds.)

Physical and mechanical properties of some uranium-containing carbides In Plutonium 1975 and other actinides **
AIX-08:310001;ERA-02:041837;EDB-77:094406; (1976)
North-Holland

SUBJECT DESCRIPTORS: BINDING ENERGY;CRYSTAL LATTICES;ELECTRONIC SPECIFIC HEAT;INTERSTITIALS;LATTICE PARAMETERS;MECHANICAL PROPERTIES: Q1;MICROHARDNESS;PHASE DIAGRAMS;PHASE STABILITY;PHYSICAL PROPERTIES: Q1;POISSON RATIO;SOLID SOLUTIONS;STRAIN HARDENING;URANIUM CARBIDES: T1;VICKERS HARDNESS;YIELD STRENGTH;YOUNG MODULUS

ABSTRACT: The alloying of uranium carbides considerably deteriorates their nuclear characteristics. The change in physical and mechanical properties on formation of solid solutions of carbides, however, is of essential interest from the view-point of formulating rules for their strengthening. Properties of various uranium containing carbides are discussed.

EDB SUBJECT CATEGORY: EDB-360203;360204;050700
INIS CATEGORY: B24

<210>
Gopala Rao, R.V.; Sen, D. (Jadavpur Univ., Calcutta (India))

Perturbation treatment of the Percus-Yevick equation and structures of liquid magnesium and cadmium
AIX-08:300995;EDB-77:088841; Chem. Phys. Lett. (CHPLB) 43:(3):455-456 (1 Nov 1976)

SUBJECT DESCRIPTORS: CADMIUM: T;CORRELATION FUNCTIONS;FOURIER TRANSFORMATION;HIGH TEMPERATURE;LIQUID METALS;MAGNESIUM: T;PERCUS-YEVICK EQUATION;SQUARE-WELL POTENTIAL

ABSTRACT: An analytical expression for the structure factor has been derived by using a square well potential as a perturbation over the hard sphere potential. The calculated values for the structure factors of liquid magnesium and cadmium are in good agreement with experiments.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<211>
Gordon, P.; Breyer, N.N.; Albright, D.L.; Warke, W.R., Illinois Inst. of Tech., Chicago (USA)

In Environmental sensitivity of structural metals: liquid metal embrittlement. Annual technical progress report No. 4, 1 Jun 1972--31 May 1973 ** EDB-77:094287; (31 May 1973) AD--912439

SUBJECT DESCRIPTORS: ALUMINIUM;ANTIMONY;ARSENIC;CADMIUM;COPPER ALLOYS;CRACKS;EMBRITTLEMENT: Q1;FAILURES;FRACTURE PROPERTIES;FRACTURES;GRAIN BOUNDARIES;IMPURITIES;INDIUM;LEAD;LIQUID METALS: T2;MERCURY;METALLURGICAL EFFECTS: Q2;METALS: T1;PHOSPHORUS;SOLDERING;STEELS;SURFACE PROPERTIES;TIN;ZINC

ABSTRACT: The phenomenon of LME is being investigated on levels from the atomic through bulk specimen and structural properties, and is being considered from both experimental and theoretical viewpoints. The research is aimed at elucidating the three important aspects of LME, namely, the mechanism by which embrittlement takes place at a crack, or potential crack, site; the mechanism by which the embrittling species is transported to this site; and various metallurgical, physical, and mechanical factors which have a significant influence on the severity of the embrittlement. (GRA)

EDB SUBJECT CATEGORY: EDB-360105

<212>
Gordon, P.; Breyer, N.N.; Broutman, L.J.; Dally, J.W.; Albright, D.L., Illinois Inst. of Tech., Chicago (USA)

In Environmental sensitivity of structural metals: liquid metal embrittlement. Annual technical progress report No. 2, 25 Jun 1970--31 May 1971 ** EDB-77:094057; (Jun 1971) AD--886441

SUBJECT DESCRIPTORS: ALUMINIUM ALLOYS;BUILDING MATERIALS: T1;CADMIUM;EMBRITTLEMENT: Q1;FRACTURES;INDIUM;LEAD;LIQUID METALS: T2;METALLURGICAL EFFECTS: Q2;STEELS;STRESSES;TIN;ZINC

ABSTRACT: Liquid metal embrittlement (LME) is being investigated on levels from the atomic through bulk specimen and structural properties, and is being considered from both experimental and theoretical viewpoints. The research is aimed at elucidating the three important aspects of LME, namely, the mechanism by which the embrittlement takes place at a crack, or potential crack, site, the mechanism by which the embrittling species is transported to this site, and

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<212> CONT.
various metallurgical, physical and mechanical factors which have a significant influence on the severity of the embrittlement. (auth)

EDB SUBJECT CATEGORY: EDB-360103

<213>
Gorecki, T. (Wyzsza Szkola Inzynierska, Opole (Poland). Lab. of Physics)

Vacancies und melting curves of metals at high pressure
AIX-08:327774;EDB-77:140506; Z. Metallkd. (ZEMTA) 68:(3):231-236 (Mar 1977)

SUBJECT DESCRIPTORS: BINDING ENERGY;DATA COMPILATION;MELTING: Q1,Q2,Q3,Q4,Q5;MELTING POINTS;METALS: T5;NEPTUNIUM: T1;PLUTONIUM: T2;PRESSURE DEPENDENCE;RARE EARTHS: T3;URANIUM: T4;VACANCIES;VERY HIGH PRESSURE

ABSTRACT: The vacancy mechanism of the melting process is utilized as a starting point in derivation of the pressure dependence of melting temperature for metals. The results obtained for the initial slope of the melting curve are compared with experimental data for 45 metals (including U, Np, Pu, rare earths) and in most cases the agreement is very good. An on-linearity of the fusion curve and appearence of the maximum on the melting curve at a pressure approximately equal to the bulk modulus is also predicted with qualitative agreement with existing experimental data.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<214>
Gorcncek, K.; Falta, G.; Pichlmayer, F., Oesterreichische Studiengesellschaft fuer Atomenergie G.m.b.H., Vienna

In Determination of the burn up and differentiation of the fission yields of uranium-thorium-fuels **
AIX-08:315028;ERA-02:054499;EDB-77:127184; (Feb 1975) SGAE--2425

SUBJECT DESCRIPTORS: BURNUP: T2,Q1;CESIUM 137;FISSION YIELD;FUEL ELEMENTS: T1;GAMMA SPECTROSCOPY;HIGHLY ENRICHED URANIUM;ISOTOPE RATIO;MASS SPECTROSCOPY;MEASURING METHODS: Q2;MOLYBDENUM;MOLYBDENUM OXIDES;NUCLEAR FUELS;THORIUM OXIDES;URANIUM;URANIUM DIOXIDE

ABSTRACT: The burnup of highly enriched and highly burned up (U, Th) O$sub 2$ fuels has been determined by two different and

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unrelated methods. The results for the fuel burnup calculated from the ratio of the uranium isotopes is compared with the results from the method of the stable molybdenum isotopes. The number of Mo-95 atoms enables the calculation of the total burnup; the respective fission yields of U-233 and U-235 are obtained by the ratio of Mo-95 to Mo-100 isotopes. This method requires fewer assumptions than the former but it is more laborious because one has to determine the content of uranium and molybdenum of the samples. Moreover the burnup data obtained from the gamma-spectroscopic determination of Cs-137 are given.

EDB SUBJECT CATEGORY: EDB-220300
INIS CATEGORY: B16

<215>
Goryachev, Yu.M.; Kovenskaya, B.A.; Dudnik, E.M.; Severyanina, E.N.; Arabei, B.G.

Electron structure of rare-earth metal tetraborides
EDB-77:031006; Zh. Strukt. Khim. (ZSTKA) 16:(6):1036-1040 (1975)

SUBJECT DESCRIPTORS: BORIDES: T2;ELECTRICAL PROPERTIES;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6;GADOLINIUM BORIDES: T4;HALL EFFECT;HOLMIUM BORIDES: T6;NEODYMIUM BORIDES: T3;PHYSICAL PROPERTIES;RARE EARTH COMPOUNDS: T1;TERBIUM BORIDES: T5

ABSTRACT: The electron structure of the tetraborides of rare-earth metals, in particular NdB$sub 4$, GdB$sub 4$, TdB$sub 4$, and HoB$sub 4$, is discussed theoretically and the results are compared with the experimentally-measured electrical and thermophysical properties. On the basis of a linear-combination-of-atomic-orbits approach, the electron energy spectrum of these four tetraborides is calculated, and the principal parameters of the electron energy structures are deduced. A scheme is proposed for the nature of the interatomic bonds in the tetraborides. Experimental Hall effect data, together with the theory, indicate that the conduction band of these compounds is formed by a group of electron states of B and metal atoms, the B electron states playing a minor role.

EDB SUBJECT CATEGORY: EDB-360204

<216>

<216>
Gotkis, I.S.; Gusarov, A.V.; Gorokhov, L.N. (AN SSSR, Moscow. Inst. Vysokikh Temperatur; Ivanovskij Khimiko-Tekhnologicheskij Inst. (USSR))

Mass spectra and vapor composition of niobium pentafluoride EDB-76:049131; Zh. Neorg. Khim. (ZNOKA) 20:(5):1250-1253 (May 1975)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION: Q1;MASS SPECTRA: Q1;NIOBIUM FLUORIDES: T1;SUBLIMATION HEAT;VAPORS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<217>
Goudy, A.J., Pittsburgh Univ., Pa. (USA)

In Hydrogen solubility in rare earth intermetallic compounds ** INS-78:001581;EDB-78:021867; (1976) Univ. of Pittsburgh

SUBJECT DESCRIPTORS: ABSORPTION: Q4;CRYSTAL STRUCTURE;HYDROGEN: T4;RARE EARTH ALLOYS: T1;SORPTIVE PROPERTIES: Q1,Q2,Q3;VOLUME

ABSTRACT: A study of the hydrogen sorption characteristics of some RFe$sub 3$ and R$sub 2$Co$sub 7$ intermetallic compounds was conducted. These compounds are of interest since new materials are being sought which absorb and release large quantities of hydrogen rapidly and reversibly at ambient temperatures and pressures. These materials were found to be very receptive to hydrogen. The proton densities in most cases were as high as that in liquid hydrogen. Accordingly, measurements were made pertaining to the thermodynamics of hydride formation, specifically pressure-composition isotherms from which $delta$H, $delta$G and $delta$S for the hydrogenations could be determined. The data provide information as to the hydride stabilities.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<218>
Green, D.W.; Gabelnick, S.D.; Reedy, G.T., Argonne National Lab., Ill. (USA)

In Fine definition of ir spectra from high temperature interactions of U + O$sub 2$. Part II. Final report, 1 July 1974--30 June 1975 **
INS-77:002399;ERA-02:017902;EDB-77:031754; (Aug 1975)
AD-A--020534

SUBJECT DESCRIPTORS: CHARGE EXCHANGE: Q1,Q2,Q3,Q4;INFRARED SPECTRA;NITRIC OXIDE: M4;NITROGEN DIOXIDE: M3;URANIUM DIOXIDE: M1;URANIUM OXIDES: M2;VERY LOW TEMPERATURE

ABSTRACT: The reactions of UO and UO$sub 2$ with NO and NO$sub 2$ were studied by ir spectroscopy using the matrix-isolation technique. Codeposition of vaporized UO and UO$sub 2$ with NO$sub 2$ and with NO gases in an argon matrix at 14$sup 0$K resulted in the production of the UO$sub 2$$sup +$ molecular ion with either a NO$sub 2$$sup -$ or NO$sup -$ anion. Ir absorption frequencies were measured and interpreted as the stretching modes of a linear UO$sub 2$$sup +$ ion and a bent (bond angle = 109$sup 0$) NO$sub 2$$sup -$ ion. Three different reactions were observed to yield a UO$sub 2$$sup +$ cation product: (1) UO$sub 2$ + NO$sub 2$; (2) UO$sub 2$ + NO; and (3) UO + NO$sub 2$.

EDB SUBJECT CATEGORY: EDB-400702;400201;360204
INIS CATEGORY: B13;B12;B23

<219>
Green, D.W.; Reedy, G.T.

Identification of UN in Ar matrices
INS-76:020261;ERA-02:001820;EDB-76:083240; J. Chem. Phys. (JCPSA) 65:(7):2921-2922 (1 Oct 1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;INFRARED SPECTRA: Q1;ISOTOPE EFFECTS: Q3;NITROGEN 14;NITROGEN 15: T3;SPECTRAL SHIFT;URANIUM NITRIDES: T1;VIBRATIONAL STATES

ABSTRACT: Measurements of vibrational frequencies of the matrix-isolated UN molecule are reported, leading to the identification of a linear N-U-N molecule. (AIP)

EDB SUBJECT CATEGORY: EDB-640302
INIS CATEGORY: A12

<220>

<220>
Green, D.W.; Reedy, G.T.; Leibowitz, L., Argonne National Lab., Ill. (USA)

In Thermodynamic functions and vapor pressures of uranium and plutonium oxides at high temperatures **
INS-77:014996;ERA-02:055867;EDB-77:130893; (1977)
CONF-770537--2

SUBJECT DESCRIPTORS: ELECTRONIC STRUCTURE;ENERGY LEVELS;INFRARED SPECTRA;ISOTOPE EFFECTS;OXYGEN 16;OXYGEN 18;PLUTONIUM DIOXIDE;PLUTONIUM OXIDES: M1;ROTATIONAL STATES;THERMODYNAMIC PROPERTIES: Q1,Q2;URANIUM DIOXIDE;URANIUM OXIDES: M2;URANIUM TRIOXIDE;VIBRATIONAL STATES

ABSTRACT: The total energy release in a hypothetical reactor accident is sensitive to the total vapor pressure of the fuel. Thermodynamic functions which are accurate at high temperature can be calculated with the methods of statistical mechanics provided that needed spectroscopic data are available. This method of obtaining high-temperature vapor pressures should be greatly superior to the extrapolation of experimental vapor pressure measurements beyond the temperature range studied. Spectroscopic data needed for these calculations are obtained from infrared spectroscopy of matrix-isolated uranium and plutonium oxides. These data allow the assignments of the observed spectra to specific molecular species as well as the calculation of anharmonicities for monoxides, bond angles for dioxides, and molecular geometries for trioxides. These data are then employed, in combination with data on rotational and electronic molecular energy levels, to determine thermodynamic functions that are suitable for the calculation of high-temperature vapor pressures.

EDB SUBJECT CATEGORY: EDB-050700;360204
INIS CATEGORY: B23

<221>
Grishchenko, V.F.; Lutsenko, V.G. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Electrochemical behavior of tellurium (4) in oxychloride melts
AIX-08:334295;EDB-77:141085; Elektrokhimiya (ELKKA) 12:(12):1863-1865 (Dec 1976)

SUBJECT DESCRIPTORS: ELECTROCHEMISTRY: Q1;ELECTROLYSIS;ELECTROMOTIVE FORCE;MOLTEN SALTS;OXYCHLORIDES;REACTION KINETICS;TELLURIUM COMPOUNDS: T1

<221> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400400
INIS CATEGORY: B12

<222>
Gruenberg, H., Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)

In Calculation and discussion of state diagrams in the system Pu-F-O-H **
AIX-08:329845;ERA-03:010750;NTS-78:000938;EDB-78:017483; (Oct 1976) ZfK--316

SUBJECT DESCRIPTORS: ENTHALPY;FLUORIDE VOLATILITY PROCESS;FLUORINATION;PHASE DIAGRAMS: Q1,Q2,Q3;PLUTONIUM COMPOUNDS;PLUTONIUM FLUORIDES: T1;PLUTONIUM HYDRIDES: T2;PLUTONIUM OXIDES: T3;THERMODYNAMICS

ABSTRACT: In the system Pu-F-O-H state diagrams at a pressure of reacting gases of 1 atm have been calculated and discussed together with state diagrams of the system U-F-O-H. Conclusions are drawn for the separation of uranium and plutonium and about the conversion of fluorides of uranium and plutonium to the oxides.

EDB SUBJECT CATEGORY: EDB-400702;050800
INIS CATEGORY: D12

<223>
Gubanov, V.A. (AN SSSR, Sverdlovsk. Inst. Khimii); Rosen, A.; Ellis, D.E.

Electron structure and bonding in Th0$sub 2$ and U0$sub 2$
AIX-08:321137;EDB-77:113737; Solid State Commun. (SSCOA) 22:(4):219-223 (Apr 1977)

SUBJECT DESCRIPTORS: CHARGE DENSITY;CHEMICAL BONDS;DIRAC APPROXIMATION;ELECTRONIC STRUCTURE: Q1,Q2;ENERGY LEVELS;HARTREE-FOCK METHOD;PHOTOELECTRON SPECTROSCOPY;SLATER METHOD;THORIUM OXIDES: T1;URANIUM DIOXIDE: T2;X RADIATION

ABSTRACT: Electron energy levels and charge densities for Th0$sub 2$ and U0$sub 2$ are calculated in a molecular cluster approximation, using spin unrestricted Hartree-Fock-Slater and relativistic Dirac-Slater models. Results compare favourably with X-ray photoelectron spectra

<223>

<223> CONT.
and reveal similarities in chemical bonding with rare earth oxides.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<224>
Guentherodt, H.-J.; Hauser, E.; Kuenzi, H.U. (Basel Univ. (Switzerland)); Evans, R.; Evers, J.; Kaldis, E.

Negative temperature coefficients of electrical resistivity: the divalent liquid metals Eu, Yb and Ba
AIX-07:275060;EDB-77:018827; J. Phys., F (London) (JPFMA) 6:(8):1513-1522 (Aug 1976)

SUBJECT DESCRIPTORS: BARIUM: T1;ELECTRIC CONDUCTIVITY: Q1,Q2,Q3;EUROPIUM: T2;HIGH TEMPERATURE;INTERATOMIC FORCES;LIQUID METALS;MELTING;MELTING POINTS;ORDER-DISORDER TRANSFORMATIONS;TEMPERATURE DEPENDENCE;VALENCE;VERY HIGH TEMPERATURE;YTTERBIUM: T3

ABSTRACT: The electrical resistivities rho, of Eu, Yb and Ba have been measured at high temperatures. In solid Yb and Ba rho varies linearly with temperature. This is contrary to some previous results. Both metals show a large percentage increase of rho on melting. The temperature dependence of rho in Eu in nonlinear and there is a smaller percentage change on melting. The resistivities of liquid Eu and Ba are larger than those of any other liquid metals. Negative temperature coefficients of resistivity are observed for all three metals in the liquid state. These results and those obtained in earlier measurements on alloys of rare earth metals are discussed in the context of existing theories. It is suggested that even in the liquid rare earth metals and their alloys an interpretation involving the liquid structure factors and the effective valences of the components may still provide a reasonable qualitative explanation of the behavior of the resistivity. Comments are also made on the occurrence of negative temperature coefficients in other disordered metallic systems.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<225>
Gunnerson, F.S.; Cronenberg, A.W. (New Mexico Univ., Albuquerque (USA). Dept. of Nuclear Engineering)

Prediction of the inert gas solubilities in stoichiometric molten UO$sub 2$ AIX-07:239562;ERA-02:012470;EDB-77:016973; J. Nucl. Mater. (JNUMA) 58:(3):311-320 (Dec 1975)

SUBJECT DESCRIPTORS: FAST NEUTRONS;FISSION PRODUCTS;LIQUID FUELS;LIQUIDS;RARE GASES: T1;SOLUBILITY: Q1;SOLVENT PROPERTIES: Q2;URANIUM DIOXIDE: T2

ABSTRACT: To analyze the effect of fission gas behaviour on fast reactor fuels during a hypothetical overpower transient, the solubility characteristics of the noble gases in molten UO$sub 2$ have been assessed. To accomplish this, a theoretical estimation of such solubilities is made by determining the reversible work required to introduce a hard sphere, the size of the gas atom, into the liquid solvent. Results indicate that the solubility of the noble gases in molten UO$sub 2$ is quite low, the molar fraction of gas-to-liquid being approximately 10$sup -6$. Such a low solubility of fission gases suggests that for preirradiated fuels, added swelling or formation may occur upon melting. In addition, such low solubility potential indicates that the fission gases do not play an appreciable role in the fragmentation of molten UO$sub 2$ upon quenching in sodium coolant.

EDB SUBJECT CATEGORY: EDB-050700;360104;360603
INIS CATEGORY: B12

<226>
Hadari, Z.; Mintz, M.H., Israel Nuclear Society, Yavne

In Uranium dioxide as a ceramic nuclear fuel ** Israel Nuclear Society symposium on ''Nuclear fuel in Israel'', Weizmann Institute of Science, Rehovot, 1.7.75, EDB-76:033599; (1975) INIS-mf--1966/5

SUBJECT DESCRIPTORS: CERAMICS;DENSITY;ENRICHED URANIUM;FABRICATION: Q1;FISSION PRODUCTS;FUEL PELLETS;NATURAL URANIUM;NUCLEAR FUELS;PHASE DIAGRAMS;PHYSICAL PROPERTIES: Q1;POWDER METALLURGY;SINTERING;THERMAL CONDUCTIVITY;URANIUM DIOXIDE: T1

ABSTRACT: The advantages and disadvantages of the use of UO$sub 2$ as a nuclear fuel are shown. The two stages of the process of manufacture of UO$sub 2$ nuclear fuel, UO$sub 2$ powder and UO$sub 2$ pelletizing, are described as well as the factors influencing the sintering process. A phase diagram for the uranium-oxygen system below 1500$sup 0$C is presented

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<226> CONT.
and the influence of O/U on thermal conductivity is exemplified. It is concluded that in the manufacture of pellets a density should be attained that would allow both a good thermal conductivity and the emission of the fission products.

EDB SUBJECT CATEGORY: EDB-050700;360201
INIS CATEGORY: B23

<227>
Haines, H.R.; Mardon, P.G.; Potter, P.E. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment) ** Blank, H.; Lindner, R. (eds.)

Some constitutional studies on uranium-carbon- and plutonium-carbon-rhenium and technetium systems In Plutonium 1975 and other actinides **
AIX-08:310003;ERA-02:041827;EDB-77:094385; (1976)
North-Holland

ABSTRACT: Some new experimental data on the phase diagrams U-Re-C, U-Te-C, Pu-Re-C, and Pu-Tc-C are presented. The data obtained for U-Re-C are in agreement with previous studies. The observations on the Tc systems confirm the formation of a Tc carbide with the upper limit of carbon content corresponding to the formula Tc$sub 3$C. In the U-Tc-C system, the UTcC$sub 2$ is present having an orthorhombic crystal structure, and is isomorphous with UReC$sub 2$. In the Pu-Re-C system there is no compound analogous to UReC$sub 2$, however, in this system and in the Pu-Tc-C system there is a ternary phase with a composition C ca. 30 at.%, and the Pu:Re or Tc ratio ca. 1.25. The Pu-Tc-C system is also characterised by a ternary compound PuTcsub(2-y) which has a monoclinic crystal structure. Tentative phase diagrams are presented for U-Re-C, and the Tc systems.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B24

<228>
Haines, H.R.; Mardon, P.G.; Potter, P.E. ** Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Some constitutional studies on uranium--carbon and plutonium--carbon--rhenium and technetium systems In 5th international conference on plutonium and other actinides **
AIX-07:233120;EDB-76:087287; (1975) AED-Conf--75-417-017

SUBJECT DESCRIPTORS: CRYSTAL LATTICES;PHASE DIAGRAMS: Q1,Q2,Q3,Q4

<228> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<229>
Hall, D.G., Oak Ridge National Lab., Tenn. (USA)

In Spectral density functions for disordered systems **
INS-77:002176;ERA-02:017710;EDB-77:030648; (Nov 1976)
ORNL--5184

SUBJECT DESCRIPTORS: AMORPHOUS STATE: T3,Q1;HAMILTONIANS;LIQUID METALS: T2;MONTE CARLO METHOD;ONE-DIMENSIONAL CALCULATIONS;ORDER PARAMETERS;SOLIDS: T1;SPECTRAL DENSITY: Q2,Q3

ABSTRACT: This work describes a Monte Carlo calculation of the spectral density function A(k,E) for a one-dimensional model of an amorphous solid. The model contains an adjustable short-range order parameter and A(k,E) is obtained for several values of that parameter. The Hamiltonians considered are: (1) the Hamiltonian describing an electron moving in a potential consisting of randomly placed delta functions, (2) the Hamiltonian describing a system of coupled harmonic oscillators, and (3) a tight-binding Hamiltonian describing in a simplified way either electrons or spin-waves. This numerical calculation was used to interpret recent neutron scattering data on amorphous systems. The spectral density A(k,E) gives the single-particle contribution to the dynamic form factor of neutron scattering theory. In another application of the model calculation, the spectral density is obtained in the quasicrystalline approximation (QCA) for the problem of an electron in a one-dimensional liquid metal. The QCA and exact spectral densities are compared and it is shown that the QCA fails in the strong scattering regime. 14 figures. (DIC)

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<230>
Harder, J.M.; Young, W.H. (East Anglia Univ. (UK). School of Mathematics and Physics)

Entropies of liquid rare earth metals
AIX-08:342975;EDB-78:021744; Phys. Lett., A (PYLAA) 61:(7):468-470 (27 Jun 1977)

SUBJECT DESCRIPTORS: ANGULAR MOMENTUM;CERIUM:

<230>

<230> CONT.
T1;COUPLING;ELECTRONIC STRUCTURE:
Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;ENTROPY:
Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;EUROPIUM: T2;GADOLINIUM: T3;GROUND STATES;LANTHANUM: T4;LIQUID METALS: T9;NEODYMIUM: T5;PRASEODYMIUM: T6;TERBIUM: T7;YTTERBIUM: T8

ABSTRACT: The entropies of the liquid rare earths are explained using hypotheses about the electronic structure which closely parallel some believed to be correct for the corresponding solids.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<231>
Hardy, R.J. (Univ. of Nebraska, Lincoln); Karo, A.M.

Lattice-dynamical calculation of the thermodynamic properties of NaCl, KCl and RbCl ERA-02:043811;EDB-77:101169; J. Phys. Chem. Solids (JPCSA) 38:(4):335-344 (1977)

SUBJECT DESCRIPTORS: CALCULATION METHODS;CRYSTAL LATTICES;GRUENEISEN CONSTANT;POTASSIUM CHLORIDES: T2;PREDICTION EQUATIONS;RUBIDIUM CHLORIDES: T3;SODIUM CHLORIDES: T1;SPECIFIC HEAT;THERMAL EXPANSION;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3

ABSTRACT: Results of a lattice-dynamical calculation of the coefficient of thermal expansion, the heat capacity, and the macroscopic Grueneisen ratio for NaCl, KCl and RbCl are presented. Good agreement with the experimental results is obtained without adjustable parameters. The needed normal mode frequencies and mode-Grueneisen parameters were calculated with a deformation dipole model with nearest- and next-nearest-neighbor central-force interactions. Predicted values for the static elastic constants, the strain derivatives of the static potential energy, the mechanical equilibrium value of the nearest-neighbor distance, and the mode-Grueneisen parameters are given.

EDB SUBJECT CATEGORY: EDB-400201

<232>
Hashimoto, T.; Yamamoto, M.; Kobayashi, K.

Preparation of uranium-233 with low uranium-232 content
EDB-77:098238; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 13:(3):119-124 (Mar 1976)

SUBJECT DESCRIPTORS: FUEL CYCLE;IRRADIATION: Q2;ISOTOPE RATIO;NEUTRON FLUENCE;PRODUCTION: Q1;PURIFICATION: Q1;SPECTROSCOPY;THORIUM OXIDES: T2;URANIUM 233: T1

ABSTRACT: Thorium dioxide, previously freed of uranium and protactinium contamination by means of ion-exchange, was irradiated for 70.5 and 140 hr respectively in the core and graphite thermal column positions of the KUR (Kyoto University Reactor). After being cooled for more than 1 1/2 yr, the $sup 233$U produced was chemically purified by ion-exchange, and the resulting $sup 233$U specimens were electro-deposited on a stainless steel plate for submission to $alpha$-spectrometric measurement with a silicon surface barrier detector. From the $alpha$ spectra thus obtained, the $sup 232$U to $sup 233$U atomic ratios of the specimens were evaluated and compared with the calculated values. This revealed that the rate of formation of $sup 232$U depended largely on the $sup 232$Th(n, 2n)$sup 231$Th reaction by fast neutrons, and consequently, on the neutron energy distribution prevailing at the position of irradiation. The purest $sup 233$U sample obtained from the thorium target, irradiated with pure thermal neutrons in the graphite thermal column, yielded a $sup 232$U to $sup 233$U atomic ratio of 3.02x10-$sup 9$, which corresponded to 6.62x10-$sup 6$ in $alpha$ activity ratio. 11 refs.

EDB SUBJECT CATEGORY: EDB-050700;360206

<233>
Hausman, J., Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center; Tel Aviv Univ. (Israel). Dept. of Engineering Sciences

In Measurement of fluorescence of rare earths in molten salts (Nd$sup 3+$ in NaNO$sub 3$-KNO$sub 3$ eutectic) **
EDB-76:054300; (Oct 1975) IA--1318

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;CONVERSION;EUTECTICS;FLUORESCENCE: Q1,Q2;FLUORESCENCE SPECTROSCOPY;GLASS;LIFETIME;MOLTEN SALTS;NEODYMIUM: T2;NEODYMIUM NITRATES: M1;POTASSIUM NITRATES;SODIUM NITRATES;TEMPERATURE DEPENDENCE

ABSTRACT: The existence of fluorescence of Nd(NO$sub 3$)$sub 3$ in NaNO$sub 3$-KNO$sub 3$ eutectic was proved and measured

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<233> CONT.
with a type S-1 photomultiplier tube connected to an oscilloscope. The fluorescence of a 5% Nd: glass rod was also measured and its lifetime of 303+-30mu agrees with the data given in the literature. Fluorescence lifetimes of Nd(NO$sub 3$)$sub 3$ in NaNO$sub 3$-KNO$sub 3$ were measured for some concentrations of Nd(NO$sub 3$)$sub 3$. The measured lifetime was nearly 10mu for all the concentrations, 30 times lower than the value for glass. This low value indicates the existence of some quenchers in the sample, probably water that had remained after drying. An experimental system for measuring flucrescence spectra of the system was set up. The transitions $sup 4$Fsub(3/3)$Yields$$sup 4$Isub(9/2) and $sup 4$Fsub(3/2)$Yields$$sup 4$Isub(11/2) were seen and recorded. Measurements of lifetime in a sample containing 2% Nd(NO$sub 3$)$sub 3$ in NaNO$sub 3$-KNO$sub 3$ were performed once at close to 250$sup 0$C and twice one hour later at nearly room temperature. After cooling the fluorescence lifetime was close to 6mu instead of 10mu for the hot sample. The fluorescence conversion efficiency (eta) of Nd: glass and of neodymium in NaNO$sub 3$-KNO$sub 3$ eutectic was evaluated and for 5% Nd : glass a value of 0.25+-0.04 was obtained.

EDE SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B11

<234>
Heatherly, D.E.; Vallet, C.E., Oak Ridge National Lab., Tenn. (USA)

In Composition gradient during electrolysis in mixtures analogous to molten salt battery electrolytes **
ERA-03:004593;NTS-77:001090;EDB-77:146902; (1977)
CONF-770814--5

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;ELECTRODES;ELECTROLYSIS: Q1,Q2;ELECTROLYTES: Q3;INTERFACES;LITHIUM CHLORIDES;LITHIUM-SULFUR BATTERIES: T3;MASS TRANSFER;POTASSIUM CHLORIDES;POTASSIUM NITRATES: T1;SILVER NITRATES: T2

ABSTRACT: Molten salt mixtures are attractive electrolytes for more efficient batteries. Li/S batteries with LiCl--KCl mixture as electrolyte have recently been developed. Calculations based on mass transport at electrode--electrolyte interface and in the electrolyte lead to a prediction of a concentration gradient between the electrodes. Experiments in the analogous potassium nitrate--silver nitrate system that confirm the results of

<234> CONT.
the calculations are reported. The material consists of the descriptions of slides given at a slide presentation. The slides, however, are not included. (RWR)

EDB SUBJECT CATEGORY: EDB-400400;250902

<235>
Heiss, A.

In Thermodynamic study of the U-O-C system by measurement of the carbon monoxide pressures at equilibrium **
ERA-02:049153;EDB-77:107005; J. Nucl. Mater. (JNUMA) :207-233 (1975) ORNL-tr--4326

SUBJECT DESCRIPTORS: CARBON: T3;CHEMICAL REACTIONS;GRAPHITE;OXYGEN: T2;PHASE STUDIES: Q1,Q2,Q3;URANIUM: T1;URANIUM DIOXIDE

ABSTRACT: Reaction in UO$sub 2$/graphite mixtures, leading to carbon monoxide evolution, was investigated. Isotherms were established in the range 1720--1870$sup 0$C, representing CO pressure as a function of O/U and C/U ratios. Mono- and bivariant equilibrium pressures and phase diagrams are established. This has made it possible to deduce the composition of the solid phases at high temperatures. The UO$sub 2$ phase contains a few vacancies while UC$sub 2$ (in equilibrium with UO$sub 2$ and C) does not, but contains 0.06 at percent of oxygen substituted for carbon UC$sub 2$ in equilibrium with UO$sub 1$.$sub 97$ and U(C,O) is strongly hypostoichiometric and contains little oxygen (UC$sub 1$.$sub 63$O$sub 0$.$sub 03$); the monoxycarbide, hyperstoichiometric, has the formula UC$sub 0$.$sub 95$O$sub 0$.$sub 10$. A maximum oxygen solubility of 25; in UC is observed. From these results, the free energies of formation, $delta$G$sup 0$/sub f/, were calculated for UO$sub 1$.$sub 97$, UC$sub 1$.$sub 94$C$sub 0$.$sub 06$, UC$sub 1$.$sub 92$O$sub 0$.$sub 06$, UC$sub 1$.$sub 91$, UC$sub 1$.$sub 63$O$sub 0$.$sub 03$, UC$sub 1$.$sub 66$, UC$sub 0$.$sub 95$O$sub 0$.$sub 1$, UC and UC$sub 0$.$sub 75$O$sub 0$.$sub 25$.

EDB SUBJECT CATEGORY: EDB-360102

<236>

<236>
Herranz, J.; Bloxom, S.R.; Keeler, J.B.; Roth, S.R., Massachusetts Inst. of Tech., Oak Ridge, Tenn. (USA). School of Chemical Engineering Practice

In Determination and correlation of mass transfer coefficients in a stirred cell **
ERA-01:018709;INS-76:015991;EDB-76:057823; (17 Dec 1975)
ORNL/MIT--221

SUBJECT DESCRIPTORS: BREEDER REACTORS;EXTRACTION APPARATUSES: T1;MASS TRANSFER: Q1;MERCURY;MOLTEN SALT REACTORS;POLAROGRAPHY;REPROCESSING: Q2;SPENT FUELS: M2;WATER

ABSTRACT: In the proposed Molten Salt Breeder Reactor flowsheet, a fraction of the rare earth fission products is removed from the fuel salt in mass transfer cells. To obtain design parameters for this extraction, the effect of cell size, blade diameter, phase volume, and agitation rate on the mass transfer for a high density ratio system (mercury/water) in nondispersing square cross section contactors was determined. Aqueous side mass transfer coefficients were measured by polarography over a wide range of operating conditions. Correlations for the experimental mass transfer coefficients as functions of the operating parameters are presented. Several techniques for measuring mercury-side mass transfer coefficients were evaluated and a new one is recommended. (auth)

EDB SUBJECT CATEGORY: EDB-050800;210500
INIS CATEGORY: B16;E35

<237>
Hightower, J.R. Jr. ** McNeese, L.E., Oak Ridge National Lab., Tenn. (USA)

Fuel processing for molten-salt reactors In Molten-salt reactor program. Semiannual progress report for period ending February 29, 1976 **
INS-77:003090;ERA-02:015898;EDB-77:029160; (Aug 1976)
ORNL--5132

SUBJECT DESCRIPTORS: BISMUTH;EXTRACTION APPARATUSES;FLUORINATION;FUEL CYCLE;MASS TRANSFER;MOLTEN SALT FUELS: T1;MOLTEN SALT REACTORS;NEODYMIUM COMPOUNDS;PROTACTINIUM;RARE EARTHS;REPROCESSING: Q1;RESEARCH PROGRAMS;SEPARATION PROCESSES;URANIUM

ABSTRACT: During this report period, work on the chemistry of fuel reconstitution was resumed, and engineering development progressed on the metal transfer process for rare-earth element removal, on continuous fluorinators for uranium

<237> CONT.
removal, on fuel reconstitution, and on salt-bismuth contactors to be used in reductive extraction. (DLC)

EDB SUBJECT CATEGORY: EDB-050800;210500
INIS CATEGORY: B16;E35

<238>
Hildenbrand, D.L.

Thermochemistry of gaseous UF$sub 5$ and UF$sub 4$
ERA-02:039725;INS-77:010735;EDB-77:095045; J. Chem. Phys. (JCPSA) 66:(11):4788-4794 (1 Jun 1977)

SUBJECT DESCRIPTORS: ENTROPY;EQUILIBRIUM;FORMATION HEAT: Q1,Q2;THERMOCHEMICAL PROCESSES;THERMODYNAMIC PROPERTIES;URANIUM FLUORIDES: T2;URANIUM TETRAFLUORIDE: T1

ABSTRACT: Thermochemical data for gaseous UF$sub 5$ and UF$sub 4$ were obtained from equilibrium and electron impact measurements made by high temperature mass spectrometry. Equilibrium measurements yielded for the gaseous reaction Ag+UF$sub 5$=AgF+UF$sub 4$ the enthalpy change $delta$H$sub 2$$sub 9$$sub 8$=16.9 +- 1.5 kcal by second law analysis. Additionally, the sublimation of UF$sub 4$(s) was studied by the torsion--effusion method, leading to $delta$H$sub 2$$sub 9$$sub 8$(sub) =76.2 +- 0.5 kcal/mol. These results were combined with auxiliary thermochemical data to derive the standard heats of formation $delta$Hf degree$sub 2$$sub 9$$sub 8$(UF$sub 5$, g) =-460.6 +- 3.4 kcal/mol and $delta$Hf degree$sub 2$$sub 9$$sub 8$(UF$sub 4$, g) = -377.8 +- 0.6 kcal/mol, and the bond dissociation energies D$sub 0$(F$sub 5$U--F) =68.3 +- 3.5 kcal and D$sub 0$(F$sub 4$U--F) =101.0 +- 3.4 kcal. Threshold energies for formation of UF$sub 5$ $sup +$ and UF$sub 4$ $sup +$ by dissociative ionization of UF$sub 6$ were determined along with the ionization potentials of UF$sub 6$(14.00 eV), UF$sub 5$ (11.29 eV), and UF$sub 4$ (9.96 eV), leading to the BDE values D$sub 0$(F$sub 5$U--F) =68.0 +- 3.2 kcal and D$sub 0$(F$sub 4$U--F) =102.4 +- 3.2 kcal, in agreement with the equilibrium data. Uncertainties associated with the measurements and the interpretation of the data are discussed. The entropy of UF$sub 5$(g) inferred from the equilibrium measurements was used in a third law treatment of published UF$sub 5$ sublimation data, giving thermochemical results in good agreement with the above. The UF$sub 4$ sublimation measurements lead to a vapor entropy that seems more

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<239> CONT.
compatible with a molecular configuration of lower symmetry than the obvious tetrahedral structure.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<239>
Hildenbrand, D.L., Stanford Research Inst., Menlo Park, Calif. (USA)

In Thermochemistry of gaseous metal oxides. Final report, 1 Apr 1973--31 Dec 1975 ** ERA-02:014307;EDB-77:019279; (Mar 1976) AD-A--025661

SUBJECT DESCRIPTORS: DISSOCIATION ENERGY: Q1,Q2,Q3,Q4,Q5;EUROPIUM OXIDES: T4;IONIZATION POTENTIAL: Q1,Q2,Q3,Q4,Q5;THORIUM OXIDES: T1;TITANIUM OXIDES: T3;URANIUM OXIDES: T5;ZIRCONIUM OXIDES: T2

ABSTRACT: The dissociation energies and ionization potentials of gaseous oxides in the Th-O, Zr-O, Ti-O, Eu-O, and U-O systems have been determined by high temperature mass spectrometry. Dissociation energies were derived from gaseous equilibrium measurements, while the ionization potentials were obtained from electron impact threshold measurements. Specifically, data were obtained for gaseous ThO, ThO2, ZrO, ZrO2, TiO, TiO2, EuO, UO2, and UO3. Attempts to characterize the higher oxide of aluminum, AlO2, were unsuccessful. New experimental information on the ionization potentials of Th, Zr, and Eu was also obtained. The results make it possible to accurately define the energetics of a number of ion-neutral and neutral-neutral reactions of the metals which are of importance in the analysis of nuclear burst effects. (GRA)

EDB SUBJECT CATEGORY: EDB-400201;360204;400702

<240>
Hildenbrand, D.L., Stanford Research Inst., Menlo Park, Calif. (USA)

In Thermochemistry of gaseous compounds of metals. Annual summary report 5 Dec 74--4 Dec 75 ** ERA-03:004547;EDB-78:009952; (Feb 1976) AD-A--040222

SUBJECT DESCRIPTORS: BARIUM BROMIDES: T1;BARIUM CHLORIDES: T2;CALCIUM BROMIDES: T3;DISSOCIATION ENERGY;FORMATION HEAT;STRONTIUM BROMIDES: T4;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3,Q4

ABSTRACT: Thermochemical studies of gaseous IIA monohalides

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CaBr, SrBr, BaBr, and BaCl were carried out by high temperature mass spectrometry. The monohalides were generated by the reaction of HBr or HCl with appropriate metal oxides in molybdenum effusion cells. Dissociation energies and standard heats of formation were evaluated from various equilibrium measurements at temperatures of 1800 to 2000 K. Preliminary thermochemical data were obtained for gaseous BaI. In the course of the work, the gaseous oxybromide OBBr was also observed, and thermochemical data were derived. From studies of the vaporization of CaBr2, SrBr2, and BaBr2 by the torsion-effusion methods, values were derived for the heats of sublimation/vaporization, heats of formation, and dissociation energies of the gaseous dibromides. The derived dissociation energies of the monohalides are compared with values obtained from flame equilibria, chemiluminescence, ionic model calculations, and Birge-Sponer extrapolations; the results provide an interesting comparison of the experimental methods, and give further information about chemical bonding in the monohalides. (Author)

EDB SUBJECT CATEGORY: EDB-400201

<241>

Hildenbrand, D.L., Stanford Research Inst., Menlo Park, Calif. (USA). Physical Sciences Div.

In Thermochemistry of gaseous compounds of metals. Annual summary report, 5 Dec 1975--4 Dec 1976 **
ERA-02:045983;EDB-77:107363; (Jan 1977) AD-A--035704

SUBJECT DESCRIPTORS: BARIUM IODIDES: T3;CALCIUM IODIDES: T1;CHEMILUMINESCENCE;DISSOCIATION ENERGY;EUROPIUM FLUORIDES: T4;FORMATION HEAT;SAMARIUM OXIDES: T5;STRONTIUM IODIDES: T2;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3,Q4,Q5

ABSTRACT: Thermochemical studies of a number of gaseous metal halides and oxides have been carried out by high temperature mass spectrometry, including CaI, SrI, BaI, EuF, EuF$sub 2$, and SmO. Dissociation energies and heats of formation are derived from the data, and the results are compared with the predictions of several theoretical models where possible. For the IIA metal iodides, the experimental dissociation energies follow trends established by the fluorides, chlorides and bromides; the results are compatible with corrected Birge-Sponer extrapolations and with electrostatic model calculations. The data for BaI suggest that chemiluminescent spectra resulting from the Ba + I2 reaction may be due in part to the reaction of electronically-excited Ba atoms. Sublimation data for CaI2(s), and vaporization data for SrI2(l) and BaI2(l) obtained by the torsion-effusion method are consistent with estimated molecular parameters of the

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<241> CONT.
gaseous diodide molecules, leading to accurate thermochemical data for these molecules. The results for SmO resolve a long-standing discrepancy between the dissociation energies of SmO and EuO. And finally, torsion-effusion studies of the dissociative vaporization of PbF2(s) yielded new thermochemical data for PbF4(g).

EDB SUBJECT CATEGORY: EDB-400201

<242>
Hirata, K.; Moriya, K.; Waseda, Y. (Tohoku Univ., Sendai (Japan). Research Inst. of Mineral Dressing and Metallurgy)

High temperature thermal expansion of ThO$sub 2$, MgO and Y$sub 2$O$sub 3$ by X-ray diffraction AIX-08:312372;EDB-77:107199; J. Mater. Sci. (JMTSA) 12:(4):838-839 (Apr 1977)

SUBJECT DESCRIPTORS: EQUATIONS;HIGH TEMPERATURE;LATTICE PARAMETERS;MAGNESIUM OXIDES: T1;TEMPERATURE DEPENDENCE;THERMAL EXPANSION: Q1,Q2,Q3;THORIUM OXIDES: T2;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION;YTTRIUM OXIDES: T3

ABSTRACT: Using apparatus described previously (Waseda et al., High Temp. High Press.; 7:221 (1975)) X-ray diffraction measurements were made on ThO$sub 2$, MgO and Y$sub 2$O$sub 3$ samples over the temperature range 500 to 1800$sup 0$C. Lattice parameters over the range of temperature are shown. The data were converted into % linear expansion and plotted. Equations are presented.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<243>
Hoch, M.; Vernardakis, T. (Cincinnati Univ., Ohio (USA). Dept. of Materials Science and Metallurgical Engineering)

Thermodynamic properties of solid and liquid metals and ceramics AIX-08:298632;EDB-77:068455; High Temp. - High Pressures (HTHPA) 8:(3):241-246 (1976)

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES: T3;DEBYE TEMPERATURE;ELECTRONIC SPECIFIC HEAT;ENTHALPY;FUSION HEAT;HIGH TEMPERATURE;LEAD: T2;LIQUID METALS;SODIUM: T1;SOLIDS;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3,Q4,Q5;URANIUM DIOXIDE: T4;VANADIUM: T5;VERY HIGH TEMPERATURE

ABSTRACT: It has been shown earlier that the high-temperature specific heat of solids can be expressed as Csub(p) =

<243> CONT.
3nRF(thetasub(D)/T) + bT + dT$sup 3$ where F(thetasub(D)/T) is the Debye function, b is equivalent to the electronic specific heat, and anharmonic vibrations within the lattice contribute only to d; n is the number of atoms per molecule. The specific heat of liquid metals at high temperature can be expressed as Csub(p) = 3RF(thetasub(D)/T) + gT + hT$sup -2$ where g is the electronic term, and h the anharmonic term. These two equations are used after integration to express the enthalpy of Na, Pb, V, Al$sub 2$O$sub 3$, and UO$sub 2$, over a wide temperature range, in both solid and liquid phases, where heat content data are available; they are found to represent the data very well. In addition, heats of fusion calculated with the use of the equations are in very good agreement with experimental values. The second of the two equations can also be used to estimate the high-temperature specific heat for other liquid metals and ceramics where available data are scarce.

EDB SUBJECT CATEGORY: EDB-360104;360204
INIS CATEGORY: B23

<244>
Hoch, M.; Vernardakis, T. (Cincinnati Univ., Ohio (USA). Dept. of Materials Science and Metallurgical Engineering)

Specific heat of liquid metals and ceramics
AIX-08:323990;EDB-78:009985; Rev. Int. Hautes Temp. Refract. (RIHTA) 3:(2):75-82 (Nov 1976)

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES: T1;CERAMICS;ENTHALPY;IRON: T2;LEAD: T3;LIQUID METALS;LITHIUM: T4;MERCURY: T5;MOLTEN SALTS;POTASSIUM: T6;SODIUM: T7;SPECIFIC HEAT: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;TEMPERATURE DEPENDENCE;TITANIUM: T8;URANIUM DIOXIDE: T9;VANADIUM: T10;VERY HIGH TEMPERATURE

ABSTRACT: An analysis of the specific heat of liquid metals, where accurate heat content data are available over a large temperature range (lithium, potassium, sodium, lead, mercury), show that the specific heat of a liquid at high temperature can be expressed as Cpsub(l)=3RF(thetasub(D)/T)+gT+hT$sup -2$ where g is the electronic specific heat and h the anharmonic term. This equation was applied to Fe, V, Ti, Al$sub 2$O$sub 3$, and UO$sub 2$ where heat content data are available over a large temperature range; the fit is very good. This equation can thus be used to estimate the high temperature specific heat

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<244> CONT.
for other liquid metals and ceramics where the available data are scarce.

EDB SUBJECT CATEGORY: EDB-400201;360104;360204;400702
INIS CATEGORY: B12

<245>
Holleck, H. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung)

Structure of the thorium-(zirconium, niobium, ruthenium, rhodium)-carbon systems AIX-08:324226;EDB-77:132591; J. Nucl. Mater. (JNUMA) 66:(3):273-282 (May 1977)

SUBJECT DESCRIPTORS: EQUILIBRIUM;FORMATION HEAT: Q1,Q2,Q3,Q4,Q5;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;SOLUBILITY;TERNARY ALLOY SYSTEMS;THORIUM CARBIDES: T1

ABSTRACT: With the aid of arc-melted and subsequently homogenised samples which were examined by X-rays, micrography and (sometimes) microanalysis, it was possible to establish isothermal sections in the ternary systems Th-Zr-C, Th-Nb-C,Th-Ru-C and Th-Rh-C. In the Th-Zr-C and Th-Nb-C systems, the stable carbides of zirconium and niobium are in equilibrium with thorium and thorium carbides. There are no ternary carbides. Three complex ternary carbides determine the phase-fields in the Th-Ru-C system. The reaction of thorium carbides with rhodium generates stable intermetallic phases, plus free carbon. ThRh$sub 3$ dissolves about 5-7 at.% carbon. This stabilizes ThRh$sub 3$ relative to neighbouring Th/Rh phases, and this suppresses ThRh$sub 2$ and ThRh$sub 5$ in the ternary region. The free enthalpies of formation of the ternary compounds were estimated from binary data, taking into account observed phase equilibria, and the estimates are discussed.

EDB SUBJECT CATEGORY: EDB-360104;360102
INIS CATEGORY: B22

<246>
Hseuh, L.; Nelson, A.G.; Mirza, Z.I.; Bennion, D.N., California Univ., Los Angeles (USA). School of Engineering and Applied Science

In Nonaqueous electrolyte systems: ionic transport in nonaqueous media. Interim technical report No. 7 ** EDB-77:049808; (Jul 1970) AD--714680

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES;BORATES;ELECTRIC

<246> CONT.
BATTERIES: T2;ELECTROLYTES: Q1,Q2;FEASIBILITY STUDIES;FUEL CELLS: T1;ION MOBILITY;IONIC CONDUCTIVITY;LITHIUM COMPOUNDS;LITHIUM FLUORIDES;ORGANIC SULFUR COMPOUNDS;PERCHLORATES;SODIUM OXIDES

ABSTRACT: The purpose of this work was to determine the general suitability of beta-alumina for use in electrochemical systems and the suitability of lithium perchlorate--dimethyl sulfite and lithium tetrafluoroborate--dimethyl sulfite electrolyte solutions in electrochemical fuel cells or batteries. The emphasis is on the nature of ionic conduction in beta-alumina and the nature of ionic transport in the dimethyl sulfite electrolytes.

EDB SUBJECT CATEGORY: EDB-250903;300503

<247>
Hubberstey, P. (Nottingham Univ. (UK)) ** Evans, R.; Greenwood, D.A. (eds.)

Aspects of the solution chemistry of liquid alkali metals as elucidated from electrical resistivity studies In Liquid metals, 1976 ** AIX-08:320631;EDB-77:114220; (1977) Institute of Physics

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL REACTION KINETICS;CHEMICAL REACTIONS;ELECTRIC CONDUCTIVITY;LIQUID METALS;LITHIUM: T1;PHASE STUDIES;SODIUM: T2;SOLUBILITY;SOLUTIONS;SOLVATION;SOLVENT PROPERTIES: Q1,Q2;SOLVENTS;TEMPERATURE DEPENDENCE

ABSTRACT: Resistivity techniques have been applied to a study of the behaviour of liquid alkali metals as solvents and reaction media; phase equilibria, solute reaction chemistry and the nature of the solute species have been investigated. Lithium and sodium are generally chosen as solvents and both non-metals and metals are studied as solutes. Phase relationships in alkali metal systems have been investigated using both resistivity-concentration and resistivity-temperature methods; these techniques are particularly effective for the determination of solubility data (i.e. the hypereutectic liquidus) and of liquid-liquid miscibility gaps, phase boundaries which are difficult to examine using conventional thermal methods. The stoichiometry and kinetics of chemical reactions in alkali metal solutions have been studied using resistivity techniques to monitor solute concentration. Thus, resistivity changes have shown the role of the solvent to be important when considering solute interaction in liquid metals; whereas association between H$sup -$and O$sup 2-$ occurs in sodium at 723 K according to the equilibrium H$sup

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<247> CONT.
-$ + O$sup 2-$ = OH$sup -$ + 2e, H$sup -$and N$sup 3-$ act independently in lithium at 693 K. Furthermore, resistivity changes have been used to identify solvated species; dissolution of nitrogen in solutions of barium in liquid sodium at 573 K gives rise to strongly bonded solvated unit of stoichicmetry close to Ba$sub 4$N.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<240>
Huijben, M.J.; van der Lugt, W. (Rijksinstituut voor Zuivering van Afvalwater, Voorburg (Netherlands))

Static structure factor of liquid caesium
AIX-07:274108;EDB-77:018822; J. Phys., F (London) (JPFMA) 6:(8):L225-L229 (Aug 1976)

SUBJECT DESCRIPTORS: CESIUM: T1;DISTRIBUTION FUNCTIONS;ELECTRIC CONDUCTIVITY;INTERATOMIC FORCES: Q1;LIQUID METALS;MEDIUM TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: X-ray transmission measurements of the structure factor of liquid caesium have been carried out for temperatures between 30$sup 0$C and 150$sup 0$C. From these measurements, the radial distribution function, the pair potential and the electrical resistivity are derived.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<249>
Huijben, M.J.; van der Lugt, W. (Rijksuniversiteit Groningen (Netherlands)) ** Evans, R.; Greenwood, D.A. (eds.)

Structure factor of liquid caesium and sodium-caesium alloys In Liquid metals, 1976 ** AIX-08:319480;EDB-77:120333; (1977) Institute of Physics

SUBJECT DESCRIPTORS: CESIUM: T1;CESIUM ALLOYS: T2;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4,Q5;INTERATOMIC DISTANCES;INTERATOMIC FORCES;LIQUID METALS;POTASSIUM: T5;SCALING LAWS;SODIUM: T4;SODIUM ALLOYS: T3;TRANSMISSION;X-RAY DIFFRACTION

AESTRACT: X-ray transmission diffraction experiments have been carried out for liquid sodium, potassium, caesium and some sodium-caesium alloys. The structure factor of liquid pure

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caesium at the melting point can be scaled down to those of sodium and potassium with reasonable accuracy.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<250>
Huijben, M.J.; van der Lugt, W. (Rijksuniversiteit Groningen (Netherlands)) ** Nederlandse Natuurkundige Vereniging, Amsterdam

Structure factors of liquid alkali metals In Spring meeting, 26 and 27 April 1976, Amsterdam ** AIX-08:283295;EDB-77:068427; (1976) INIS-mf--3227

SUBJECT DESCRIPTORS: CESIUM: T1;GONIOMETERS;LIQUID METALS;POTASSIUM: T2;SMALL ANGLE SCATTERING;SODIUM;X-RAY DIFFRACTION: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<251>
Ikeda, Y.; Tamaki, M.; Matsumoto, G. (Nagoya Univ. (Japan). Faculty of Engineering)

Vaporization of uranium-carbon-nitrogen system AIX-07:244137;EDB-77:003017; J. Nucl. Mater. (JNUMA) 59:(2):103-111 (Feb 1976)

SUBJECT DESCRIPTORS: ENTHALPY;EVAPORATION: Q1,Q2;SOLID SOLUTIONS;TEMPERATURE DEPENDENCE;URANIUM CARBIDES: T1;URANIUM NITRIDES: T2;VAPOR PRESSURE;VERY HIGH TEMPERATURE

ABSTRACT: The vaporization of species from the uranium-carbon-nitrogen system has been investigated by mass spectrometry with the Knudsen cell technique. After calibration with gold, the vapor pressures of U and N$sub 2$ have been obtained over UCsub(1-x)Nsub(x) in the temperature range of 1900-2300K. For uranium mono-nitride, values of enthalpies $delta$H$sup 0$$sub 2$$sub 9$$sub 8$ for overall reaction (1)UN(s)=U(g)+0.5N$sub 2$(g) and the partial reactions (2)UN(s)=U(L)+0.5N$sub 2$(g) and U(L)=U(g) have been obtained with both second- and third-law treatments. For UCsub(1-x)Nsub(x) the experimental vapor pressures were used to calculate activity of UN in the solutions. For three

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<251> CONT.
compositions (x=0.69, 0.48, 0.30) measured, activity coefficients were found to be slightly smaller than unity.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<252>
Iksanov, B.A.; Martynov, S.Z.; Minaev, Y.A.; Pavlov, Y.A. (Moskovskij Inst. Stali i Splavov (USSR))

Spreading of iron-nickel alloys on ZrC and nickel-cobalt alloys on ZrN AIX-09:349475;EDB-78:027704; Izv. Vyssh. Uchebn. Zaved., Chern. Metall. (IVUMA) (1):12-13 (1976)

ABSTRACT: Spreading of iron-nickel melts on ZrC has been studied, and the diffusion film thickness is estimated alongside with the mobility of components in nickel alloys. A fairly linear character of the squared drop radius dependence on the time of wetting indicates that the process is of diffusion nature, namely, the wetting film is spreading according to the diffusion growth mechanism.

EDB SUBJECT CATEGORY: EDB-360204;360104
INIS CATEGORY: B22

<253>
Il'in, V.K.; Chervonnyi, A.D.; Krenev, V.A. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Kinetics and mechanism into preparation of samarium-, europium- and ytterbium dichlorides and their some properties AIX-08:329852;EDB-78:010005; Zh. Neorg. Khim. (ZNOKA) 21:(3):614-618 (Mar 1976)

ABSTRACT: A kinetic study has been made of the reaction of hydrogen with anhydrous trichlorides of samarium, europium and ytterbium in the temperature ranges 20-710, 20-480 and 20-660 deg and hydrogen pressures 0.02-1.0 atm, as well as of the process of oxidation of dichlorides of these elements by hydrogen chloride in the temperature ranges 560-660 deg, 280-360 and 450-585 deg. Activation energies of the process of reduction of trichlorides of samarium, europium and ytterbium were found to be 18.9; 28.9; 25.7 kcal/mole, respectively. The results of kinetic studies allowed conditions of reduction of trichlorides to be proposed to obtain anhydrous dichlorides of high purity. The pressure of saturated vapours of dichlorides obtained was determined in the temperature range 620-1005 deg. Data obtained on the rate of evaporation of dichlorides allowed calculation of the

<253> CONT.
dependence of the vapour pressure of these compounds on temperature in the form of a two-member equation.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<254>
Il'yasov, I.I.; Dunaeva, T.I. (Rostovskij-na-Donu Filial Zaochnogo Inst. Sovetskoj Torgovli (USSR))

Ternary system of potassium, cesium and calcium nitrates
AIX-08:339901;EDB-78:017324; Zh. Neorg. Khim. (ZNOKA) 22:(1):265-267 (Jan 1977)

SUBJECT DESCRIPTORS: CALCIUM NITRATES: T1;CESIUM NITRATES: T2;CRYSTALLIZATION;EUTECTICS;PHASE DIAGRAMS: Q1,Q2,Q3;POTASSIUM NITRATES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<255>
Il'yasov, I.I.; Dunaeva, T.I.; Litvinov, Yu.G.; Volchanskaya, V.V. (Zaochnyj Inst. Sovetskoj Torgovli, Rostov-na-Donu (USSR))

LiNO$sub 3$-CsNO$sub 3$-Ca(NO$sub 3$)$sub 2$ and NaNO$sub 3$-CsNO$sub 3$-Ca(NO$sub 3$)$sub 2$ system
AIX-08:282887;EDB-77:037410; Zh. Neorg. Khim. (ZNOKA) 21:(8):2298-2301 (Aug 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<256>
Il'yasov, I.I.; Iskandarov, K.I.; Davranov, M.; Berdieva, R.N.

Phase diagrams of LiCl,CsCl,CaCl and LiBr,CsBr,CaBr ternary systems EDB-76:036670; Zh. Neorg. Khim. (ZNOKA) 20:(1):250-253 (Jan 1975)

SUBJECT DESCRIPTORS: EUTECTICS;HIGH TEMPERATURE;MELTING POINTS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6

<256>

<256> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<257>
Il'yasov, I.I.; Iskandarov, K.I. (Samarkandskij Meditsinskij Inst. (USSR))

Ternary mutual system of chlorides and iodides of rubidium and cadmium AIX-08:329853;EDB-78:010006; Zh. Neorg. Khim. (ZNCKA) 21:(3):792-794 (Mar 1976)

SUBJECT DESCRIPTORS: CADMIUM CHLORIDES: T1;CADMIUM IODIDES: T2;CHEMICAL REACTIONS;CRYSTALLIZATION;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;RUBIDIUM CHLORIDES: T3;RUBIDIUM IODIDES: T4

ABSTRACT: A study has been made of the ternary systems of rubidium and cadmium chlorides and iodides by visual polythermal method. To avoid decomposition of iodides a stream of dry carbon dioxide has been permanently passed through the melt. It has been found that the crystallization surface of the system studied is determined by existence of three compounds CdJ$sub 2$x2RbJ, CdCl$sub 2$xRbCl and CdCl$sub 2$x4RbCl on sides CdJ$sub 2$-Rb$sub 2$J$sub 2$ and CdCl$sub 2$-Rb$sub 2$Cl$sub 2$, as well as eutectics on two other sides. The system is a belt-like adiagonal mutual system with clear-cut formation of complexes between components of binary systems. The crystallization surface is complex and consists of seven fields: four fields of components and three fields of compounds. In the field of CdCl$sub 2$ the homomorphous transformation at 460 deg obtained earlier has been found. The above-mentioned fields coincide in five non-variant points.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<258>
Il'yasov, I.I.; Litvinov, Yu.G. (Rostovskij-na-Donu Filial Zacchnogo Inst. Sovetskoj Torgovli (USSR))

TlCl-RbCl-CsCl and NaI-TlI-CsI systems EDB-76:048905; Ukr. Khim. Zh. (UKZHA) 41:(2):210-211 (Feb 1975)

SUBJECT DESCRIPTORS: PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6

<258> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602;400201
INIS CATEGORY: B12

<259>
Imoto, S.; Adachi, H.; Hori, T. (Osaka Univ., Suita (Japan). Faculty of Engineering)

Band structure and chemical bond in ThX compounds
AIX-08:280630;EDB-77:031011; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 12:(11):711-716 (Nov 1975)

SUBJECT DESCRIPTORS: BAND THEORY;CHEMICAL BONDS;COMPUTER CALCULATIONS;ELECTRONIC STRUCTURE;MOLECULAR STRUCTURE: Q1,Q2,Q3,Q4;THORIUM;THORIUM CARBIDES: T1;THORIUM NITRIDES: T2;THORIUM PHOSPHIDES: T3;THORIUM SULFIDES: T4

ABSTRACT: The band structure of metallic Th and NaCl-type ThX (X=C, N, P, S) compounds were calculated by tight-binding method, with the parametrization improvement. Values of two-center parameters chosen so as to fit the result for Th given by Gupta and Loucks were found to be very close to two-center integrals with a suitable integration range. Applying this method for evaluating parameters, the band structures for ThX compounds were also computed. Population analysis to determine the electron populations in each orbital based on the results obtained by the method indicated that for all compounds calculated the occupied states consist mainly of sigma type bonding between metalloid p and Th d sub($gamma$) as well as pi bonding between p and Th dsub(epsilon).

EDB SUBJECT CATEGORY: EDB-360204;400702
INIS CATEGORY: B12

<260>
Inaba, H.; Matsui, T.; Naito, K. (Nagoya Univ. (Japan). Faculty of Engineering)

Entropy change for the lambda-type transition in nonstoichiometric U$sub 4$Osub(9-y) EDB-76:053987; J. Nucl. Mater. (JNUMA) 58:(1):115-116 (Oct 1975)

SUBJECT DESCRIPTORS: ELECTRIC CONDUCTIVITY;ENTROPY: Q1;ORDER-DISORDER TRANSFORMATIONS;URANIUM OXIDES: T1

ABSTRACT: The Z-type jump of the electrical conductivity for UOsub(2.250), UOsub(2.240) and UOsub(2.228) has been measured

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<260> CONT.
by the conventional four probe method. The relative jump widths and entropy changes are presented.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B24

<261>
Inaba, H.; Ono, S.; Naito, K. (Nagoya Univ. (Japan). Faculty of Engineering)

Phase transition in doped U$sub 4$Osub(9-y). I. Heat capacity measurement AIX-08:310007;EDB-77:094397; J. Nucl. Mater. (JNUMA) 64:(1):189-194 (Jan 1977)

SUBJECT DESCRIPTORS: CATIONS;DOPED MATERIALS;ENTHALPY;ENTROPY;HIGH TEMPERATURE;LOW TEMPERATURE;MEDIUM TEMPERATURE;MULTICHARGED IONS;NIOBIUM IONS;PHASE TRANSFORMATIONS;SPECIFIC HEAT: Q1;THORIUM IONS;TRANSITION TEMPERATURE;URANIUM OXIDES: T1

ABSTRACT: Heat capacities of U$sub 4$Osub(9-y) doped with Th$sup 4+$ and Nb$sup 5+$ ions as impurities in the temperature range from 200 to 505 K by means of adiabatic calorimetry and the effect of doping on the phase transition of U$sub 4$Osub(9-y) was investigated. The lambda-type peak in the heat capacity curve becomes broadened on doping, resulting from U$sup 4+$ and U$sup 5+$ sites being disordered by the presence of impurity ions. The enthalpy change during the transition is proportional to the transition temperature for both doped and undoped samples, but at the same enthalpy change the transition temperature of doped samples is higher than that of undoped samples. The entropy changes during the transition are interpreted in terms of the average valence of the uranium.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B24

<262>
Inaba, H.; Shimizu, H.; Naito, K. (Nagoya Univ. (Japan). Faculty of Engineering)

Lambda-type heat capacity anomalies in U$sub 3$O$sub 8$ AIX-08:310006;ERA-02:041852;EDB-77:094438; J. Nucl. Mater. (JNUMA) 64:(1):66-70 (Jan 1977)

SUBJECT DESCRIPTORS: ENTHALPY;ENTROPY;HIGH TEMPERATURE;MEDIUM TEMPERATURE;PHASE TRANSFORMATIONS;SPECIFIC HEAT: Q1;TEMPERATURE DEPENDENCE;TRANSITION TEMPERATURE;URANIUM OXIDES U3O8: T1;X-RAY DIFFRACTION

<262> CONT.

ABSTRACT: The heat capacity of U$sub 3$O$sub 8$ was measured in the temperature range from 310 to 970 K using an adiabatic scanning calorimeter. Three lambda-type heat capacity anomalies were observed at 483, 568 K and 850 K, indicating second order phase transitions. The enthalpy and entropy changes for these anomalies were 135, 148 and 314J mol$sup -1$, and 0.28, 0.26 and 0.37 J mol$sup -1$ K$sup -1$, respectively. A high temperature X-ray diffraction study has also been undertaken to confirm these phase transitions. The first anomaly at 483 K involves the structural change from orthorhombic to pseudohexagonal (strictly speaking orthorhombic). The origin of the other two phase transitions is not yet clear, but some order-disorder process would be involved in these phase transitions.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B24

<263>

Inman, D.; Graves, A.D.; Nobile, A.A.

Electrochemistry of molten salts EDB-77:044399; Electrochemistry (ECHMB) (2):61-116 (1972)

SUBJECT DESCRIPTORS: DIFFUSION;ELECTRIC CONDUCTIVITY;ELECTROCHEMISTRY: Q1;ELECTRODES;ELECTROLYSIS;ELECTROLYTES: Q2,Q3;HIGH-TEMPERATURE FUEL CELLS: M2;MASS TRANSFER;METAL-NONMETAL BATTERIES: M3;MOLTEN SALTS: M1;REVIEWS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400400;300505;250903;300503

<264>

Inyushkina, T.L.; Marenkova, I.N.; Dzyubo, L.N.

Titanium dioxide solubility in melts of lithium- and alkaline earth metal chlorides AIX-08:317710;EDB-77:133385; Zh. Fiz. Khim. (ZFKHA) 49:(9):2458-2459 (Sep 1975)

SUBJECT DESCRIPTORS: ENTHALPY;MOLTEN SALTS: T2;SOLUBILITY: Q1;SOLVENT PROPERTIES: Q2;STRONTIUM CHLORIDES;TEMPERATURE DEPENDENCE;TITANIUM OXIDES: T1

<264>

<265> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<265>
Inyushkina, T.I.; Petukhova, L.P.; Kornilova, V.T. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR))

Solubility of magnesium oxide in alkali metal chloride melt EDB-76:049116; Zh. Neorg. Khim. (ZNOKA) 20:(4):1058-1060 (Apr 1975)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T2;CHEMICAL REACTION KINETICS;MAGNESIUM OXIDES: T1;MOLTEN SALTS;SOLUBILITY: Q1;SOLVENT PROPERTIES: Q2;TEMPERATURE DEPENDENCE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<266>
Inzenhofer, A. (Kraftwerk Union A.G., Erlangen (Germany, F.R.). Abt. Brennelement-Technologie)

Influence of small additions to the preparation and the properties of UO$sub 2$ ceramics. Part A. UO$sub 2$/Gd$sub 2$O$sub 3$ AIX-08:337296;ERA-03:000270;EDB-78:007611; Staatsanz. Baden-Wuerttemb. (SAZRA) 109:(9):510-513 (1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CHEMICAL PREPARATION: Q1,Q2;GADOLINIUM OXIDES: T2;LATTICE PARAMETERS;MELTING POINTS: Q1;PHASE DIAGRAMS: Q1,Q2;REVIEWS;SINTERING;SOLID SOLUTIONS;THERMAL EXPANSION;URANIUM DIOXIDE: T1

ABSTRACT: The effects of oxide additions on the preparation and burn-up behaviour fo UO$sub 2$ fuels is presented within the framework of a literature survey. In the present part A, the addition of Gd$sub 2$O$sub 3$ (max. 5 wt.%) is dealt with. Firstly a few crystallographic data are given: phase diagrams, lattice parameters, coefficient of expansion. The preparation of UO$sub 2$-Gd$sub 2$O$sub 3$ sinter bodies is then treated. The melting point of UO$sub 2$ is somewhat

<267> CONT.
lowered by the addition of Gd$sub 2$O$sub 3$, the lattice constants become smaller.

EDB SUBJECT CATEGORY: EDB-050700;360201;360202
INIS CATEGORY: B23

<267>
Inzenhofer, A. (Kraftwerk Union A.G., Erlangen (Germany, F.R.). Abt. Brennelement-Technologie)

Influence of small additions on the preparation and the properties of UO$sub 2$ ceramics. Part B. The UO$sub 2$-TiO$sub 2$ system
AIX-08:337297;ERA-03:000267;EDB-78:013800; Staatsanz. Baden-Wuerttemb. (SAZRA) 109:(12):728-731 (Dec 1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CHEMICAL PREPARATION;CRYSTAL DEFECTS;DENSITY;DIFFUSION;EUTECTICS;FLEXURAL STRENGTH;GRAIN GROWTH;MELTING POINTS: Q1;PHASE DIAGRAMS: Q1,Q2;SINTERING;SOLID SOLUTIONS;TITANIUM OXIDES: T2;URANIUM DIOXIDE: T1

ABSTRACT: In the present part B of the literature survey on the effect of oxide additions on the behaviour of UO$sub 2$, the influence of titanium oxide is dealt with. Firstly, a few important basic data of the two-phase system UO$sub 2$-TiO$sub 2$ are given: phase diagram, diffusion constants, flexural strength. The sinter behaviour and the grain growth are then treated. In particular, the question of at which temperature a malten phase forms and this then contributes to an increase of the sintering rate is answered.

EDB SUBJECT CATEGORY: EDB-050700;360204;360202
INIS CATEGORY: B23

<268>
Iskandarov, K.I.; Litvinov, Yu.G.; Il'yasov, I.I. (Zaochnyj Inst. Sovetskoj Torgovli, Rostov-na-Donu (USSR))

LiBr, RbBr, CsBr ternary system AIX-08:295305;EDB-77:056216; Zh. Necrg. Khim. (ZNOKA) 21:(7):1990-1992 (Jul 1976)

SUBJECT DESCRIPTORS: CESIUM BROMIDES: T1;COMPLEXES;HIGH TEMPERATURE;LITHIUM BROMIDES: T2;MELTING POINTS;PHASE DIAGRAMS: Q1,Q2,Q3;QUANTITY RATIO;RUBIDIUM BROMIDES: T3;SOLID SOLUTIONS

<268>

<268> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<269>
Ito, Y.; Matsunaga, M.; Yoshizawa, S. ** Selman, J.R. (ed.)

Studies on the negative alloy electrode In Proceedings of the symposium and workshop on advanced battery research and design, March 22--24, 1976 ** ERA-02:003289;EDB-76:091634; (1976) ANL--76-8

SUBJECT DESCRIPTORS: ALKALI METALS;ALUMINIUM ALLOYS;ANODES: Q1;EFFICIENCY;ELECTRIC POTENTIAL;HIGH TEMPERATURE;LITHIUM ALLOYS;LITHIUM-CHLORINE BATTERIES: M1,Q2;MOLTEN SALTS;OFF-PEAK ENERGY STORAGE: T2;PHASE DIAGRAMS;TIN ALLOYS;ZINC ALLOYS

ABSTRACT: Alkali metal alloy is a promising negative electrode for a high-performance battery. Energy density and power density of such alloy electrodes can be discussed in relation to the phase diagram. Liquid alloy is preferable when cycle life is exaggerated, and solid alloy is preferable from the cell design aspect. Experimental data to support such conclusions are shown in this paper. 15 figures, 3 tables.

EDB SUBJECT CATEGORY: EDB-250903

<270>
Ivanova, I.A.; Petrova, M.A.; Podkolzina, I.G.

LiF-ErF$sub 3$ system AIX-08:286055;EDB-77:044213; Zh. Neorg. Khim. (ZNOKA) 20:(8):2292-2293 (Aug 1975)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;ERBIUM FLUORIDES: T1;EUTECTICS;LITHIUM FLUORIDES: T2;MICROSCOPY;PHASE DIAGRAMS: Q1,Q2;REFRACTION;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<271>
Iyer, R.H.; Natarajan, P.R. (eds.), Bhabha Atomic Research Centre, Bombay (India)

In Radiochemistry Division annual progress report for 1973 ** AIX-07:270256;EDB-77:044468; (1975) BARC--821

ABSTRACT: The R and D work carried out in the Radicchemistry Division of the Bhabha Atomic Research Centre, Bombay, during 1973 is reported under the following topical headings: process chemistry (of transuranic elements), radioanalytical chemistry and services, chemical quality control of Pu fuels, heavy element chemistry, nuclear chemistry and instrumentation. The major highlights are: preparation of $sup 238$Pu, non-destructive estimation of Pu by X-ray fluorescence and gamma counting, determining impurities in trace amounts in uranium and plutonium fuels, determination of solubility of PuF$sub 3$ in molten fluoride mixtures as a part of the chemical development program for the molten salt reactor concept, studies on correlation between average total kinetic energy, fission asymmetry and shell structure.

EDB SUBJECT CATEGORY: EDB-400700;400103
INIS CATEGORY: B13

<272>
Jacobs, H. ** Commission of the European Communities, Brussels (Belgium)

The calculation of the consequences of sodium/fuel interactions with allowance for temperature gradients in the sodium In Second specialist meeting on sodium/fuel interaction in fast reactors, Ispra, 21-23 November 1973. Sponsored by the Committee on the Safety of Nuclear Installations, OECD Nuclear Energy Agency, Paris, France ** EDB-76:052697; ([nd]) EUR--5309

SUBJECT DESCRIPTORS: B CODES: Q3;COMPUTER CODES: T3;FUEL-COOLANT INTERACTIONS: T,Q1;FUSION HEAT;HEAT TRANSFER;LMFBR TYPE REACTORS: T1;NUCLEAR FUELS;SODIUM;TEMPERATURE DEPENDENCE;THERMAL CONDUCTIVITY

ABSTRACT: The state of the code BRENDY is described together with an outlook on its further development. The code is applied to study the effect of various assumptions used in sodium fuel interaction codes in connection with sodium thermal conductivity, heat transfer during phase B, fuel

<272>

<273> CONT.
latent heat of fusion, decoupled heat transfer calculations, and incompressible sodium slugs.

EDB SUBJECT CATEGORY: EDB-220900;210500
INIS CATEGORY: F51

<273>
Jacucci, G.; Taylor, R. (Paris-11 Univ., 91 - Orsay (France). Centre de Calcul); Klein, M.L.

Static structure factor of liquid Li
AIX-07:269600;EDB-77:013024; Solid State Commun. (SSCOA) 19:(7):657-659 (Jul 1976)

SUBJECT DESCRIPTORS: BOUNDARY CONDITIONS;INTERATOMIC FORCES: Q1;INTERMOLECULAR FORCES;IONS;LIQUID METALS;LITHIUM: T1;MATHEMATICAL MODELS;NEUTRON DIFFRACTION;POTENTIAL ENERGY

ABSTRACT: The classical Molecular Dynamics method has been used to calculate the structure factor S(Q) of liquid Li and this quantity is compared with that measured by neutron scattering. A system of 1458 Li atoms has been employed interacting, via periodic boundary conditions, with a recently derived interionic pair potential. The good agreement between the calculation and experiment is taken to indicate that the explicit many body interionic forces are not important in liquid Li.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<274>
James, S.D.; DeVries, L.E.

Structure and anodic discharge behavior of lithium-boron alloys in the licl-kcl eutectic melt. EDB-76:080765; J. Electrochem. Soc. (JESOA) 123:(3):321-327 (Mar 1976)

SUBJECT DESCRIPTORS: ANODES: Q1;BORON ALLOYS;ELECTRIC BATTERIES: T1;ELECTRODES;EUTECTICS;HIGH TEMPERATURE;LITHIUM BASE ALLOYS;LITHIUM CHLORIDES: T2;PHASE DIAGRAMS;POTASSIUM CHLORIDES: T3;THERMODYNAMIC PROPERTIES: Q2,Q3

ABSTRACT: Anodic discharge curves in the LiCl--KCl eutectic melt have been obtained from two lithium--boron alloys (70 and 80 weight per cent Li) between 673$sup 0$ and 873$sup 0$ (400$sup 0$ and 600$sup 0$ and from 2 to 8 A/cm$sup 2$. The behavior of Li contained in wicks of porous Ni was also studied for comparison. Calculated Li contents for Li--B alloy anodes, at the main break in curvature of discharge

<274> CONT.
curves, clustered closely around 0.67 mole fraction Li. The authors consider this strong evidence for the existence of a compound Li$sub 2$B in this alloy system. Between 748$sup 0$ and 873$sup 0$ (475$sup 0$ and 600$sup 0$) and up to at least 8 A/cm$sup 2$, there is no diffusional limitation to the anodic extraction of Li from the Li--B alloys.

EDB SUBJECT CATEGORY: EDB-250903;360102

<275>
James, S.D.; DeVries, L.E., Naval Surface Weapons Center, Silver Spring, Md. (USA)

In Structure of lithium--boron alloys and their performance as potential anodes for high power molten salt batteries. Progress report, 1 Aug 1974--30 Jun 1975 **
ERA-02:013693;EDB-77:018209; (1 Mar 1976) AD-A--025202

SUBJECT DESCRIPTORS: ANODES: Q1,Q2;BORON ALLOYS;ELECTRIC BATTERIES: T1;ELECTROCHEMISTRY;EUTECTICS;HIGH TEMPERATURE;INTERMETALLIC COMPOUNDS;LITHIUM BASE ALLOYS;LITHIUM CHLORIDES;LITHIUM-SULFUR BATTERIES: T2;MOLTEN SALTS;NICKEL;PERFORMANCE;POTASSIUM CHLORIDES

ABSTRACT: Anodic discharge curves in the LiCl--KCl eutectic melt have been obtained for two lithium--boron alloys (70 and 80 wt % Li) between 673 and 873 K (400 and 600 C) and from 2 to 8 A/sq cm. The behavior of Li contained in wicks of porous Ni was also studied for comparison. Calculated Li contents for Li--B alloy anodes, at the main break in curvature of discharge curves, clustered closely around 0.67 mole fraction Li. This is considered strong evidence for the existence of a compound Li$sub 2$B in this alloy system. Between 748 and 873 K (475 and 600 C) and up to at least 8 A/sq cm, there are no diffusional limitations to the anodic extraction of Li from the Li--B alloys. The shape of discharge curves, the lack of anodic diffusional limitation, and the longer low-V plateaus of the alloy richer in Li are consistent with the following picture of the discharge process. The discharging material behaves like a sponge of solid Li$sub 2$B compound containing a Li-rich, Li--B liquid alloy, probably a conjugate phase to the Li$sub 2$B compound. Lithium anodizes into the melt at constant V out of this liquid alloy until it is wholly transformed to solid Li$sub 2$B. This process constitutes the main plateau of alloy discharge curves. At this point (the main break in discharge curves) voltage rises to values where tighter-bound Li can be anodized out of the decomposing compound. The Li--B alloy electrodes are markedly superior to the Li--Ni wicks, both in gravimetric coulombic capacity and in the ability to retain Li at high temperatures. Useful

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<275> CONT.
coulombic capacities of the Li--B alloys ranged up to 7700 coulombs per g of (Li$sup +$B) at about 3 V versus a chlorine reference electrode. (GRA)

EDB SUBJECT CATEGORY: EDB-250903

<276>
Janz, G.J.; Allen, C.B.; Downey, J.R. Jr.; Tomkins, R.P.T., Rensselaer Polytechnic Inst., Troy, N.Y. (USA). Cogswell Lab.

In EUTECTIC DATA: safety, hazards, corrosion, melting points, compositions, and bibliography **
ERA-02:034550;EDB-77:073948; (Jul 1976) TID--27163-P1

SUBJECT DESCRIPTORS: BIBLIOGRAPHIES;CHEMICAL COMPOSITION;CORROSIVE EFFECTS;DATA COMPILATION: Q1,Q2;EUTECTICS: T1;HAZARDS;HEAT STORAGE: T;MELTING POINTS;MOLTEN SALTS: T2;SAFETY

ABSTRACT: The present compilation provides an authoritative compendium of properties relative to safety, hazards, corrosion, melting points, and compositions of molten salt eutectic mixtures. The scope of the single salts data in this compilation encompasses the end-components of the eutectic mixtures reported. Each section contains a systems index and bibliography. The bibliographies in Pt. 1 and Pt. 2 total approximately 4000 entries. More than 6000 eutectic entries are included in the two parts.

EDB SUBJECT CATEGORY: EDB-250600

<277>
Janz, G.J.; Reeves, R.D.

Molten-salt electrolytes--transport properties EDB-76:052816; Adv. Eletrochem. Electrochem. Eng. (AEEEA) 5::137-204 (1967)

SUBJECT DESCRIPTORS: DENSITY;DIFFUSION;ELECTRIC BATTERIES: T1;ELECTRIC CONDUCTIVITY;ELECTROCHEMISTRY: Q2;ELECTROLYTES: Q1;MASS TRANSFER;MOLTEN SALTS: T2;SOLVENTS;VISCOSITY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250902;400400

<278>
Jayadevan, N.C.; Chadha, A.; Chackraburtty, D.M., Bhabha Atomic Research Centre, Bombay (India)

In Preparation and characterization of higher uranates(VI) of thallium(I) ** AIX-08:292339;EDB-77:075233; (1976) BARC--866

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL PREPARATION: Q1,Q2;CRYSTAL STRUCTURE: Q1,Q2;INFRARED SPECTRA;STRUCTURAL CHEMICAL ANALYSIS;THALLIUM COMPOUNDS: T1;THERMAL ANALYSIS;URANATES: T2;URANIUM OXIDES U3O8;URANIUM TRIOXIDE;X-RAY DIFFRACTION

ABSTRACT: Two new thallium(I) uranates, Tl$sub 2$U$sub 4$O$sub 13$ and Tl$sub 2$U$sub 7$O$sub 22$ have been prepared by heating Tl$sub 2$CO$sub 3$ with UO$sub 3$ or U$sub 3$O$sub 8$ at 600$sup 0$C in air. The chemical compositions were confirmed from the analysis of uranium and thallium on solutions of the pure compounds in very dilute nitric acid. The tetrauranate is hexagonal with cell constants of a = 14.315 (5) A$sup 0$ and c = 14.280(5) A$sup 0$ while the heptauranate is indexed on an orthorhombic cell of dimension a = 6.950 (4) A$sup 0$, b = 19.609 (7) A$sup 0$. Both are isostructural with the corresponding potassium and rubidium compounds. The compounds were further characterized by infrared and thermal methods. Tl$sub 2$U$sub 7$O$sub 22$ decomposes in air above 850$sup 0$C to form Tl$sub 2$U$sub 4$O$sub 13$ which decomposes into the components Tl$sub 2$O and U$sub 3$O$sub 8$ only above 1150$sup 0$C. Reaction of Tl$sub 2$U$sub 4$O$sub 13$ with excess UO$sub 3$ gives Tl$sub 2$U$sub 7$O$sub 22$ at 600$sup 0$C.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B12

<279>
Jefferson, J.H.; Stevens, K.W.H. (Nottingham Univ. (UK))

Statistical mechanics of intermediate-valence rare earth compounds AIX-07:266496;EDB-77:007340; J. Phys., C (London) (JPSOA) 9:(11):2151-2165 (14 Jun 1976)

SUBJECT DESCRIPTORS: CURIE-WEISS LAW;FREE ENTHALPY;MAGNETIC SUSCEPTIBILITY;PERTURBATION THEORY;RARE EARTH COMPOUNDS: M1;STATISTICAL MECHANICS: Q1;VALENCE

ABSTRACT: Using thermodynamic perturbation theory the statistical mechanics of intermediate-valence rare earth compounds is investigated. The Gibbs' free energy is calculated to second order in the Anderson mixing interaction and is shown to diverge logarithmically as T tends to 0. At high temperatures the susceptibility is approximately of the

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<279> CONT.
Curie-Weiss form chi = C/(T + Tsub(F), where kTsub(F) approximately $delta$, the 'width parameter' associated with interconfigurational fluctuations.

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: A13

<280>
Jcergensen, C.K. (Geneva Univ. (Switzerland). Dept. de Chimie Minerale et Analytique) ** Dunitz, J.D. (ed.) (Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Organische Chemie); Hemmerich, P. (ed.) (Konstanz Univ. (F.R. Germany). Fachbereich Biologie); Holm, R.H. (ed.) (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Chemistry); Ibers, J.A. (ed.) (Northwestern Univ., Evanston, Ill. (USA). Dept. of Chemistry); Joergensen, C.K. (ed.) (Geneva Univ. (Switzerland). Dept. de Chimie Minerale et Analytique); Neilands, J.B. (ed.) (California Univ., Berkeley (USA). Dept. of Biochemistry); Reinen, D. (ed.) (Marburg Univ. (F.R. Germany). Fachbereich Chemie); Williams, R.J.P. (ed.) (Oxford Univ. (UK). Inorganic Chemistry Lab.)

Partly filled shells constituting anti-bonding orbitals with higher ionization energy than their bonding counterparts In Rare earths ** Structure and Bonding,
AIX-07:257186;EDB-77:007477; (1975) Springer

SUBJECT DESCRIPTORS: CHEMICAL BONDS;COMPARATIVE EVALUATIONS;COVALENCE;DATA;ELECTRONIC STRUCTURE: Q1;EXCITED STATES;F STATES;FERMI LEVEL;IONIZATION;LCAO METHOD;PHOTOELECTRON SPECTROSCOPY;RARE EARTH COMPOUNDS;RARE EARTHS: T1;REVIEWS;SPECTRA;TABLES

ABSTRACT: In a first part, one-electron substitutions in the lowest configuration are treated by monatomic entities, 4f-group compounds, and comparison with iodide, xenon and cesium, in a second part, the Copenhagen principle of final states are described by photo-electron spectra of metallic lanthanides and of lanthanide compounds, and by the question of the number of 4f electrons as an integer, and in a third part, the partly covalent bonding is treated by means of the variation principle and the LCAO model, the importance of kinetic energy, and the comparison with copper(II) complexes.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<281>

Johnson, C.E.; Blackburn, P.E.; Carroll, K., Argonne National Lab., Ill. (USA)

In Chemical Engineering Division fuels and materials chemistry. Annual report, July 1975--June 1976 **
ERA-02:042665;EDB-77:098236; (1976) ANL--76-103

SUBJECT DESCRIPTORS: BURNUP;CERIUM OXIDES;CESIUM OXIDES;CHEMICAL REACTIONS: Q1,Q2,Q3;DATA COMPILATION: Q5;ENTHALPY;ENTROPY;EVAPORATION;FISSION PRODUCTS: T3;GASES;LITHIUM;LMFBR TYPE REACTORS: T4;MOLYBDENUM OXIDES;NUCLEAR FUELS: T5,Q4;PLUTONIUM CARBIDES: T7;PLUTONIUM DIOXIDE: T1;STOICHIOMETRY;THERMODYNAMIC PROPERTIES: Q6,Q7,Q1,Q2,Q3;TRAPPING: Q8;TRITIUM IONS: T8;URANIUM CARBIDES: T6;URANIUM DIOXIDE: T2;URANIUM OXIDES;VERY HIGH TEMPERATURE

ABSTRACT: Measurements of the oxygen potential for urania-plutonia mixtures show an increase with increasing plutonium content. The oxygen potential model for uranium-plutonium oxide has been extended to include the effects of burnup on oxygen potential. The model predicts an increase in oxygen potential with burnup for both enriched and nonenriched hypostoichiometric fuel, with the nonenriched fuel exhibiting a higher rate of increase in oxygen potential with burnup than does the enriched fuel. Knudsen effusion-mass spectrometric studies of the urania-molybdia system have shown that molybdia has limited solubility in urania at high temperatures and that the solid solutions exhibit positive deviations from ideal behavior. The kinetics of the reaction of gaseous cesium with hyperstoichiometric urania is being studied. The reaction rate has been found to depend linearly on the initial U/O ratio of the urania. Measurements of the carbon activity above a U--Pu--C system have shown segregation to monocarbide and sesquicarbide phases, with the sesquicarbide phase exhibiting a higher plutonium content. A handbook of thermophysical and mechanical properties of carbide and nitride fuels has been compiled to serve as an authoritative source of properties data for persons working on advanced fuels. A limited number of measurements were made to determine the trapping efficiency of lithium for tritium ions. A trapping efficiency of lithium for tritium was determined to be about 90 percent.

EDB SUBJECT CATEGORY: EDB-050700;360200

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<282>
Johnson, C.E.; Foster, M.S.

Phase equilibrium studies of lithium halide-containing electrolytes EDB-77:131874; J. Electrochem. Soc. (JESOA) 116:(11):1612-1613 (Nov 1969)

SUBJECT DESCRIPTORS: CHEMICAL PROPERTIES;ELECTRIC BATTERIES: T1;ELECTROCHEMICAL CELLS;ELECTROLYTES: Q1;LITHIUM;LITHIUM CHLORIDES;LITHIUM HALIDES: T2;LITHIUM IODIDES;MELTING POINTS;PHASE STUDIES: Q2;PHYSICAL PROPERTIES;POTASSIUM IODIDES

ABSTRACT: The application of fused-salt mixtures as electrolytes in electrochemical cells has resulted in increased interest in their physical and chemical properties. A knowledge of these properties is important in selecting appropriate electrolytes, since the choice depends on a variety of factors. One of the salt systems being considered for use as an electrolyte in lithium-anode galvanic cells is LiCl--LiI--KI. This system was chosen for investigation after a preliminary examination had indicated that it had a minimum melting point of 264 C, one of the lowest observed for ternary alkali halide mixtures. The good agreement between the calculated and experimental values and the few experiments required to obtain the necessary data makes it clear that the conformal ionic solution theory offers significant saving of experimental effort in the election of low-melting-point electrolyte mixtures.

EDB SUBJECT CATEGORY: EDB-250901;360602

<283>
Kabankova, N.N.; Moskvitina, E.N.; Kuzyakov, Yu.Ya. (Moskovskii Gosudarstvennyi Univ. (USSR))

Absorption spectrum of HfCl molecule AIX-07:265060;EDB-77:013460; Vestn. Mosk. Univ., Ser. II. Khim. (VMUKA) 16:(2):232-233 (Mar 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;DATA;HAFNIUM CHLORIDES: T1;VIBRATIONAL STATES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<284>
Kadochnikov, V.A.; Lebedev, V.A.; Nichkov, I.F.; Raspopin, S.P.

Thermodynamic properties of the U-Sn-alloys riched with tin AIX-08:283300;EDB-77:043771; Izv. Akad. Nauk SSSR, Met. (IZNMA) (4):67-69 (Jul 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;EQUATIONS;HIGH TEMPERATURE;LIQUID METALS;MEDIUM TEMPERATURE;REACTION KINETICS;SOLUBILITY;TABLES;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1,Q2;THERMODYNAMICS;TIN ALLOYS: T1;URANIUM ALLOYS: T2;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<285>
Kakihana, H.; Yato, Y. (Tokyo Inst. of Tech. (Japan). Research Lab. of Nuclear Reactor)

Calculation of the reduced partition function ratio for uranium hexafluoride AIX-07:259569;EDB-77:013689; Bull. Tokyo Inst. Technol. (Engl. Ed.) (BTITA) (127):71-81 (Mar 1975)

SUBJECT DESCRIPTORS: CORIOLIS FORCE;ISOTOPE EFFECTS;ISOTOPE SEPARATION;MOLECULAR STRUCTURE;PARTITION FUNCTIONS: Q1;SPECTRAL SHIFT;SYMMETRY;URANIUM 235;URANIUM 238;URANIUM HEXAFLUORIDE: T1;VIBRATIONAL STATES

ABSTRACT: The reduced partition function ratio of UF$sub 6$ is calculated by determining the complete general valence force field from the Coriolis zeta constant data together with the observed vibrational frequencies. The disagreement in the previous calculations is due to the ambiguity that arises in the force field determination for the octahedral molecules. The calculation leads to the In(s/s')f($sup 238$UF$sub 6$/$sup 235$UF$sub 6$) value of (2.346 +- 0.134) x 10$sup -3$ at 300$sup 0$K in reasonable agreement with a previous estimate by Kakihana who used the Badger's relation to determine the force field.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B12

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<286>
Kalina-Khorokhorova, L.A.; Simonova, M.V.; Kalinin, S.N.
(Rostovskij-na-Donu Inzhenerno-Stroitel'nyj Inst. (USSR))

Reaction between sodium, rubidium and strontium chlorides
AIX-08:286060;EDB-77:044249; Khim. Khim. Tekhnol. (Alma-Ata) (KKTKA) 19:(4):664 (Apr 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL REACTIONS: Q1,Q2,Q3;ENTROPY;EUTECTICS;FUSION HEAT;MELTING POINTS;RUBIDIUM CHLORIDES: T1;SODIUM CHLORIDES: T2;STRONTIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<287>
Kalinyuk, N.N. (AN Ukrainskoj SSR, Kiev. Inst. Ehlektrosvarki)

Hydrogen solubility in liquid zirconium
AIX-08:340196;EDB-78:016857; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (1):134-138 (Jan 1976)

SUBJECT DESCRIPTORS: HYDROGEN: T1;LIQUID METALS;MAGNETIC FIELDS;SOLUBILITY: Q1,Q2;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES;VERY HIGH TEMPERATURE;ZIRCONIUM: T2

ABSTRACT: The hydrogen solubility in liquid zirconium was studied in the temperature range of 1965 to 2485 deg C with the hydrogen partial pressure of 7.9 to 43.8 mm Hg. The 'liquid zirconium - hydrogen' system has been found to obey the Sieverts law within the temperature range studied. A comparison of the free energies of hydrogen dissolving in liquid and solid zirconium at the melting point shows that the free energy value, and the hydrogen solubility as well, in the solid-to-liquid zirconium transition increases due to an abrupt increase of the system entropy. This process is accompanied by some decrease in the heat of hydrogen dissolving in zirconium. The data obtained indicate that in liquid zirconium, as well as in molten titanium and niobium, the hydrogen solubility decreases with the temperature growth and the boiling point it will be equal to zero.; in the process of zirconium melting the hydrogen solubility in it is growing in steps. At the melting point the hydrogen

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solubility in liquid zirconium is 1.7 to 2.5 times as high as in solid zirconium.

EDB SUBJECT CATEGORY: EDB-360104;360105
INIS CATEGORY: B22

<288>
Kaloev, N.I.; Egerev, O.I.; Dzeranova, K.B.; Kulova, I.K.
(Gruzinskij Politekhnicheskij Inst., Tbilisi (USSR))

Phase diagrams of BiBr$sub 3$-BiI$sub 3$ system
AIX-08:336946;EDB-77:146483; Zh. Neorg. Khim. (ZNOKA)
21:(1):290-292 (Jan 1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;BISMUTH BROMIDES: T1;BISMUTH IODIDES: T2;DIFFERENTIAL THERMAL ANALYSIS;ENTHALPY;MELTING POINTS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2;SOLID SOLUTIONS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<289>
Kanashvili, N.V.; Morozov, A.I. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Thermal investigation of NdCl$sub 3$-AlCl$sub 2$-KCl and NdCl$sub 3$-AlCl$sub 3$-CsCl system
AIX-08:336948;EDB-77:146787; Zh. Neorg. Khim. (ZNOKA)
22:(2):464-470 (Feb 1977)

ABSTRACT: The systems NdCl$sub 3$-AlCl$sub 3$-MCl(M-K, Cs) have been studied by the DTA method with the use of the visual-polythermal technique. On the liquidus surface of the system NdCl$sub 3$-AlCl$sub 3$-KCl the authors found seven fields of primary crystallization corresponding to primary isolation of KCL, KAlCl$sub 4$, AlCl$sub 3$, NdCl$sub 3$, K$sub 2$NdCl$sub 5$ and K$sub 3$NdCl$sub 6$. The system has five four-phase equilibria occurring at three points of triple eutectics and at two periteptic points In the system NdCl$sub 3$-AlCl$sub 3$-CsCl there are six fields of initial crystallization, corresponding to the isolation of NdCl$sub 3$, NdCl$sub 3$x AlCl$sub 3$, AlCl$sub 3$, CsAlCl$sub 4$,

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<290> CONT.
CsCl, Cs$sub 3$NdCl$sub 6$ from the melt and four four-phase equilibria at three eutectic and one peritectic points.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<290>
Kang, T.; Castanet, R. (Centre National de la Recherche Scientifique, 13 - Marseille (France). Centre de Recherches de Microcalorimetrie et de Thermochimie)

Thermodynamic study of the binary system copper-indium. I. Calorimetric study AIX-08:309827;EDB-77:093958; J. Less-Common Met. (JCOMA) 51:(1):125-135 (Jan 1977)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CALORIMETRY;CHEMICAL COMPOSITION;COPPER ALLOYS: T1;FORMATION HEAT: Q1,Q2;HIGH TEMPERATURE;INDIUM ALLOYS: T2;LIQUID METALS;PHASE DIAGRAMS;VERY HIGH TEMPERATURE

ABSTRACT: The integral enthalpy of formation hsup(f) of Cu-In liquid alloys has been measured by direct reaction calorimetry for 0 < xsub(In) < 1 and 903 < T(K) < 1348. The excess heat capacity Csub(p)sup(E) which has been deduced is temperature independent. The hsup(f) minimum and the Csub(p)sup(E) maximum, at xsub(In) approximately 0.75, are interpreted in terms of a local order in the melts. The integral enthalpy of formation of the $beta$, $gamma$ and eta solid phases has also been measured by dissolution calorimetry at 904 and 941 K. The entropy of melting of the $gamma$ phase has been determined. It is pointed out that many systems do not have zero excess heat capacity; thus the mean values of hsup(f) as calculated from measurements at different temperatures are incorrect.

EDB SUBJECT CATEGORY: EDB-360101;360104
INIS CATEGORY: B22

<291>
Kang, T.; Kehiaian, H.V.; Castanet, R. (Centre National de la Recherche Scientifique, 13 - Marseille (France). Centre de Recherches de Microcalorimetrie et de Thermochimie)

Thermodynamic study of the binary system copper--indium. II. Potentiometric study AIX-08:340197;EDB-78:016828; J. Less-Common Met. (JCOMA) 53:(2):153-166 (Jun 1977)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;COPPER ALLOYS: T1;ELECTROLYTIC CELLS;ELECTROMOTIVE FORCE;ENTROPY: Q1,Q2;FORMATION FREE ENERGY;FORMATION FREE ENTHALPY:

<291> CONT.
Q1,Q2;INDIUM ALLOYS: T2;LIQUID METALS;POTENTIOMETRY;SPECIFIC HEAT: Q1,Q2;THERMODYNAMIC ACTIVITY;VERY HIGH TEMPERATURE

ABSTRACT: The electrochemical cell with solid electrolytes -Mo/In(l),In$sub 2$O$sub 3$(s)/ZrO$sub 2$, CaO/air, Pt/Pt, air/CaO, ZrO$sub 2$/In-Cu(l), In$sub 2$O$sub 3$(s)/Mo+ was used to measure the activity of indium in liquid Cu-In alloys at nine concentrations in the temperature range from 1020 to 1389 K. The procedure was checked by determining the enthalpy of formation of indium oxide In$sub 2$O$sub 3$. Combining the present results with those obtained by direct calorimetry, thermodynamically consistent values were proposed for the free energy, entropy, enthalpy and heat capacity of liquid Cu-In alloys.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<292>
Kanno, M. (Tokyo Univ. (Japan). Faculty of Engineering); Yamagami, S.

Chronopotenticmetry of U(III) and U(IV) in molten LiCl-KCl eutectic AIX-07:243901;EDB-76:075888; Denki Kagaku (DNKKA) 43:(3):131-137 (Mar 1975)

SUBJECT DESCRIPTORS: DIFFUSION;EUTECTICS;HIGH TEMPERATURE;LITHIUM CHLORIDES;MIXTURES;MOLTEN SALTS;POTASSIUM CHLORIDES: T1;POTENTIOMETRY: Q1;QUANTITATIVE CHEMICAL ANALYSIS;TIME DEPENDENCE;URANIUM CHLORIDES

ABSTRACT: For the needs to kinetic studies of the transfer processes in liquid metal-molten salt system, a chronopotentiometric investigation for the quantitative analysis of U(III) and U(IV) in LiCl-KCl eutectic salt has been investigated. It was found that chronopotentiometry of U(III) and U(IV) obeyed Sand's equation, and U(III) and U(IV) have been determined with an accuracy of +-3% when there is no oxygen and water contamination at 450$sup 0$C both in their individual solutions and mixed solutions. According to Sand's equation, the product of current density i and 1/2 power of transition time tau should be constant with different i's. However, it was observed to hold within a limited range of current densities. Positive and negative deviations from the constancy were explained. The diffusion coefficients of U(III) and U(IV) in LiCl-KCl eutectic salt at 400$sup 0$C have been determined by chronopotentiometry as follows, Dsub(u(i i i))=4.38.10$sup -4$ exp (-5,940/RT)

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<292> CONT.
cm$sup 2$/sec Dsub(u(i v))=1.73.10$sup -3$ exp (-7,430/RT) cm$sup 2$/sec.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B12

<293>
Kanno, M. (Tokyo Univ. (Japan). Faculty of Engineering); Yamagami, S.

Electrochemical behavior of U(III) and U(IV) in molten LiCl-KCl eutectic AIX-07:262534;EDB-77:019438; Denki Kagaku (DNKKA) 43:(5):253-257 (May 1975)

SUBJECT DESCRIPTORS: ELECTROCHEMISTRY: Q1;ELECTROMOTIVE FORCE;EUTECTICS;HIGH TEMPERATURE;LITHIUM CHLORIDES;MIXTURES;MOLTEN SALTS;POTASSIUM CHLORIDES;POTENTIOMETRY;REDOX POTENTIAL;URANIUM: T1;URANIUM CHLORIDES

ABSTRACT: The investigation of the reversibilities of the electrode reactions for the U(III)-U(IV) system in LiCl-KCl eutectic melt mainly based on the potential-time relationships by chronopotentiometry has been presented. A theoretical chronopotentiogram for a reversible redox system has been derived and U(III) and U(IV) have been confirmed to form a reversible redox system. Standard potentials for the couple of U(IV)/U(III) in LiCl-KCl eutectic melt have been determined against the Ag/AgCl reference electrode over the temperature range from 390 to 530$sup 0$C, and to be 0.595 V at 450$sup 0$C.

EDB SUBJECT CATEGORY: EDB-400400
INIS CATEGORY: B12

<294>
Karasev, N.M.; Sidorov, L.N.; Korenev, Yu.M. (Moskovskij Gosudarstvennyj Univ. (USSR))

Molecular vapor composition and mass spectra in KF-ZrF$sub 4$, CsF-ZrF$sub 4$ systems AIX-08:298279;EDB-77:069077; Zh. Fiz. Khim. (ZFKHA) 50:(6):1630 (Jun 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<295>
Karasev, N.M.; Sidorov, L.N.; Korenev, Yu.M. (Moskovskij Gosudarstvennyj Univ. (USSR))

Partial pressures, activities and evaporation heat in the KF-ZrF$sub 4$ system AIX-08:298280;EDB-77:069078; Zh. Fiz. Khim. (ZFKHA) 50:(6):1629 (Jun 1976)

SUBJECT DESCRIPTORS: CHEMICAL REACTION KINETICS: Q1,Q2;DISSOCIATION;MASS SPECTRA;POTASSIUM FLUORIDES: T1;VAPOR PRESSURE: Q1,Q2;VAPORIZATION HEAT: Q1,Q2;ZIRCONIUM FLUORIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<296>
Karasev, N.M.; Sidorov, L.N.; Korenev, Y.M. (Moskovskij Gosudarstvennyj Univ. (USSR))

Interval of congruent and incongruent sublimation of 3KFxZrF$sub 4$ compound in the KF-ZrF$sub 4$ system AIX-08:339906;EDB-78:017326; Zh. Fiz. Khim. (ZFKHA) 51:(1):274 (Jan 1977)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CRYSTALS;PHASE DIAGRAMS;POTASSIUM FLUORIDES: T2;SUBLIMATION: Q1,Q2;TEMPERATURE DEPENDENCE;ZIRCONIUM FLUORIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<297>
Karow, H.U., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik

In Thermodynamic state, specific heat, and enthalpy function of saturated UO$sub 2$ vapor between 3000 K and 5000 K ** ERA-03:012442;EDB-78:021168; (Feb 1977) EURFNR--1460

SUBJECT DESCRIPTORS: ENTHALPY;EVAPORATION;LMFBR TYPE REACTORS: T1;MELTDOWN;REACTOR ACCIDENTS: T,Q1;SPECIFIC HEAT;THERMODYNAMIC PROPERTIES: Q2;ULTRAHIGH TEMPERATURE;URANIUM DIOXIDE: T2;VAPORS;VERY HIGH TEMPERATURE

ABSTRACT: Reactor safety analysis requires knowledge of the thermophysical properties of molten oxide fuel and of the

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<297> CONT.
thermal equation-of-state of oxide fuel in thermodynamic liquid-vapor equilibrium far above 3000$sup 0$K. The thermodynamic state of saturated UO$sub 2$ fuel vapor, its internal energy U(T), specific heats C/sub v/(T) and C/sub p/(T), and enthalpy functions H$sup 0$ (H) and H$sup 0$ (T)-H$sub 0$$sup 0$ have been determined by means of statistical mechanics in the temperature range 3000 to 5000$sup 0$K. The discussion of the thermodynamic state includes the evaluation of the plasma state and its contribution to the caloric variables-of-state of saturated oxide fuel vapor. The resulting enthalpy functions and specific heats for saturated UO$sub 2$ vapor of equilibrium composition and that for pure UO$sub 2$ gas are compared with the enthalpy and specific heat data of gaseous UO$sub 2$ at lower temperatures known from literature. Tentatively also experimental enthalpy data of the condensed phases of UO$sub 2$ have been converted into the vapor phase using the Clausius-Clapeyron equation. However, the correlation based on the Clausius-Clapeyron equation turns out to fail because this equation is not applicable to the chemically reactive oxide fuel system.

EDB SUBJECT CATEGORY: EDB-220900;210500

<298>
Kartsev, V.E.; Kovalev, F.V.; Korshunov, B.G. (Gosudarstvennyj Inst. Redkikh Metallov, Moscow (USSR); Moskovskij Inst. Stali i Splavov (USSR))

Fusibility in K$sub 2$Nb(Ta)F$sub 7$-LiF-NaF systems
AIX-07:277791;EDB-77:031398; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (3):150-152 (1975)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: D12

<299>
Kartsev, V.E.; Kovalev, F.V.; Korshunov, B.G.

Meltability in system of K$sub 2$TaF$sub 7$--NaF--NaCl--KCl
AIX-08:298281;EDB-77:069023; Zh. Neorg. Khim. (ZNOKA) 20:(8):2204-2208 (Aug 1975)

SUBJECT DESCRIPTORS: MIXTURES;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;POTASSIUM CHLORIDES: T1;POTASSIUM FLUORIDES: T2;QUANTITY RATIO;SODIUM FLUORIDES: T3;SODIUM FLUORIDES: T5;TANTALUM FLUORIDES: T4;THERMAL ANALYSIS

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ABSTRACT: Thermographic and visual-polythermal techniques were used to study the meltability in K$sub 2$TaF$sub 7$-NaF-NaCl-KCl system. The tetrahedron-forming sections NaF-NaCl-K$sub 2$TaF$sub 7$xKCl and NaF-K$sub 2$TaF$sub 7$xKCl-2K$sub 2$TaF$sub 7$xNaCl divide the concentration tetrahedron into three particular tetrahedra: NaF-K$sub 2$TaF$sub 7$xKCl-2K$sub 2$TaF$sub 7$xNaCl-K$sub 2$TaF$sub 7$, NaF-NaCl-K$sub 2$TaF$sub 7$xKCl-2K$sub 2$TaF$sub 7$xaCl, and NaF-NaCl-KCl-K$sub 2$TaF$sub 7$xKCl. Non-variant equilibrium points in all of the particular four-component systems have been determined.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<300>

Kartsev, V.E.; Kovalev, F.V.; Korshunov, B.G.

Meltability in K$sub 2$NbF$sub 7$-NaF-NaCl-KCl system
AIX-07:277792;EDB-77:031466; Zh. Neorg. Khim. (ZNOKA) 21:(2):536-540 (Feb 1976)

SUBJECT DESCRIPTORS: EUTECTICS;MELTING;NIOBIUM FLUORIDES: T1;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;POTASSIUM CHLORIDES: T2;POTASSIUM FLUORIDES: T3;SODIUM CHLORIDES: T4;SODIUM FLUORIDES: T5;THERMAL ANALYSIS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<301>

Kazanjian, A.R., Atomics International Div., Golden, Colo. (USA)

In Radiolytic gas generation in plutonium contaminated waste materials ** INS-77:004217;ERA-02:019404;EDB-77:035009; (29 Oct 1976) RFP--2469

SUBJECT DESCRIPTORS: ALPHA SOURCES;AUTORADIOLYSIS: Q1;CARBON TETRACHLORIDE: T6;CHEMICAL REACTION YIELD: Q2;GLOVES: T10;HYDROGEN: T2;MASS SPECTROSCOPY;OILS: T5;ORGANIC ION EXCHANGERS: T7;ORGANIC SOLVENTS: T9;PLEXIGLAS: T3;PLUTONIUM 238;PLUTONIUM 239;PLUTONIUM OXIDES;POLYETHYLENES: T8;PVC: T4;RADIOACTIVE WASTES: T1;RADIOLYSIS: Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;SOLID WASTES

ABSTRACT: Many plutonium contaminated waste materials decompose into gaseous products because of exposure to alpha radiation. The gases generated (usually hydrogen) over long-storage

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periods may create hazardous conditions. To determine the extent of such hazards, knowing the gas generation yields is necessary. These yields were measured by contacting some common Rocky Flats Plant waste materials with plutonium and monitoring the enclosed atmospheres for extensive periods of time. The materials were Plexiglas, polyvinyl chloride, glove-box gloves, machining oil, carbon tetrachloride, chlorothene VG solvent, Kimwipes (dry and wet), polyethylene, Dowex-1 resin, and surgeon's gloves. Both $sup 239$Pu oxide and $sup 238$Pu oxide were used as radiation sources. The gas analyses were made by mass spectrometry and the results obtained were the total gas generation, the hydrogen generation, the oxygen consumption rate, and the gas composition over the entire storage period. Hydrogen was the major gas produced in most of the materials. The total gas yields varied from 0.71 to 16 cm$sup 3$ (standard temperature pressure) per day per curie of plutonium. The oxygen consumption rates varied from 0.0088 to 0.070 millimoles per day per gram of plutonium oxide-239 and from 0.0014 to 0.0051 millimoles per day per milligram $sup 238$Pu.

EDB SUBJECT CATEGORY: EDB-052001;400600
INIS CATEGORY: E51;B14

<302>
Kazanskii, K.A.; Novikov, V.M.

Thermophysical and electrophysical properties of uranium hexafluoride at temperatures of (1--11) x10$sup 3$ degreeK and pressures of 0.1--100 atm ERA-02:023066;EDB-77:044535; High Temp. (USSR) (Engl. Transl.) (HITEA) 14:(3):410-415 (Nov 1976)

SUBJECT DESCRIPTORS: ELECTRIC CONDUCTIVITY: Q1;MEDIUM PRESSURE;PARTIAL MOLAL VOLUME;THERMODYNAMIC PROPERTIES: Q1;URANIUM HEXAFLUORIDE: T1;VERY HIGH TEMPERATURE

ABSTRACT: The partial composition of uranium hexafluoride at temperatures of (1--11) x10$sup 3$ $sup 0$K and pressures of 0.1--100 atm is calculated with due regard to all the uranium fluoride dissociation processes and single ionization of uranium atoms. These data are used to calculate the thermodynamic functions and electrical conductivity of UF$sub 6$. The region in which the electronegativity of fluorine has little effect on the conductivity is determined. Qualitative explanations of the variation of the thermodynamic quantities with temperature are given. (AIP)

EDB SUBJECT CATEGORY: EDB-400702

<303>

Keller, C.; Berndt, U. (Kernforschungszentrum Karlsruhe (F.R. Germany). Inst. fuer Radiochemie) ** Mueller, W.; Lindner, R. (eds.)

Reaction of americium oxides with threevalent metal oxides In Transplutonium 1975 **
AIX-07:270260;ERA-02:020582;EDB-77:036885; (1976)
North-Holland

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES: T4;AMERICIUM OXIDES;BINARY MIXTURES;BORON OXIDES: T7;LATTICE PARAMETERS;LUTETIUM OXIDES: T2;NEPTUNIUM OXIDES: T9;PHASE STUDIES: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;PLUTONIUM DIOXIDE: T10;SAMARIUM OXIDES: T1;SCANDIUM OXIDES: T6;SOLUBILITY;THERMODYNAMIC PROPERTIES;THORIUM OXIDES: T8;VANADIUM OXIDES: T5;YTTRIUM OXIDES: T3

ABSTRACT: In accordance with its electronic configuration and the resulting position in the periodic table, the 5f element americium is the heavy homologue of the 4f element europium. But according to the ionic radii it is anticipated that Am$sup 3+$ (r = 0.99A) shows solid state reactions more similar to Nd$sup 3+$ (r = 0.995A) than to Eu$sup 3+$ (r = 0.95 A). Differences in the solid state chemical behavicur of Am$sup 3+$ and Nd$sup 3+$ (or Eu$sup 3+$) are observed because of the higher oxidation states Am(IV), Am(V) and Am(VI), especially being stabilized in ternary and polynary oxides. Only a few investigations have been published concerning Am$sup 3+$ in tenary oxides. This report gives a comprehensive review on the solid state reaction of AmOsub(1.5) (Am$sub 2$O$sub 3$).

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B13

<304>

Kent, R.A.; Zocher, R.W., Los Alamos Scientific Lab., N.Mex. (USA)

In Reduction of PuO$sub 2$ by CO and equilibrium partial pressures above plutonia **
INS-77:010092;ERA-02:039272;EDB-77:087060; (Nov 1976)
LA--6534

SUBJECT DESCRIPTORS: CARBON MONOXIDE: T2;CHEMICAL PREPARATION;CHEMICAL REACTIONS: Q2;PLUTONIUM DIOXIDE: T1;RADIOISOTOPE HEAT SOURCES;REDUCING AGENTS;REDUCTION: Q1;THERMODYNAMICS;VERY HIGH TEMPERATURE

ABSTRACT: The reduction of plutonia in flowing carbon monoxide has been determined over the range of 1200 to 1800$sup 0$K.

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<304> CONT.
The experimental data confirm recently published thermodynamic functions for the plutonium--oxygen system. Equilibrium partial pressures are listed for vapor species above stoichiometric and reduced plutonia in the range 1200 to 1800$sup 0$K.

EDB SUBJECT CATEGORY: EDB-070300;360201
INIS CATEGORY: D21;B23

<305>
Khaldcyanidi, K.A.; Grankina, Z.A. (AN SSSR, Novosibirsk. Inst. Neorganicheskcj Khimii)

Some properties of molybdenum pentoxide
AIX-08:320642;EDB-77:114198; Izv. Sib. Otd. Akad. Nauk SSSR, Ser. Khim. Nauk (IZSKA) 2:(1):47-50 (Jan 1976)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1;CHEMICAL PROPERTIES: Q1;DIFFERENTIAL THERMAL ANALYSIS: Q1,Q2;INFRARED SPECTRA: Q1,Q2;MAGNETIC SUSCEPTIBILITY;MOLTEN SALTS;MOLYBDENUM COMPLEXES;MOLYBDENUM OXIDES: T1;POTASSIUM FLUORIDES: T2;SOLUBILITY;X-RAY DIFFRACTION: Q1,Q2

ABSTRACT: The molybdenum (V) pentoxide has been synthesized by the dehydration of MoO(OH)$sub 3$, some of its physico-chemical properties have been investigated. The system KF-Mo$sub 2$O$sub 5$ containing from 0 to 60 mol.% KF was studied by thermography, X-ray and IR-spectroscopy methods.

EDB SUBJECT CATEGORY: EDB-400201;360204
INIS CATEGORY: B12

<306>
Khanaev, E.I.; Afanas'ev, Y.A.; Storozhenko, T.P. (Kubanskij Gosudarstvennyj Univ., Krasnodar (USSR))

Formation enthalpy of di- and trifluorides of samarium
AIX-08:317721;EDB-77:133387; Zh. Fiz. Khim. (ZFKHA) 49:(9):2454 (Sep 1975)

SUBJECT DESCRIPTORS: CALORIMETRY;DISSOLUTION;FORMATION HEAT: Q1;HYDROFLUORIC ACID;MEDIUM TEMPERATURE;SAMARIUM;SAMARIUM FLUORIDES: T1

<307> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<307>
Khomyakov, V.I.; Shishkov, Yu.D. ** AN SSSR, Moscow; Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow

Use of fluoride melts for separation of some fission products and americium from mixtures of different fluorides being the simulators of residues from fast reactor fuel fluorination In All-union conference on chemistry of transplutonium elements (americium, curium, berkelium, californium) **
AIX-08:295460;EDB-77:072630; (1976) INIS-mf--3283

SUBJECT DESCRIPTORS: AMERICIUM: T2;AMERICIUM FLUORIDES;CALCIUM FLUORIDES;CESIUM FLUORIDES;DISTRIBUTION FUNCTIONS;EUROPIUM FLUORIDES;EUTECTICS;FISSION PRODUCTS: T1;LANTHANUM FLUORIDES;MOLTEN SALTS;OXIDES;SEPARATION PROCESSES: Q1,Q2;SILICON FLUORIDES;SODIUM FLUORIDES;STRONTIUM FLUORIDES;URANIUM FLUORIDES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B13

<308>
Khomyakov, V.I.; Shishkov, Yu.D.; Galkin, N.P. ** AN SSSR, Moscow; Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow

Investigation into americium extraction process from residues of irradiated nuclear fuel after its fluorination by SiF-NaF and SiF-CaF$sub 2$ melts of eutectic composition In All-union conference on chemistry of transplutonium elements (americium, curium, berkelium, californium) **
AIX-08:295583;ERA-02:032905;EDB-77:089179; (1976) INIS-mf--3283

SUBJECT DESCRIPTORS: AMERICIUM: T1;AMERICIUM FLUORIDES;CALCIUM FLUORIDES;DISTRIBUTION FUNCTIONS;EUTECTICS;MOLTEN SALTS;NUCLEAR FUELS;PLUTONIUM FLUORIDES;RARE EARTH COMPOUNDS;SEPARATION PROCESSES: Q1;SILICON FLUORIDES;SODIUM FLUORIDES

<308>

<308> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400105
INIS CATEGORY: B16

<309>
King, R.T.; DeVan, J.H.; Goodwin, G.M.; Isaacs, H.; Heestand, R.L.; McCurdy, H.C., Oak Ridge National Lab., Tenn. (USA)

In Report of task force on alternate structural materials for Liquid Metal Fast Breeder Reactors **
ERA-01:019155;EDB-76:052411; (May 1976) ORNL--5076

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS: Q2;CORROSION;LMFBR TYPE REACTORS: T1;MECHANICAL PROPERTIES: Q3,Q4;REACTOR MATERIALS: T2,Q1;STAINLESS STEEL-304: T3;STAINLESS STEEL-316: T4

ABSTRACT: The findings and recommendations of the Task Force on Alternate Structural Materials for Liquid Metal Fast Breeder Reactors are summarized. The objectives and results of this activity were: (1) Identify existing and potential problems with types 304 and 316 stainless steel as LMFBR structural alloys for vessels, piping, and components. The advantages and disadvantages of types 304 and 316 stainless steels for these applications are summarized. Sufficient disadvantages were found to warrant exploring alternate materials. (2) Assess commercial alloys and their properties that may solve problems identified in the Phase I section. For the expected designs and operating temperatures of future LMFBRs, no commercial alloys were found that solve all problems without introducing others. However, the advantages of certain stabilized ferritic alloys containing about 9--14 percent Cr and 1 percent Mo, austenitic 15 Cr-15 Ni alloys, subclasses of types 304 and 316 stainless steels that offer possible improved stress corrosion resistance, and nickel-bearing alloys warrant further evaluation and development for their service as LMFBR structural alloys. (3) Identify specific objectives of a program plan to develop alternate structural alloy(s) to the point where an LMFBR system based thereon may be designed by 1985. Objectives of development programs involving the testing and evaluation of progressively larger heats of material are identified. Fabrication and testing of trial components in sodium test loops are included. Relevant industrial experience and literature information that form the basis of the report are identified.

EDB SUBJECT CATEGORY: EDB-210500;360103

<310>
Kirbiyik, M.; Garner, P.L.; Refling, J.G.; Reynolds, A.B. (Virginia Univ., Charlottesville (USA). Dept. of Nuclear Engineering)

Hydrodynamics of post-disassembly fuel expansions
AIX-07:245060;ERA-02:007339;EDB-77:002390; Nucl. Eng. Des. (NEDEA) 35:(3):441-460 (Dec 1975)

SUBJECT DESCRIPTORS: BOUNDARY CONDITIONS;ENTHALPY;ENTROPY;EQUATIONS OF STATE;F CODES;FINITE DIFFERENCE METHOD;HYDRODYNAMICS: Q2;LAGRANGIAN FUNCTION;LMFBR TYPE REACTORS: M1;MATHEMATICAL MODELS;NUCLEAR FUELS;REACTOR CORE DISRUPTION: M2,Q1;REACTOR CORES;SODIUM;THERMAL EXPANSION

ABSTRACT: The early expansion of the fuel following disassembly in an LMFBR core disruptive accident is modeled. Spherical expansion in the sodium is assumed. A Langrangian, finite-difference hydrodynamic code (FEXPAN) describes the motion. Disassembly employs VENUS-II, and a consistent equation of state for fuel was used throughout disassembly and FEXPAN. Time-dependent mechanical work and fuel vaporized without fuel mixing are obtained. FEXPAN is compared with time-independent expansion for the effect of fuel mixing. For example, for a particular accident analysed 75 MW sec mechanical work was calculated for expansion with no mixing versus 10 MW sec with complete core mixing.

EDB SUBJECT CATEGORY: EDB-220900;210500
INIS CATEGORY: E35

<311>
Kiriolovich, A.P.; Dem'yanovich, M.A.; Lavrinovich, Yu.G.; Skiba, O.V.; Gazizov, R.K.; Vorobey, M.P., Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Melekess (USSR)

In Study of the behavior of high activity waste produced during the regeneration of fast reactor fuel elements by the gaseous fluoride method ** INS-77:000068;ERA-02:009302;EDB-77:005682; (1975) ERDA-tr--204

SUBJECT DESCRIPTORS: BOR-60 REACTOR;CARBON STEELS: M2;CHEMICAL PROPERTIES: Q5;COMPATIBILITY;COMPATIBILITY: Q5;CORROSION RESISTANCE: Q2,Q3,Q4;DEGASSING;FLUORIDE VOLATILITY PROCESS;NICKEL: M4;RADIOACTIVE WASTE DISPOSAL: M,Q1;RADIOACTIVE WASTES: M5;REPROCESSING: M1;SPENT FUEL ELEMENTS;STAINLESS STEELS: M3

ABSTRACT: The composition and certain physicochemical and radiation properties of waste obtained from reprocessing BOR-60 fuel by the gaseous fluoride method were studied on an

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<311> CONT.
experimental stand. It was found that from 80 to 85 percent of the total activity is concentrated in the fluorination cakes. From thermographic analysis, measurement of radiation-induced gas evolution and composition of the gaseous phase, it is concluded that the waste must be canned. Compatibility of carbon steel, austenitic steel, and nickel with low-activity fluoride cakes was studied. It is shown that the corrosion of these materials increases with temperature and moisture content of the medium. In the first stage of waste disposal, hermetic storage in special containers of stainless steel or nickel is recommended. From their corrosion resistance in low-activity fluoride cakes, the wall temperatures of containers made of St. 3 should not exceed 100$sup 0$C, Kh18N10T 230$sup 0$C, and nickel 300$sup 0$C. Later, after cooling and a decrease in the $gamma$ activity of the waste (10 to 15 years), they can be reprocessed to recover valuable components (Am, Cm, etc.) and then buried. 5 tables. (DLC)

EDB SUBJECT CATEGORY: EDB-052002;050800
INIS CATEGORY: E52;B16

<312>
Kiselev, Y.M.; Sevast'yanov, V.G.; Spitsyn, V.I. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii; Moskovskij Gosudarstvennyj Univ. (USSR))

Stability of rare earth tetrafluorides
AIX-08:320647;EDB-77:114207; Izv. Akad. Nauk SSSR, Ser. Khim. (IASKA) (5):959-962 (May 1976)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;CERIUM FLUORIDES: T1;PRASEODYMIUM FLUORIDES: T2;PYROLYSIS: Q1,Q2,Q3;STABILITY;TERBIUM FLUORIDES: T3;THERMAL GRAVIMETRIC ANALYSIS;THERMODYNAMICS;VAPOR PRESSURE;X-RAY DIFFRACTION

ABSTRACT: A study was made of thermal stability of tetrafluorides of praseodymium, cerium and terbium. The study was carried out thermogravimetrically in the nitrogen atmosphere with the heating rate of 3-6 grad./min, and manometrically. The products of thermolysis were investigated by the X-ray diffraction method.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<313>
Kisun'ko, V.Z.; Novokhatskij, I.A.; Arkharov, V.I.; Belov, B.F.

Effect of various additions on the temperature of structural transformation in liquid iron AIX-07:232998;EDB-76:059951; Izv. Akad. Nauk SSSR, Met. (IZNMA) (2):176-179 (Mar 1975)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;CARBON ADDITIONS;CHROMIUM ADDITIONS;IRON: T1;LIQUID METALS;MANGANESE ADDITIONS;NICKEL ADDITIONS;PHASE TRANSFORMATIONS: Q1;SILICON ADDITIONS;STABILITY;TEMPERATURE DEPENDENCE;TRANSITION TEMPERATURE;VISCOSITY

ABSTRACT: The crucible torsional vibration method was used for demonstrating that both the absolute values of the kinematic viscosity (nu) and the activation energy of viscous flow (Esub(nu)) of molten iron (melting temp. 1750$sup 0$C) change abruptly at 1635+-10$sup 0$C. This phenomenon is explained in terms of a polymorphic transformation of ordered microregions (clusters) of the melt. The characteristic features of cluster polymorphism in liquid cobalt and nickel are not observed in the melting temperature range up to 1700$sup 0$C. A study is made of the effect of C, Si, Mn, Cr, Ni, and W, in a concentration of 1.0 at.%, on the polymorphous transformation temperature (tsub(pol)) of clusters of liquid iron at which the abrupt change of nu and Esub(nu) was recorded.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<314>
Kitamura, T.; Kojima, T. (Government Industrial Research Inst., Takamatsu (Japan)); Ichise, Mitsunojo

Comparison of the tendencies of complex formation of various metal ions in fused LiF-NaF-KF (eut.) and in fused LiCl-KCl (eut.) AIX-07:243905;EDB-76:075656; Denki Kagaku (DNKKA) 43:(3):119-126 (Mar 1975)

SUBJECT DESCRIPTORS: ANIONS;CADMIUM COMPLEXES: T1;CATIONS;CHEMICAL PREPARATION: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;CHEMICAL REACTIONS;COBALT COMPLEXES: T7;COPPER COMPOUNDS: T2;CYANIDES;ELECTROMOTIVE FORCE;EQUILIBRIUM;EUTECTICS;FREE ENERGY;IODIDES;IRON COMPLEXES: T8;LEAD COMPLEXES: T4;LITHIUM CHLORIDES;LITHIUM FLUORIDES;MANGANESE COMPLEXES: T9;MOLTEN SALTS;NICKEL COMPLEXES: T6;POTASSIUM CHLORIDES;POTASSIUM FLUORIDES;SODIUM FLUORIDES;STABILITY;THALLIUM COMPLEXES: T3;VOLTAMETRY;ZINC COMPLEXES: T5

ABSTRACT: Complex formation of Cu$sup +$, Tl$sup +$, Cd$sup ++$,

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<314> CONT.
Pb$sup ++$, Zn$sup ++$, Ni$sup ++$, Co$sup ++$, Fe$sup ++$ and Mn$sup ++$ with I$sup -$ and CN$sup -$ in LiF-NaF-KF (eut.) was studied by emf method and potential sweep voltammetry. Stability constants and free energies of complex formation were determined for Cu$sup +$-I$sup -$, Cu$sup +$-CN$sup -$, Tl$sup +$-I$sup -$, Cd$sup ++$-CN$sup -$, Ni$sup ++$-CN$sup -$, Co$sup ++$-CN$sup -$, and Fe$sup ++$-CN$sup -$ systems. The tendencies of complex formation in LiF-NaF-KF were compared with those in LiCl-KCl. The free energies of complex formation of Cu$sup +$ and Tl$sup +$ were greater in LiF-NaF-KF than in LiCl-KCl, but those for divalent metal ions were greater in LiCl-KCl than in LiF-NaF-KF. Cd$sup ++$ and Pb$sup ++$ formed iodide complexes in LiCl-KCl, but did not in LiF-NaF-KF. Zn$sup ++$, Ni$sup ++$, Co$sup ++$, Fe$sup ++$, and Mn$sup ++$ did not form any iodide complex in both solvents. Prediction of these tendencies was tried by calculating free energy changes of complex formation from the standard electromotive forces for single metal halides given by Hamer. Though the predicted values were substantially smaller than the experimental values, they showed qualitatively the tendencies of the complex formation.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<315>
Kleykamp, H., Kernforschungszentrum Karlsruhe (F.R. Germany)

In Microprobe study of fission product behavior in high-burnup HTR fuels ** ERA-01:019121;INS-76:016066;EDB-76:058152; (1 Sep 1975) ORNL-tr--4108

SUBJECT DESCRIPTORS: BURNUP;COATED FUEL PARTICLES: Q1,T2;COATINGS;CORROSION;DIFFUSION;FISSION PRODUCT RELEASE: Q2;FISSION PRODUCTS;HTGR TYPE REACTORS: T1;PERFORMANCE;PYROLYTIC CARBON;SILICON CARBIDES;SOLUBILITY;URANIUM CARBIDES;URANIUM DIOXIDE

ABSTRACT: Electron microprobe analysis of irradiated coated particles with high burnup (greater than 50 percent fima) gives detailed information on the chemical state and the transport behavior of the fission products in UO$sub 2$ and UC$sub 2$ kernels and in the coatings. In oxide fuel kernels, metallic inclusions and ceramic precipitations are observed. The solubility behavior of the fission products in the fuel matrix has been investigated. Fission product inclusions could not be detected in carbide fuel kernels; post irradiation annealed UC$sub 2$ kernels, however, give information on the element combinations of some fission product phases. Corresponding to the chemical state in the

<315> CONT.
kernel, Cs, Sr, Ba, Pd, Te and the rare earths are released easily and diffuse through the entire pyrocarbon coating. These fission products can be retained by a silicon carbide layer. The initial stage of a corrosive attack of the SiC coating by the fission products is evidenced.

EDB SUBJECT CATEGORY: EDB-210300
INIS CATEGORY: E33

<316>
Kleykamp, H. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung)

Radial oxygen distribution in the fuel of irradiated mixed oxide fuel elements with different final stoichiometries
AIX-08:325220;ERA-03:003611;EDB-77:145592; J. Nucl. Mater. (JNUMA) 66:(3):292-300 (May 1977)

SUBJECT DESCRIPTORS: BURNUP;CHEMICAL COMPOSITION;ENTHALPY;FAST NEUTRONS;FUEL PINS;IRRADIATION;MOLYBDENUM;MOLYBDENUM OXIDES: T1;PLUTONIUM OXIDES;QUANTITY RATIO;SPATIAL DISTRIBUTION;STOICHIOMETRY: Q1,Q2;URANIUM OXIDES: T2

ABSTRACT: The radial gradients of the oxygen potential and the oxygen/metal ratio O/M in the fuel of irradiated mixed oxide pins at the end of life have been determined from the Mo and MoO$sub 2$ concentrations in the metallic and ceramic inclusions. The measurements were carried out on uranium-plutonium oxides with different initial stoichiometries (O/M)$sub 0$ of 1.96, 1.98 and 1.99, resp., after fast neutron irradiation under identical conditions. Using the measured overall final stoichiometries and the stoichiometry shifts during burnup, the initial stoichiometries of the three investigated oxides have been recalculated, giving (O-M)$sub 0$ values of 1.961, 1.978, and > 1.985, resp.

EDB SUBJECT CATEGORY: EDB-220300
INIS CATEGORY: E23

<317>
Klinkova, L.A.; Ukshe, E.A.

Dissolution of corundum in molten vanadates EDB-76:036560; Zh. Neorg. Khim. (ZNOKA) 20:(2):481-484 (Feb 1975)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS: T1;CORUNDUM: T2;CRYSTALS;DIFFERENTIAL THERMAL ANALYSIS;DISSOLUTION;EUTECTICS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3;VANADATES: T3;X-RAY DIFFRACTION

<317>

<317> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B12

<318>
Kmetko, E.A.; Hill, H.H. (Los Alamos Scientific Lab., N.Mex. (USA))

Anomalous melting of f electron metals (with attention to Pu)
AIX-07:270409;EDB-77:030681; J. Phys., F (London) (JPFMA) 6:(6):1025-1037 (Jun 1976)

SUBJECT DESCRIPTORS: ACTINIDES: T1;BCC LATTICES;ELECTRONS;F STATES;LIQUID METALS;MELTING POINTS: Q1,Q2;PLUTONIUM: T2;PLUTONIUM-EPSILON;SELF-DIFFUSION

ABSTRACT: An explanation is offered for the anomalously low melting points of f electron metals, especially the early actinides. It is known that f electron participation in bonding is responsible for the crystal structures of unusually low symmetry found in the early actinides at room temperature. It is suggested that f electrons, because of the angular dependence of their wavefunctions, are able to bond only to a minimal extent in the high temperature BCC phase out of which most of the metals of concern melt. Indeed the f electrons bond better in the liquid than in the BCC phase. Attention is directed to Pu, and several of the anomalous properties of its BCC epsilon phase are discussed in detail. A role for f electron participation in self-diffusion is proposed.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<319>
Kniseley, R.N.; Butler, C.C.; Fassel, V.A. ** Dean, J.A. (ed.)

Rare earth elements In Flame emission and atomic absorption spectrometry. III. Elements and matrices **
ERA-01:016787;EDB-76:042531; (1975) Marcel Dekker, Inc.

SUBJECT DESCRIPTORS: ABSORPTION SPECTROSCOPY: Q1;CHEMICAL ANALYSIS;EMISSION SPECTROSCOPY: Q1;RARE EARTHS: T1;SENSITIVITY

ABSTRACT: Methods are surveyed for the determination of the rare earth elements by flame and atomic absorption spectroscopy. Flame conditions necessary for the flame excitation of the line spectra of the rare earths are specified. Data for the

<319> CONT.
emission and atomic absorption detection limits for the rare earths are tabulated. Analytical applications are discussed for both methods. 82 references. (BLM)

EDB SUBJECT CATEGORY: EDB-400104

<320>
Kober, V.I.; Nichkov, I.E. (Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR))

Interaction of atoms of rare earths-metal alloys
AIX-08:298575;EDB-77:068255; Zh. Fiz. Khim. (ZFKHA) 50:(1):281 (Jan 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CHEMICAL REACTION KINETICS;ELECTRONIC STRUCTURE;MELTING POINTS;ORBIT STABILITY;PHASE DIAGRAMS;RARE EARTH ALLOYS: T

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360100
INIS CATEGORY: B22

<321>
Kobzenko, G.F.; Chernogorenko, V.B.; L'vov, S.N.; Lesnaya, M.I.; Lynchak, K.A.

Phase diagram and properties of Nd--As alloys
AIX-08:298286;EDB-77:068799; Zh. Neorg. Khim. (ZNOKA) 20:(8):2169-2173 (Aug 1975)

SUBJECT DESCRIPTORS: ARSENIC: T2;ARSENIC COMPOUNDS;ARSENIDES: T1;BINARY ALLOY SYSTEMS;CHEMICAL COMPOSITION;ELECTRIC CONDUCTIVITY;MELTING POINTS: Q1;N-TYPE CONDUCTORS;NEODYMIUM;NEODYMIUM ALLOYS;PHASE DIAGRAMS: Q1;QUANTITY RATIO;SOLUBILITY: Q2;SOLVENT PROPERTIES

ABSTRACT: The phase diagram of Nd--As system has been constructed, and the electrophysical properties of the alloys belonging to this system have been studied. It has been established that the system includes three arsenides: Nd$sub 3$As, NdAs and NdAs$sub 2$. When heated, the latter dissociates into NdAs and gaseous arsenic. The melting point of NdAs is 2.250+-15 deg C. The solubility of arsenic in

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<322> CONT.
neodymium is less than 1%. In all alloys containing up to 50% of arsenic, n-conduction is prevalent.

EDB SUBJECT CATEGORY: EDB-360603;360104
INIS CATEGORY: B12

<322>
Koch, G. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Heisse Chemie)

Chemical reprocessing of spent nuclear fuels
AIX-08:334490;ERA-02:058490;EDB-77:137286; Chem. Ztg. (CMKZA) 101:(2):64-81 (Feb 1977)

ABSTRACT: The reprocessing of nuclear fuels from atomic power stations has a twofold goal. On the one hand it is serving for fuel supply by recovering the fissile materials which have not been consumed or which have been freshly generated in the reactor. On the other hand the radioactive waste products from nuclear power generation are pretreated for long-term safe disposal. The core element of the chemical processing is the PUREX Process, a counter-current solvent extraction procedure using tributyl phosphate (TBP) as the solvent for uranium and plutonium. The chemical basis and the technological performance of the process are discussed.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<323>
Koelling, D.D., Argonne National Lab., Ill. (USA)

In Band structure studies of actinide systems **
INS-77:004829;ERA-02:022817;EDB-77:043619; (1976)
CONF-760956--2

SUBJECT DESCRIPTORS: ACTINIDE ALLOYS: T3;ACTINIDE COMPOUNDS: T2;ACTINIDES: T1;BAND THEORY;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6;F STATES;URANIUM ALLOYS: T5;URANIUM CARBIDES: T4;URANIUM HEXAFLUORIDE: T6

ABSTRACT: The nature of the f-orbitals in an actinide system plays a crucial role in determining the electronic properties. It has long been realized that when the actinide separation is small enough for the f-orbitals to interact directly, the system will exhibit itinerant electron properties: an absence of local moment due to the f-orbitals and sometimes even superconductivity. However, a number of systems with the larger actinide separation that should imply local moment behavior also exhibit intinerant properties.

<323> CONT.
Such systems (URh$sub 3$, UIr$sub 3$, UGe$sub 3$, UC) were examined to learn something about the other f-interactions. A preliminary observation made is that there is apparently a very large and ansiotropic mass enhancement in these systems. There is very good reason to believe that this is not solely due to large electron--electron correlations but to a large electron--phonon interaction as well. These features of the ''non-magnetic'', large actinide separation systems are discussed in light of our results to date. Finally, the results of some recent molecular calculations on actinide hexafluorides are used to illustrate the shielding effects on the intra-atomic Coulomb term U/sub f-f/ which would appear in any attempt to study the formation of local moments. As one becomes interested in materials for which a band structure is no longer an adequate model, this screened U/sub ff/ is the significant parameter and efforts must be made to evaluate it in solid state systems.

EDB SUBJECT CATEGORY: EDB-360102;400702;360202
INIS CATEGORY: B22;B13;B23

<324>
Kolster, B.H., Nijverheidsorganisatie TNO, The Hague (Netherlands). Projectgroep Kernenergie TNO

In Study of mass transfer by liquid sodium in closed loop systems. Sodium technology development programme **
EDB-76:036501; (Dec 1974) INIS-mf--2001

SUBJECT DESCRIPTORS: CARBON;CHROMIUM ADDITIONS;CORROSION: Q1;CORROSION PRODUCTS;CORROSIVE EFFECTS: Q2;DEPOSITION;HIGH TEMPERATURE;LIQUID METALS;MASS TRANSFER: Q2;NIOBIUM ADDITIONS;PRIMARY COOLANT CIRCUITS;SECONDARY COOLANT CIRCUITS;SODIUM: T2;SODIUM COOLED REACTORS;STAINLESS STEEL-316: T1

ABSTRACT: Results of a research program on mass transfer phenomena by liquid sodium are reported. Concerning corrosion, results are presented of investigations of the influence of temperature, oxygen level, and downstream position on the corrosion behavior of stainless steel 316 specimens. A brief summary of a model and a derivation of the corrosion rate expression is given. For deposition the same parameters as for corrosion are studied. Specimens were extensively investigated by means of a combination of metallographic techniques. In order to eliminate the influence of the loop material on the mass transport, a loop will be built using molybdenum for construction material. Decarburization studies are carried out and it is concluded that heat treatment and an addition of certain amounts of

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<324> CONT.
niobium and chromium have a stabilizing effect on the decarburization of specimen materials.

EDB SUBJECT CATEGORY: EDB-360105
INIS CATEGORY: B15

<325>
Komarevtseva, N.I.; Kuz'micheva, E.U.; Kovba, L.M.

New oxide of uranium EDB-76:066381; Sov. Radiochem. (Engl. Transl.) (SVRDA) 17:(3):432-433 (1975)

SUBJECT DESCRIPTORS: BOND ANGLE;BOND LENGTHS;CHEMICAL PREPARATION;PHASE STUDIES: Q1;STRUCTURAL CHEMICAL ANALYSIS: Q1;URANIUM OXIDES: M1;VERY HIGH PRESSURE;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: The formation of the phase U$sub 16$O$sub 3$$sub 9$ in the interaction of the uranium oxides UO$sub 2$.$sub 02$ and U$sub 3$O$sub 8$ by heating for 5 min at 1000$sup 0$C and a pressure of 87 kbar was detected. The parameters of the unit cell were determined by an x-ray diffraction method.

EDB SUBJECT CATEGORY: EDB-400702;400104;360202

<326>
Komm, T.Z.; Kaul, A.R.; Tret'yakov, Yu.D.

Investigation of formation thermodynamic of rare earth aluminates with perovskite structure
AIX-08:334306;EDB-77:140993; Vestn. Mosk. Univ., Ser. II. Khim. (VMUKA) 17:(5):636 (Sep 1976)

SUBJECT DESCRIPTORS: ALUMINATES: T1;CRYSTAL STRUCTURE;FORMATION FREE ENTHALPY: Q1,Q2;LANTHANUM COMPOUNDS;NEODYMIUM COMPOUNDS;PRASEODYMIUM COMPOUNDS;RARE EARTH COMPOUNDS: T2;SAMARIUM COMPOUNDS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<327>
Kononenko, V.I.; Lomovtsev, V.I.; Sukhman, A.L.

Adhesion properties of melted Al, Ga, In on solid titanium
AIX-08:286443;EDB-77:043782; Izv. Akad. Nauk SSSR, Met. (IZNMA) (5):104-107 (Sep 1976)

SUBJECT DESCRIPTORS: ADHESION: Q1,Q2,Q3;ALUMINIUM: T1;GALLIUM: T2;GRAPHITE;HIGH TEMPERATURE;INDIUM: T3;LIQUID METALS;SOLUBILITY;SUBSTRATES;TEMPERATURE DEPENDENCE;TITANIUM: T4;VERY HIGH TEMPERATURE;VISCOSITY;WETTABILITY: Q4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<328>
Kononenko, V.I.; Yatsenko, S.P.

In Diffusion coefficients in molten metals **
NSA-33:30133;ERA-01:013612;EDB-76:036237; Tr. Inst. Khim., Akad. Nauk SSSR, Ural. Fil. (TKAUA) 23::62-67 (1971)
TT--74-58011

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;ANTIMONY;BISMUTH;CALCULATION METHODS;GALLIUM;INDIUM: T2;INDIUM ALLOYS: T3;LEAD;LIQUID METALS;SELF-DIFFUSION: Q1,Q2,Q3,Q4;SILVER;THALLIUM;TIN: T1;TIN ALLOYS: T4;USSR;VISCOSITY

ABSTRACT: The self-diffusion coefficients of indium and tin were determined experimentally in not only the pure metals but a wide range of binary liquid indium-tin alloys over the temperature range 800 to 1100$sup 0$K. Activation energies and pre-exponential factors were calculated for each metal. A break in the Arrhenius plot was found. Coefficients of diffusion for Ag, In, Th, Sn, Pb, Sb, and Bi in liquid gallium were calculated from viscosity data. (GRA)

EDB SUBJECT CATEGORY: EDB-360102

<329>
Koroleva, G.N.; Gava, S.A.; Poluehktov, N.S.; Kirillov, A.I.; Kornelli, M.E.. (AN Ukrainskoj SSR, Odessa. Inst. Obshchej i Neorganicheskoj Khimii)

Interaction of lanthanide ions with fluorine-ions
AIX-08:295321;EDB-77:056246; Dokl. Akad. Nauk SSSR (DANKA) 228:(6):1384-1386 (21 Jul 1976)

<329>

<329> CONT.
SUBJECT DESCRIPTORS: FLUORIDES;MEDIUM TEMPERATURE;PH VALUE;POTENTIOMETRY;QUANTITY RATIO;RARE EARTH COMPLEXES: T1;SOLUBILITY: Q1;STABILITY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<330>
Kosorukov, A.A.; Korenev, Yu.M.; Novoselova, A.V.

Preparation of lithium octafluorohafnates EDB-76:036678; Zh. Neorg. Khim. (ZNOKA) 20:(2):543-544 (Feb 1975)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL PREPARATION: Q1,Q2;CRYSTALS;HAFNIUM FLUORIDES: T1;LATTICE PARAMETERS;LITHIUM FLUORIDES: T2;STRUCTURAL CHEMICAL ANALYSIS;TETRAGONAL LATTICES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<331>
Kotlin, V.P.; Barbanel, Y.A.

Use of the SF-8 detection spectrophotometer for measuring absorption spectra of molten salts
AIX-08:322641;EDB-77:121463; Prib. Tekh. Eksp. (PRTEA) 18:(4):232-233 (Jul 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;FOCUSING;FURNACES;LENSES;MOLTEN SALTS: T1;SPECTROPHOTOMETERS: T;VERY HIGH TEMPERATURE

ABSTRACT: Three versions of the use of the SF-8 spectrophotometer for high-temperature measurements are described: 1) based on the standard optical scheme at temperatures of up to 400$sup 0$C; 2) based on a modified one-wave scheme; 3) based on a modified twin-wave scheme. The external heater used in the schemes 2 and 3 ensures that measurements can be performed at temperatures of up to 1000$sup 0$C. In order to obtain the spectra of thin-layer samples vessels with an insert are used. For operation of the spectrophotometer according to the schemes 2 and 3 te heater

<331> CONT.
may in principle be replaced by a cryostat or some other external device.

EDB SUBJECT CATEGORY: EDB-440300
INIS CATEGORY: E42

<332>
Kouhsen, C.

In Preparation and thermochemical stabily of uranium-zirconium-carbonitrides. **
AIX-07:270464;ERA-02:027039;EDB-77:055710; (1975) Technische Hochschule

SUBJECT DESCRIPTORS: CARBON NITRIDES;CHEMICAL PREPARATION;CHEMICAL REACTION KINETICS: Q2,Q3,Q4,Q5;ENTROPY;FORMATION HEAT;LATTICE PARAMETERS;METALLOGRAPHY: Q2,Q3,Q4,Q5;METALLURGY;PHASE DIAGRAMS;QUANTITATIVE CHEMICAL ANALYSIS;QUATERNARY ALLOY SYSTEMS;REDUCTION;SEGREGATION;SOLID FUELS;SOLID SOLUTIONS;STABILITY;URANIUM CARBIDES: T2;URANIUM NITRIDES: T3;ZIRCONIUM CARBIDES: T4;ZIRCONIUM NITRIDES: T5

ABSTRACT: This investigation deals with the preparation and the thermochemical stability of uranium-zirconium-carbonitrides as well as with the mechanism of (U,Zr)(C,N)-preparation by carbothermic reduction of uranium-zirconium-oxide. Single-phase (U,Zr)(C,N)-solid solutions with U:Zr-proportions of 3:1, 1:1, and 1:3 were prepared from oxide powder, obtained using the KFA-H-Process. The thermochemical stability of the (U,Zr)(C,N)-solid solutions against carbon was measured for varying Zr- and N-contents and for several temperatures; the results indicate an increase of the uranium carbide stability potential by the formation of (U,Zr)(C,N)-solid solutions. The thermodynamic properties $delta$G$sup 0$, $delta$H$sup 0$, and $delta$S$sup 0$ were calculated and the correlation between the M(C,N)-lattice constant and the N-content was evaluated. Through an intensive investigation of the reaction mechanism, several different reaction paths were found; for each of them the characteristical diffusion of matter was explained by means of the microsections. It was shown that the Zr-concentration of the oxide reactant and the heating rate during the carbothermic reduction influence the species of the reaction product, especially the homogeneity of the (U,Zr)(C,N)-solid solution.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

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Kouhsen, C., Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Reaktorwerkstoffe und Heisse Zellen; Technische Hochschule Aachen (Germany, F.R.)

In Preparation and thermochemical stability of uranium-zirconium-carbonitrides. A contribution to nuclear fuels for advanced high-temperature reactors **
AIX-07:265247;ERA-02:020575;EDB-77:036863; (Aug 1975)
Juel--1228

SUBJECT DESCRIPTORS: CARBON NITRIDES: T3;CHEMICAL PREPARATION: Q1,Q2,Q3,Q4,Q5;CHEMICAL REACTION KINETICS;ENTROPY;FORMATION HEAT;LATTICE PARAMETERS;METALLOGRAPHY;PHASE DIAGRAMS;QUANTITATIVE CHEMICAL ANALYSIS;QUATERNARY ALLOY SYSTEMS;REDUCTION;SEGREGATION;SOLID FUELS;SOLID SOLUTIONS;STABILITY: Q1,Q2,Q3,Q4,Q5;URANIUM CARBIDES: T1;URANIUM NITRIDES: T2;ZIRCONIUM CARBIDES: T4;ZIRCONIUM NITRIDES: T5

ABSTRACT: This investigation deals with the preparation and the thermochemical stability of uranium-zirconium-carbonitrides as well as with the mechanism of (U,Zr) (C,N)-preparation by carbothermic reduction of uranium-zirconium-oxide. Single-phase (U,Zr) (C,N)-solid solutions with U:Zr-proportions of 3:1, 1:1, and 1:3 were prepared from oxide powder. The thermochemical stability of the (U,Zr) (C,N)-solid solutions against carbon was measured for varying Zr- and N-contents and for several temperatures; the results indicate an increase of the uranium carbide stability potential by the formation of (U,Zr) (C,N)-solid solutions. The thermodynamic properties $delta$G$sup 0$, $delta$H$sup 0$, and $delta$S$sup 0$ were calculated and the correlation between the M(C,N)-lattice constant and the N-content was evaluated. Through an intensive investigation of the reaction mechanism, several different reaction paths were found; for each of them the characteristical diffusion of matter was explained by means of the microsections. It was shown that the Zr-concentration of the oxide reactant and the heating rate during the carbothermic reduction influence the species of the reaction product, especially the homogeneity of the (U,Zr) (C,N)-solid solution.

EDB SUBJECT CATEGORY: EDB-360201;050700
INTS CATEGORY: B23

<334>
Kouhsen, C.; Naoumidis, A.; Nickel, H. (Kernforschungsanlage Juelich G.m.b.H. (F.R. Germany). Inst. fuer Reaktorwerkstoffe)

Preparation and thermochemical stability of uranium-zirconium-carbonitrides
AIX-07:270478;ERA-02:015888;EDB-77:029153; J. Nucl. Mater. (JNUMA) 61:(1):88-98 (Jul 1976)

SUBJECT DESCRIPTORS: COATED FUEL PARTICLES: T1;ENTHALPY;HTGR TYPE REACTORS;LATTICE PARAMETERS;PRODUCTION: Q1,Q2,Q3,Q4,Q5;SOLID SOLUTIONS;STABILITY;TEMPERATURE DEPENDENCE;URANIUM CARBIDES: T2;URANIUM NITRIDES: T3;VEGARD LAW;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION;ZIRCONIUM CARBIDES: T4;ZIRCONIUM NITRIDES: T5

ABSTRACT: Although the currently available coated particle fuel developed for use in gas-cooled HTRs can nominally be used up to at least 1250$sup 0$C, in recent years for safety reasons the need to develop a kernel having greater compatibility with the PyC coating has increased. Uranium carbide is a potential high temperature fuel if it can be stabilized against reaction with PyC of the coating. One method is to combine the UC with nitrogen and zirconium. In this paper possible ways of preparing (U,Zr)(C,N)-solid solutions are described. The range of stability of (U,Zr)(C,N) against carbon and the thermodynamic properties ($delta$G$sup 0$, $delta$H$sup 0$, and $delta$S$sup 0$) were determined by heating the solid solution-carbon mixture to equilibrium. X-ray analysis was used to determine the (U,Zr)(C,N) lattice parameters as a function of nitrogen content, and it was found that there was a positive deviation from Vegard's law.

EDB SUBJECT CATEGORY: EDB-050700;360201
INIS CATEGORY: B24

<335>
Kovalevskii, A.V.; Lebedev, V.A.; Nichkov, I.F.; Raspopin, S.P.

Corrosion of liquid alloys of zinc with yttrium and with rare earth elements in LiCl--KCl melts EDB-77:132851; J. Appl. Chem. USSR (Engl. Transl.) (JAPUA) 46:(11):2743-2745 (Nov 1973)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CORROSIVE EFFECTS: Q10,Q11;ELECTRIC POTENTIAL;ELECTROCHEMICAL CORROSION: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;LIQUIDS;LITHIUM CHLORIDES: M10;PHASE STUDIES;POTASSIUM CHLORIDES: M11;TEMPERATURE DEPENDENCE;ZINC BASE ALLOYS: M9

ABSTRACT: The corrosion of liquid alloys of zinc with yttrium and with rare earth elements (RE) in an LiCl--KCl melt was

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<335> CONT.
investigated, and their stationary potentials were measured. The corrosion rates were calculated from these data, and the calculated values were compared with corrosion rates found experimentally. The experiments were conducted in the electrolytic cell in an atmosphere of purified argon. The alloys were prepared directly in the cell by fusion of Zn with freshly prepared shavings of the following metals: Ce, Nd, La, Dy, Er, Y, Sm, and Yb. The metal contents (8 to 10 wt.%) in the zinc corresponded to the two-phase state (saturated solution-compound) of the alloys. It is shown from experimental data that under equal conditions the corrosion of most of the alloys is approximately equal, and increases regularly with rise of temperature. The corrosion of alloys of zinc with samarium and especially with ytterbium is greater. Experimental rates of lanthanum and cerium corrosion in zinc alloys are compared with values calculated from the stationary potentials of the alloys. The good agreement between the values confirms the electrochemical mechanism of corrosion of Ce--Zn and La--Zn alloys.

EDB SUBJECT CATEGORY: EDB-360105

<336>
Kozachenko, E.G.; Safonov, V.V.; Ksenzenko, V.I. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

On interaction of tellurium tetrachloride with copper (1), mercury (2), bismuth and iron (3) chlorides EDB-76:036679; Zh. Neorg. Khim. (ZNOKA) 20:(2):562-563 (Feb 1975)

SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS;MELTING;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;QUANTITY RATIO;SOLID SOLUTIONS;TELLURIUM CHLORIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<337>
Kozachenko, E.G.; Safonov, V.V.; Levina, N.A.; Ksenzenko, V.I. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

Phase diagrams of BiCl$sub 3$-CuCl-TeCl$sub 4$ and CuCl-FeCl$sub 3$-TeCl$sub 4$ systems AIX-08:336958;EDB-77:146484; Zh. Neorg. Khim. (ZNOKA) 21:(1):219-221 (Jan 1976)

ABSTRACT: Interaction in the systems TeCl$sub 4$-CuCl-BiCl$sub 3$(FeCl$sub 3$) has been studied by differential-thermal analysis. In the system BiCl$sub 3$-CuCl-TeCl$sub 4$ the

<337> CONT.
nonvariant point E has a melting point 150 deg C; in the system CuCl-FeCl$sub 3$-TeCl$sub 4$ eutectic mixtures (points E$sub 1$, E$sub 2$ and E$sub 3$) melt at 113 deg, 115 deg and 140 deg, respectively. Experimental and literature data on interaction of TeCl$sub 4$ with chlorides of impurities (BiCl$sub 3$, CuCl, and FeCl$sub 3$) and with NaCl allow a conclusion to be made about possible separation of the main amounts of impurities from TeCl$sub 4$ with the aid of salt chromatography.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<338>
Kozeeva, L.P.; Konstanchuk, I.G.; Klevtsov, P.V.

Double tungstate K$sub 5$La(WO$sub 4$)$sub 4$ EDB-76:066305; Inorg. Mater. (USSR) (Engl. Transl.) (INOMA) 11:(11):1800 (Nov 1975)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1,Q2,Q3,Q4;CRYSTAL STRUCTURE;LANTHANUM TUNGSTATES: T2;LATTICE PARAMETERS;MELTING POINTS;POTASSIUM TUNGSTATES: M3;RARE EARTH COMPOUNDS: A4;TUNGSTATES: M1

ABSTRACT: The possibility of formation of K$sub 5$Ln(WO$sub 4$)$sub 4$ was investigated for Ln = La, Ce, Pr, Nd, Sm, Eu, Gd, and Y; solid-phase reaction and crystallization from K$sub 2$W$sub 2$O$sub 7$ melt were used for the synthesis. X-ray phase analysis showed that only the compound K$sub 5$La(WO$sub 4$)$sub 4$ was formed; the others formed a mixture of two phases, KLn(WO$sub 4$)$sub 2$ and K$sub 2$WO$sub 4$. K$sub 5$La(WO$sub 4$)$sub 4$ melts at 820 +- 20$sup 0$C; it is isostructural with palmierite, and its hexagonal lattice constants are a = 6.030 +- 0.008 A and c = 20.89 +- 0.04 A. (DLC)

EDB SUBJECT CATEGORY: EDB-400201

<339>
Kozin, L.F.; Dergacheva, M.B.; Almazova, N.G.

Cs-Hg amalgam thermodynamic properties
AIX-08:283309;EDB-77:043773; Izv. Akad. Nauk SSSR, Met. (IZNMA) (4):178-184 (Jul 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CESIUM ALLOYS: T2;ELECTROMOTIVE FORCE;HIGH TEMPERATURE;LIQUID METALS;MERCURY ALLOYS: T1;QUANTITY RATIO;REACTION KINETICS;TABLES;THERMODYNAMIC PROPERTIES: Q1,Q2

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<339> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<340>
Kozin, L.F.; Nigmetova, R.Sh.; Dairova, A.M.; Amangel'diev, B.R.

Thermodynamic properties of Cd-Zn-Hg liquid alloys
AIX-08:286444;EDB-77:043783; Izv. Akad. Nauk SSSR, Met. (IZNMA) (5):224-228 (Sep 1976)

SUBJECT DESCRIPTORS: CADMIUM ALLOYS: T1;ENTHALPY;HIGH TEMPERATURE;ISOTHERMAL PROCESSES;LIQUID METALS;MERCURY ALLOYS: T2;PHASE STUDIES;QUANTITY RATIO;TEMPERATURE DEPENDENCE;TERNARY ALLOY SYSTEMS;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;VAPOR PRESSURE;ZINC ALLOYS: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<341>
Kozin, V.F.; Sheka, I.A. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Study of kinetics of monovalent indium ions formation in the In$sup 0$-InCl$sub 3$-LiCl-H$sub 2$O system EDB-76:037013; Ukr. Khim. Zh. (UKZHA) 41:(5):486-490 (May 1975)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;CATIONS;CHEMICAL REACTION KINETICS: Q1,Q2,Q3,Q4;FORMATION HEAT;INDIUM: T1;INDIUM CHLORIDES: T2;LITHIUM CHLORIDES: T3;QUANTITY RATIO;TEMPERATURE DEPENDENCE;WATER: T4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<342>
Kozina, L.N.; Revyakin, A.V.; Romanova, V.P.

Solubility of oxygen in liquid niobium EDB-76:042266; Izv. Akad. Nauk SSSR, Met. (IZNMA) (3):28-33 (May 1975)

SUBJECT DESCRIPTORS: AFFINITY;EQUILIBRIUM;FREE ENERGY;LIQUID METALS;NIOBIUM: T1;NIOBIUM OXIDES;OXIDATION;OXYGEN: T2;SOLUBILITY: Q2;SOLVENT PROPERTIES: Q1;VERY HIGH TEMPERATURE

ABSTRACT: A method has been developed for determining the solubility of oxygen in liquid refractory metals possessing a strong affinity for oxygen and having volatile oxides. The equilibrium constant Ksub(p) and the change of standard free energy $delta$F$sup 0$ have been determined for the reaction which occurs when oxygen is dissolved in liquid niobium at 2800$sup 0$K: Ksub(p)=1.08x10$sup 4$ wt.%/at.; $delta$F$sup 0$=-52 150 cal/mole.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<343>
Kozlov, V.B.; Karpenko, I.P.

Approximation of tabulated thermodynamic data for purposes of optimization of two-phase liquid-metal power cycles ERA-02:034000;EDB-77:073116; Heat Transfer - Sov. Res. (HTSRA) 8:(2):49-54 (1976)

SUBJECT DESCRIPTORS: ALKALI METALS: T3;CESIUM;DESIGN;ENTHALPY;ENTROPY;LIQUID METALS;LITHIUM;OPTIMIZATION;POTASSIUM;RUBIDIUM;SODIUM;THERMAL POWER PLANTS: T1;THERMODYNAMIC CYCLES: Q1;THERMODYNAMIC PROPERTIES: Q3;TWO-PHASE FLOW

ABSTRACT: Methods of utilization of tabulated thermodynamic properties of liquid-metal working fluids in computer calculations for purposes of optimization of power cycles are presented. Over a given temperature range of the two-phase flow the properties are represented as linear functions of the saturation temperature. Errors in determining the properties over a given temperature range are evaluated. Given the allowable error in determination of the properties, the maximum temperature range over which the method is applicable is determined.

EDB SUBJECT CATEGORY: EDB-200102

<344>

<344>
Kozlova, O.B. (Vsesoyuznyj Inst. Ogneuporov, Leningrad (USSR));
Suvorov, S.A. (Leningradskij Tekhnologicheskij Inst. (USSR))

Wetting of certain refractories of the system MgO-Al$sub 2$O$sub 3$-ZrO$sub 2$ with metallic melts
AIX-08:337300;EDB-77:140700; Ogneupory (OGNPA) (12):41-45 (1976)

ABSTRACT: The wettability of refractory bricks (Al$sub 2$O$sub 3$-ZrO$sub 2$ and MgAl$sub 2$O$sub 4$-ZrO$sub 2$) by iron and aluminium has been investigated at 1550 and 1100 deg C, respectively. A study of the dependencies of the wetting angle THETA upon the retention time at the test temperature and the analysis of the brick microstructure subsequent to wetting by iron and aluminium show the materials examined to be wetted by iron from the moment of melting, the THETA value in corundum refractory bricks being two times less than that in spinel-based bricks. Least wettability by iron is characteristic of compositions comprising 85% MgAl$sub 2$O$sub 4$ + 15% ZrO$sub 2$. Refractory bricks comprising 90% Al$sub 2$O$sub 3$ + 10% ZrO$sub 2$ are wetted less by aluminium than bricks of different composition. The application of bricks comprising MgAl$sub 2$O$sub 4$ with a ZrO$sub 2$ admixture is recommended in the manufacture of insertfeeders for continuous steel teeming.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<345>
Krascella, N.L., United Technologies Research Center, East Hartford, Conn. (USA)

In The spectral properties of uranium hexafluoride and its thermal decomposition products **
ERA-02:037512;INS-77:010118;EDB-77:088303; (Sep 1976)
N--76-33030

SUBJECT DESCRIPTORS: ABSORPTION;DECOMPOSITION: Q2;GAS FUELED REACTORS: M1;HELIUM;NUCLEAR FUELS: Q1;TEMPERATURE EFFECTS;ULTRAVIOLET RADIATION;ULTRAVIOLET SPECTRA: Q2;URANIUM HEXAFLUORIDE: M2;VERY HIGH TEMPERATURE

ABSTRACT: This investigation was initiated to provide basic spectral data for gases of interest to the plasma core reactor concept. The attenuation of vacuum ultraviolet (VUV) radiation by helium at pressures up to 20 atm over path lengths of about 61 cm and in the approximate wavelength range between 80 and 300 nm was studied. Measurements were also conducted to provide basic VUV data with respect to UF6 and UF6/argon mixtures in the wavelength range between 80 and

<345> CONT.
120 nm. Finally, an investigation was initiated to provide basic spectral emission and absorption data for UF6 and possible thermal decomposition products of UF6 at elevated temperatures. (Author) (GRA)

EDB SUBJECT CATEGORY: EDB-220100;050700
INIS CATEGORY: E21

<346>
Krasnii, Yu.P.; Shvets, V.T. (Odesskij Gosudarstvennyj Univ. (Ukrainian SSR))

Electron contribution to the liquid metal viscosity
AIX-08:334577;EDB-77:132689; Ukr. Fiz. Zh. (Russ. Ed.) (UFIZA) 21:(4):679-680 (Apr 1976)

SUBJECT DESCRIPTORS: CESIUM: T2;DIFFRACTION MODELS;ELECTRIC CONDUCTIVITY;ELECTRON DENSITY;FERMI LEVEL;LEAD;LIQUID METALS: T1;LITHIUM: T3;RELAXATION;SODIUM: T4;THERMAL CONDUCTIVITY;THERMOELECTRIC PROPERTIES;VISCOSITY: Q1,Q2,Q3,Q4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<347>
Krasnoperova, A.P. (Khar'kovskij Gosudarstvennyj Univ. (Ukrainian SSR)) ** Khar'kovskij Gosudarstvennyj Univ. (Ukrainian SSR)

Investigation of solubility and thermodynamics of dissolution of salts in mixed solvents In 8th radiochemical conference **
AIX-08:286087;EDB-77:069006; (1975) INIS-mf--3228

SUBJECT DESCRIPTORS:
DISSOLUTION;ENTHALPY;ENTROPY;ETHANOL;LABELLED COMPOUNDS;MEDIUM TEMPERATURE;METHANOL;MIXED SOLVENTS;SOLUBILITY: Q1;STRONTIUM 89;STRONTIUM NITRATES: T1;TEMPERATURE DEPENDENCE;TRACER TECHNIQUES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<348>

<348>
Krasulin, Yu.L.

Ceramic-base heat resisting constructional material
EDB-76:036582; Fiz. Khim. Obrab. Mater. (FKOMA) (5):62-69 (1974)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360203;360202
INIS CATEGORY: B23

<349>
Krivanek, M.; Krtil, J.; Sus, F.; Moravec, J. (Ustav Jaderneho Vyzkumu, Rez (Czechoslovakia))

Experience of the Central Control Laboratory (CCL) in accounting for and controlling nuclear material in Czechoslovakia In Safeguarding nuclear materials. Vol. 2 **
AIX-08:284456;ERA-02:019456;EDB-77:035061; (1976) IAEA

SUBJECT DESCRIPTORS: ACCOUNTING:
Q2;ACCURACY;BURNUP;CZECHOSLOVAKIA: T1;DISSOLUTION;FUEL SCANNING;INVENTORIES;ISOTOPE RATIO;MASS SPECTROSCOPY;NUCLEAR FUELS;NUCLEAR MATERIALS MANAGEMENT:
T2,Q1;PLUTONIUM;QUANTITATIVE CHEMICAL ANALYSIS;QUANTITY RATIO;SAFEGUARDS;THORIUM;TITRATION;URANIUM;URANIUM DIOXIDE

ABSTRACT: The four years of experience obtained in accounting for and controlling nuclear materials within the framework of the Czechoslovak safeguards system and with the co-operation of the IAEA is discussed. The methods for determining uranium, thorium, and plutonium in various nuclear materials, from the aspect of both chemical and isotopic composition, have been developed and introduced into routine use. The transport, storing, and preparation of samples for analysis, as well as experimental devices, calibration, and comparative tests, are involved. The errors evaluated are given. Other methods have also been established at the CCL for solving some problems in nuclear fuel control such, for example, as the determination of burnup and nuclear spectrometry. Participation in the PAFEX-I and PAFEX-II experiments is noted.

EDB SUBJECT CATEGORY: EDB-055001
INIS CATEGORY: F41

<350>
Krohn, B.J.; Person, W.B.; Overend, J.

Predicted infrared spectrum and the structure of the isolated UF$sub 5$ molecule INS-76:020004;ERA-02:001214;EDB-76:081892; J. Chem. Phys. (JCPSA) 65:(3):969-976 (1 Aug 1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;INFRARED SPECTRA: Q1;MOLECULAR STRUCTURE: Q1;URANIUM FLUORIDES: T1;VIBRATIONAL STATES

ABSTRACT: The infrared absorption spectrum by the fundamental modes of UF$sub 5$ is calculated using force constants transferred from UF$sub 6$ to predict the wave numbers and using the F atom polar tensor from CH$sub 3$F to predict the intensities. Calculations are made for several assumed geometrical configurations of UF$sub 5$. Comparison of the predicted spectra with the recently observed spectrum, in the UF-stretching region, of a photolysis product of UF$sub 6$ isolated in an Ar matrix suggests strongly that the structure is square pyramidal (C$sub 4$/subv/) with the U atom above the F atom equatorial plane. Although the model for the intensities is simple, the calculated spectrum is expected to predict the correct order of magnitude of the intensities of the fundamentals, first overtones, and binary combination bands of UF$sub 5$, and the approximate wavenumbers for the expected absorption. Some comparisons are given between the calculations for the several structures of UF$sub 5$ and observed spectra of other XF$sub 5$ molecules, including PF$sub 5$, BrF$sub 5$, and IF$sub 5$. (AIP)

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<351>
Kryukova, A.I.; Korshunov, I.A. (Gor'kovskij Gosudarstvennyj Univ. (USSR))

Solubility of Sr(NO$sub 3$)$sub 2$ in the LiNO$sub 3$-KNO$sub 3$ melt of variable composition EDB-76:037021; Zh. Neorg. Khim. (ZNOKA) 20:(5):1438-1440 (May 1975)

SUBJECT DESCRIPTORS: CRYSTALLIZATION;EUTECTICS;ISOTHERMAL PROCESSES;LITHIUM NITRATES: T2;MIXTURES;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3;POTASSIUM NITRATES: T3;SOLUBILITY;STRONTIUM NITRATES: T1

<351>

<352> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<352>
Kucera, G.H.; Saboungi, M.L.

Solubility of magnesium oxide in calcium oxide--calcium chloride mixtures ERA-02:005456:EDB-76:097750; Metall. Trans., B (MTTBC) 156:(7B):213-215 (Jun 1976)

SUBJECT DESCRIPTORS: CALCIUM CHLORIDES: T2;CALCIUM OXIDES: T3;MAGNESIUM OXIDES: T1;SOLUBILITY: Q1;SOLVENT PROPERTIES: Q2,Q3;VERY HIGH TEMPERATURE

ABSTRACT: Measurements and theoretical calculations of the solubility product of magnesium oxide in calcium chloride-calcium oxide mixtures at 1133$sup 0$K are reported. A filtration technique in an inert atmosphere was used to obtain samples for analysis by atomic absorption for magnesium content. At low concentrations of O$sup 2-$, the data are in consonance with the very low solubility product of 10$sup -6$.$sup 2$ predicted by a simple thermodynamic cycle first proposed by Flood, Foerland and Grjotheim.

EDB SUBJECT CATEGORY: EDB-360603

<353>
Kugel, R.; Williams, C.; Fred, M.; Malm, J.G.; Carnall, W.T.; Hindman, J.C.; Childs, W.J.; Goodman, L.S.

Isotope effects in the molecular spectrum of plutonium hexafluoride ERA-02:008299;INS-77:000577;EDB-77:009372; J. Chem. Phys. (JCPSA) 65:(9):3486-3492 (1 Nov 1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;EXCITED STATES;INFRARED SPECTRA;ISOTOPE EFFECTS: Q2,Q3;PLUTONIUM 239: T2;PLUTONIUM 242: T3;PLUTONIUM FLUORIDES: T1;VIBRATIONAL STATES

ABSTRACT: The first evidence for an isotope shift in the near infrared region of the spectrum of an actinide molecule, PuF$sub 6$, is reported. By use of samples of $sup 239$PuF$sub 6$ and $sup 242$PuF$sub 6$, isotope shifts were found in the absorption region near 8000 A. Shifts of 0.3 to 1.2 cm$sup -1$ were observed. The data are interpreted as indicating that some of the absorption bands in this region are vibronically induced electronic transitions which result from coupling of one or more quantum changes in the

<353> CONT.
asymmetric $nu$$sub 3$(F$sub 1$/sub u/) and $nu$$sub 4$(F$sub 1$/sub u/) vibrations to electronic states of the nonbonding 5f electrons in the molecule. (AIP)

EDB SUBJECT CATEGORY: EDB-640302;400202
INIS CATEGORY: A12;B12

<354>
Kuliasha, M.A.; Cronenberg, A.W. (New Mexico Univ., Albuquerque (USA))

Theoretical prediction of the thermal conductivity of uranium nitride vapor AIX-08:343064;EDB-78:021944; J. Nucl. Mater. (JNUMA) 67:(3):320-325 (Aug 1977)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS;DISSOCIATION;ENTHALPY;LMFBR TYPE REACTORS;MOLECULE-MOLECULE COLLISIONS;REACTOR CORE DISRUPTION;THERMAL CONDUCTIVITY: Q1;URANIUM NITRIDES: T1;VAPORS

ABSTRACT: A theoretical calculation of the thermal conductivity of uranium nitride vapor has been carried out. The calculational procedure is based on consideration of collisional, polyatomic, dissociation and reaction effects and only effects which do not perturb values by more than a factor of two are considered. Parameters such as the thermal conductivity of vapors are necessary for safety analyses of potential nuclear fuels for LMFBR reactors, such as uranium nitride.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<355>
Kuntz, L.K. (Ames Lab., IA); Bautista, R.G.

Heat capacities and heat content of molten cerium by levitation calorimetry INS-76:022924;EDB-76:097491; Metall. Trans., B (MTTBC) 7B:(1):107-113 (Mar 1976)

SUBJECT DESCRIPTORS: CALORIMETRY;CERIUM: T1;CORRELATIONS;ENTHALPY: Q1;LEVITATION;LIQUID METALS;SPECIFIC HEAT: Q1;VERY HIGH TEMPERATURE

ABSTRACT: A 15 kVa, 450 kHz radio frequency generator was used to levitate and melt cerium samples ranging in size from 0.4 to 1.7 g. The molten cerium samples were then dropped into a copper block calorimeter contained in isothermal surroundings. The cerium data between 1400 and 1700$sup 0$K

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<355> CONT.
indicated a nonlinear heat content function as described by the equation: H/sub T/ -- H$sub 2$$sub 9$$sub 8$.$sub 15$ = --0.01255 T$sup 2$ + 75.305 T -- 32,995.401 J/mol. The correlation coefficient for the curve fitting process was 0.81. The data between 1700 and 2500$sup 0$K indicated a linear heat content function as described by the equation: H/sub T/ - H$sub 2$$sub 9$$sub 8$.$sub 15$ = [31.616 +- 0.596](T - 1077) + [38,917.267 +- 575.049] J/mol. The average percent deviation between this and the experimental values was 0.67. Experimental heat contents were corrected for convection and radiation heat losses during the fall of the sample from the levitation chamber into the calorimeter. The maximum estimated error for the levitation calorimetry work was +-2.5 percent.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<356>
Kutsenko, S.A.; Amirova, S.A.; Chizhov, N.N. (Permskij Politekhnicheskij Inst. (USSR))

Influence of intermediate products on chlorination kinetics of vanadium oxides in salt melt AIX-07:274857;EDB-77:019304; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (3):75-78 (1975)

SUBJECT DESCRIPTORS: CHEMICAL REACTION KINETICS;CHEMICAL REACTION YIELD;CHLORINATION: Q1;MASS TRANSFER;MOLTEN SALTS;OXYCHLORIDES;VANADIUM OXIDES: T1

ABSTRACT: This study deals with the kinetics of chlorination of vanadium oxides in a melt of salts KCl, NaCl, KCl-NaCl. The rate-determining step of the process is the mass transfer of the intermediate product formed as a result of interaction of chlorine with the oxide (K$sub 2$VOCl$sub 4$). Adding a carbonic reducer to the melt is conducive to a sharp increase in the rate of chlorination of the oxide stock. In this case, the rate-determining step of the process is the mass transfer of oxygen from the oxide to the carbon, which is aided by oxochlorides. The diffusion nature of the process is particularly manifested in the case of chlorination in an equimolar mixture of KCl and NaCl. In this case, the yield of VOCl$sub 3$ is much higher than that of pure salts, which can be acccunted for by the improved hydrodynamic characteristics

<357> CONT.
of the melt, owing to the fact that the KCl-NaCl mixture is less viscous as compared to pure salts.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<357>
Kuz'min, N.M.; Pelipas, V.P.; Tikhonova, A.I.; Khromov, A.D.

Investigation of some rare earth aluminates by the method of infrared spectroscopy AIX-08:283314;EDB-77:044046; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 12:(8):1424-1426 (Aug 1976)

SUBJECT DESCRIPTORS: ALUMINATES;COMPARATIVE EVALUATIONS;CRYSTAL STRUCTURE;FILMS;INFRARED SPECTRA: Q1,Q2;NEODYMIUM COMPOUNDS: T1;RARE EARTH COMPOUNDS: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603;400201
INIS CATEGORY: B22

<358>
Kyrs, M.; Malek, Z.; Vesely, V.

In Twenty years of research in the processing of radioactive fuel and neutralization of radioactive waste at the Nuclear Research Institute (NRI) ** ERA-02:024089;EDB-77:047078; Jad. Energ. (JADEA) 21:(5):181-183 (1975) RFP-Trans--217

SUBJECT DESCRIPTORS: CZECHOSLOVAKIA;FLUORIDE VOLATILITY PROCESS;ION EXCHANGE;RADIOACTIVE WASTE PROCESSING: T;REPROCESSING: Q1;SPENT FUELS: T1

ABSTRACT: A complete review of the activities of workers in the field of radiochemistry over the past twenty years is given. It is subdivided into problems of the aqueous methods, fluoride method, and problems encountered in processing radioactive waste.

EDB SUBJECT CATEGORY: EDB-052001;050800

<359>

<359>

Lamparter, P.; Knoll, W.; Steeb, S., Max-Planck-Institut fuer Metallforschung, Stuttgart (Germany, F.R.). Inst. fuer Werkstoffwissenschaften

In Structure of molten Bi--Sb alloys by means of neutron diffraction ** AIX-07:276420;EDB-77:061862; (1976) AED-Conf--76-087-009

SUBJECT DESCRIPTORS: ANTIMONY ALLOYS: M1;BISMUTH ALLOYS: M2;CHEMICAL COMPOSITION;COMPARATIVE EVALUATIONS;CRYSTAL STRUCTURE;DIAGRAMS;INTERMETALLIC COMPOUNDS;LIQUID METALS;MICROSTRUCTURE: Q1,Q2;NEUTRON DIFFRACTION;PHASE STUDIES;QUANTITY RATIO;SPECTRA;STRUCTURAL CHEMICAL ANALYSIS

ABSTRACT: The structural investigations with melts can be subdivided into two groups: The first group contains molten metals and molten alloys, and one can state that the structure of molten metals and of molten alloys nowadays is rather well understood. Interference functions of molten metals may be described by a hard sphere model. This is valid also for molten alloys with statistical distribution. For the second group, namely molten non-metals and molecular melts, the interference functions as well as the pair correlation functions are very offen rather complicated and not well understood. The present study is concerned with the transition region between these two groups. It is shown that the melts of the Bi-Sb system exhibit a change from metallic to non-metallic structure. Regarding the experimental details: the experiments were done with the two-axes spectrometer D 4 at the high-flux reactor at Grenoble. The containers consisted of cylindrical quartz tubes with a wall thickness of 0.1 cm. The furnace consisted of a direct-heated vanadium tube. The wavelength of the neutrons was 0.695 A. The final result is that the structure in molten Bi-Sb-alloys consists of primitive tetrahedra with coordination number 3. There are less tetrahedra in molten Bi than in molten Sb. Also with rising temperature the number of tetrahedra decreases. It is shown how to compose the coordination numbers of two structures to get the observed coordination number. The observed values are always the mean values of the two structures.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<360>
Landresse, G.; Martinot, L.; Lysy, R.; Duyckaerts, G. (Liege Univ. (Belgium)) ** Mueller, W.; Lindner, R. (eds.)

Redox and chemical properties of U, Np and Pu in molten alkali chlorides In Transplutonium 1975 **
AIX-07:270268;ERA-02:020660;EDB-77:037517; (1976)
North-Holland

SUBJECT DESCRIPTORS: CHEMICAL PROPERTIES: Q1,Q2,Q3;CHEMICAL REACTION KINETICS;HIGH TEMPERATURE;MOLTEN SALTS;NEPTUNIUM: T1;NEPTUNIUM CHLORIDES: T5;OXIDATION;PLUTONIUM: T2;PLUTONIUM CHLORIDES: T4;REDOX REACTIONS: Q4,Q5,Q6;REDUCTION;SPECTROPHOTOMETRY;URANIUM: T3;URANIUM CHLORIDES: T6

ABSTRACT: Besides their fundamental interest, the chemical properties of uranium and the transuranium elements in molten alkali chlorides are of importance for the development of nuclear reactor technology. Their behaviour in redox reactions are best predicted by the potential versus pO$sup 2--$ (- log /C$sup --$/) diagrams. In order to work out these diagrams, the standard potential of the various half-cell reactions corresponding to the different oxidation stages, were measured. Two methods have been used: (a) e.m.f. measurements were carried out in various alkali halides melts and at different temperatures and (b) spectrophotometric methods.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<361>
Laptev, D.M.; Kulagin, N.M.; Astakhova, I.S. (Sibirskii Metallurgicheskii Inst., Novokuznetsk (USSR))

Melting point of europium dichloride
AIX-07:265077;EDB-77:013485; Zh. Neorg. Khim. (ZNOKA) 20:(7):1987-1989 (Jul 1975)

SUBJECT DESCRIPTORS: ALLOTROPY;DIFFERENTIAL THERMAL ANALYSIS;EUROPIUM CHLORIDES: M1;MELTING POINTS: Q1;PHASE TRANSFORMATIONS;TRANSITION TEMPERATURE

ABSTRACT: Europium dichloride produced by hydrogen reduction of waterless EuCl$sub 3$ when exposed to 580-590$sup 0$C during 7-8h was studied by DTA method. Polymorphous transformation

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<362> CONT.
was discovered with temperature equal to 747+-5$sup 0$C. Melting temperature of EuCl$sub 2$ is 254+-2$sup 0$C.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<362>
Larin, A.A.; Vlasov, V.G.

Effect of oxygen content on the structural characteristics of uranium oxycarbides EDB-77:018938; Sov. Powder Metall. Met. Ceram. (Engl. Transl.) (SPMCA) 13:(9):761-763 (Sep 1974)

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE: Q1,Q2;PHASE STUDIES;URANIUM CARBIDES: T2;URANIUM OXIDES: T1

ABSTRACT: A study was made of the effect of oxygen content upon the structural characteristics of uranium oxycarbides. It is shown that uranium oxycarbides are deficient phases with an ordered disposition of vacancies. The fact that, with rise in the oxygen content of the oxycarbide, the number of vacant sites in both the sublattices increases and the crystal lattice parameter decreases is explained in terms of the occurrence of Me-Me and Me-X reactions. 14 refs.

EDB SUBJECT CATEGORY: EDB-360202;400702

<363>
Lau, K.F., California Inst. of Tech., Pasadena (USA)

In Pulse NMR in solids: chemical shift, lead fluoride, and thorium hydride ** INS-77:008225;EDB-77:069327; (1976) California Inst. of Tech.

SUBJECT DESCRIPTORS: ANISOTROPY;CALCIUM FLUORIDES: T1;CHEMICAL SHIFT: Q1;CRYSTAL STRUCTURE: Q4;DOPED MATERIALS;FLUORINE 19: T2;LEAD FLUORIDES: T3;MONOCRYSTALS;NUCLEAR MAGNETIC RESONANCE: Q2;PHASE TRANSFORMATIONS;PULSE TECHNIQUES;SODIUM FLUORIDES;SPECTRAL SHIFT;SPIN-LATTICE RELAXATION: Q3;TEMPERATURE DEPENDENCE;THORIUM HYDRIDES: T4;VERY HIGH PRESSURE

ABSTRACT: The fluorine chemical shift of a single crystal CaF$sub 2$ was measured up to 4 kilobar at room temperature using multiple pulse NMR. The pressure dependence of the shift is found to be --1.7 +- 1 ppM/kbar, while an overlap model predicts a shift of --0.46 ppM/kbar.The chemical shift tensor is separated into ''geometrical'' and ''chemical'' contributions, and comparison of the proposed model calculations with recent data on hydroxyl proton chemical

<363> CONT.
shift tensors shows that the geometrical portion accounts for the qualitative features of the measured tensors. A study of fluoride ion motion in $beta$-PbF2 doped with NaF was conducted by measurement of the $sup 19$F transverse relaxation time (T$sub 2$), spin lattice relaxation time (T$sub 1$) and the spin lattice relaxation time in the rotating frame (T/sub 1r). Two samples of Th$sub 4$H$sub 15$, prepared under different conditions but both having the proper ratio of H/Th (to within 1 percent), were studied. The structure of the Th$sub 4$H$sub 15$ suggested by x-ray measurements is confirmed through a moment analysis of the rigid lattice line shape.

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B13;B12

<364>
Lazarev, V.M.; Proshina, O.P.; Suponitskii, Yu.L.; Mayer, A.I.; Karapet'yants, M.Kh. (Moskovskij Khimiko-Tekhnologicheskij Inst. (USSR))

High-temperature calorimeter for determination of reaction enthalpy AIX-08:289600;EDB-77:044970; Zh. Fiz. Khim. (ZFKHA) 50:(8):2160-2161 (Aug 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-440300;400201
INIS CATEGORY: B22

<365>
Le Roy, J.; Moreau, J.M.; Paccard, D.; Parthe, E. (Geneva Univ. (Switzerland). Lab. Crystallographie aux Rayons X)

R$sub 3$T$sub 2$ compounds (R = rare earth or Y; T = Rh, Pd, Pt) with the rhombohedral Er$sub 3$Ni$sub 2$ structure type AIX-08:342994;EDB-78:021626; Acta Crystallogr., Sect. B (ACBCA) 33:(8):2414-2417 (15 Aug 1977)

ABSTRACT: Sm$sub 3$Rh$sub 2$ crystallizes with the Er$sub 3$Ni$sub 2$ structure type. Space group R3$sup -$, a=8.701 (2), c=16.526 (7) A,Z=9, Dsub(x)=9.06 g cm$sup -3$; mu(Mo K$alpha$)=430 cm$sup -1$. Direct methods, absorption correction, least-squares refinement. R=0.11 for 451 independent reflexions. Ce$sub 3$Rh$sub 2$, Pr$sub 3$Rh$sub 2$, Nd$sub 3$Rh$sub 2$, La$sub 3$Pt$sub 2$, Ce$sub 3$Pt$sub 2$, Pr$sub 3$Pt$sub 2$, Nd$sub 3$Pt$sub 2$ and Y$sub 3$Pd$sub 2$ are isostructural with Sm$sub 3$Rh$sub 2$. The Er$sub 3$Ni$sub 2$ structure type is compared with the U$sub 3$Si$sub 2$ structure type which has been found with

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<365> CONT.
rare-earth-palladium compounds. Both structures are characterized by transition-metal-centered trigonal double prisms and rare-earth-centred cubes.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<366>
Lee, H.J.; Kim, C.W.

Thermophysical properties of UO$sub 2$ fuel materials
ERA-02:028909;EDB-77:060199; J. Korean Nucl. Soc. (KNSJA) 8:(2):81-88 (Jun 1976)

SUBJECT DESCRIPTORS: DOPED MATERIALS;FLASH HEATING;GADOLINIUM OXIDES;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;THERMAL CONDUCTIVITY;THERMAL DIFFUSIVITY;THERMODYNAMIC PROPERTIES: Q1;URANIUM DIOXIDE: M1

ABSTRACT: A flash method for measuring the unknown thermal property (density, specific heat, or thermal diffusivity could be chosen as unknown) is described. The thermal diffusivity of UO$sub 2$ fuel samples is obtained from room temperature (300 K) to high temperature (1400 K). The specific heat is measured using a commercially available differential scanning calorimeter from room temperature to 500 K. The thermal conductivity of UO$sub 2$ fuel samples is calculated from the density, thermal diffusivity, and specific heat at constant pressure. Results are in complete agreement with the usual trends for the thermal conductivity of dielectric materials, in which impurity levels are very important at low temperatures but become relatively unimportant at high temperatures. In addition, the thermal diffusivity values at room temperature are reexamined by measuring the thermal diffusivity of several UO$sub 2$ fuel samples with the same level of dopant Gd$sub 2$O$sub 3$.

EDB SUBJECT CATEGORY: EDB-050700;360204

<367>
Leibowitz, L.; Blomquist, R.; Fink, J.K., Argonne National Lab., Ill. (USA)

In Chemical Engineering Division, reactor safety and physical property studies annual report, July 1974--June 1975 **
ERA-01:019331;EDB-76:059345; (1975) ANL--75-45

SUBJECT DESCRIPTORS: AFTER-HEAT REMOVAL: Q2;CHEMICAL REACTION KINETICS: Q9;CORE CATCHERS;ENTHALPY;ENTROPY;LMFBR TYPE REACTORS: T1;MATHEMATICAL MODELS;PHYSICAL PROPERTIES:

<367> CONT.
Q3,Q4,Q5,Q6,Q7,Q8;PLUTONIUM CARBIDES: T4;PLUTONIUM DIOXIDE: T6;REACTOR CORE DISRUPTION: M2,Q1;REACTOR MATERIALS: M10,Q1;REACTOR SAFETY;RESEARCH PROGRAMS: Q10;SODIUM: T9;SPECIFIC HEAT;STAINLESS STEEL-304: T7;STAINLESS STEEL-316: T8;THERMAL CONDUCTIVITY;URANIUM CARBIDES: T3;URANIUM DIOXIDE: T5;VAPOR PRESSURE;VISCOSITY

ABSTRACT: Included are the following: a progress report on preparations to measure the enthalpies of (U, Pu)C and of sodium by drop calorimetry; progress on measurements of the speed of sound in sodium at high temperature; study of the vapor pressures of uranium and plutonium oxides by matrix isolation spectroscopy; evaluations and extrapolations of thermophysical property data for uranium carbide and steel; a discussion of studies aimed at measuring the thermal diffusivity of molten UO$sub 2$; an investigation of the interactions with sodium of various condidate sacrificial barrier materials; and an analysis of some phases of post-accident heat removal following a hypothetical core-disruptive accident.

EDB SUBJECT CATEGORY: EDB-220900;210500;360104;360204

<368>
Lemmer, R.H. (Rand Afrikaans Univ., Johannesburg (South Africa)); Viljoen, J.duP; (Atomic Energy Board, Pelindaba, Pretoria (South Africa))

Spin structure and elastic properties of uraniummononitride In Eleventh annual seminar on theoretical physics, Johannesburg, 5-9 July 1976 ** AIX-08:329695;NTS-78:000928;EDB-78:016954; (1976) INIS-mf--3670

SUBJECT DESCRIPTORS: ANTIFERROMAGNETISM;ELASTICITY: Q1;HEISENBERG MODEL;MAGNETIC PROPERTIES: Q1;RUDERMAN-KITTEL COUPLING;SPIN;SPIN WAVES;URANIUM NITRIDES: T1

ABSTRACT: The magnetic properties of uraniummononitride (UN) and the effect the magnetic properties have on the elasticity of the crystals are discussed in this lecture. The theoretical calculations of the longitudinal velocity of sound in the (001)-direction are compared with the experimental results.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: A34

<369>

<369>
Lengyel, T. (Magyar Tudomanyos Akademia Izotop Intezete, Budapest)

Investigations on the solvent extraction from molten salts by tracer technique AIX-07:277828;EDB-77:026390; J. Radioanal. Chem. (JRACB) 30:(2):433-440 (1976)

SUBJECT DESCRIPTORS: DISTRIBUTION FUNCTIONS;DMSO;EUTECTICS;GALLIUM;MOLTEN SALTS;QUANTITY RATIO;SOLVENT EXTRACTION: Q1;TBP;TERBIUM: T1;TERBIUM 160;TRACER TECHNIQUES;TTA

ABSTRACT: The distribution of terbium in a three-phase system of an organic extractant, a fused salt and metallic gallium, as well as in the corresponding two-phase subsystems has been studied. Changing the concentrations in the organic and ionic phases the distribution ratios can favorably be veried and so the selectivity of extraction improved. The lithium nitrate-ammonium nitrate eutectic (melting at 366$sup 0$K) was used as the ionic phase and gallium, the only multivalent metal besides mercury forming a liquid at moderate temperature represented the metallic one. Tri-n-butyl phosphate, thenoyl-trifluoroacetone and dimethyl sulfoxide at various concentrations diluted with decalin were used as solvent extractants while terbium was chosen as the representative of the lanthanide group, in the form of $sup 160$Tb tracer of high specific activity, enabling to keep solute concentrations as low as 10$sup -6$M. The equilibrium measurements were performed at 383 K by shaking sealed glass ampoules containing the three immiscible phases and the solute in a thermostat for one hour. The distribution ratios were calculated by determining the concentration of the solute in aliquots of the samples radiometrically.

EDB SUBJECT CATEGORY: EDB-400105
INIS CATEGORY: B12

<370>
Lengyel, T. (Magyar Tudomanyos Akademia Izotop Intezete, Budapest)

Studies on some binary solvent systems for the extraction of gadolinium AIX-08:346248;EDB-78:027829; Radiochem. Radioanal. Lett. (RRALA) 28:(5):453-458 (1977)

SUBJECT DESCRIPTORS: BINARY MIXTURES;DISTRIBUTION FUNCTIONS;EUTECTICS;GADOLINIUM: T1;MOLTEN SALTS;SOLVENT EXTRACTION: Q1;SYNERGISM

ABSTRACT: In addition to previous work regarding the extraction of terbium from a molten eutectic several binary solvent

<370> CONT.
systems have been studied with respect to the efficiency of extraction of gadolinium. Though terbium and gadolinium as neighbouring rare earths behave rather similarly, due to synergistic effects some differences can be found allowing a selective separation of the lanthanons.

EDB SUBJECT CATEGORY: EDB-400105
INIS CATEGORY: B13

<371>
Lengyel, T. (Magyar Tudomanyos Akademia Izotop Intezete, Budapest) ** Magyar Tudomanyos Akademia Izotop Intezete, Budapest

Investigations of the solvent extraction from molten salts with the use of tracer technique In 8th radiochemical conference ** AIX-08:282946;EDB-77:056060; (1975) INIS-mf--3228

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;EUTECTICS;MOLTEN SALTS: T2;ORGANIC SOLVENTS;QUANTITY RATIO;SOLVATION;SOLVENT EXTRACTION: Q1;SOLVENT PROPERTIES: Q2;SYNERGISM;TERBIUM: T1;TERBIUM 160;TERBIUM COMPLEXES;TRACER TECHNIQUES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400105
INIS CATEGORY: B12

<372>
Levin, Y.B.; Filippov, S.I. (Moskovskij Inst. Stali i Splavov (USSR))

Effect of basicity on ferrous oxide activity in complex oxide systems AIX-08:320662;EDB-77:113748; Izv. Vyssh. Uchebn. Zaved., Chern. Metall. (IVUMA) (7):5-11 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES: T5;CALCIUM OXIDES: M1;ELECTROMOTIVE FORCE;ENTHALPY;ENTROPY;IRON OXIDES: M2;MELTING;MOLTEN SALTS;REACTION KINETICS: Q1,Q2,Q3,Q4,Q5,Q6;SILICON OXIDES: M3;TEMPERATURE DEPENDENCE;THERMODYNAMICS;TITANIUM OXIDES: T6;VANADIUM OXIDES: M4

ABSTRACT: An empirical study was made of the thermodynamic properties of melts in relation to the CaO/SiO$sub 2$ ratio in the following systems: FeO-CaO-SiO$sub 2$, FeO-CaO-SiO$sub 2$-Al$sub 2$O$sub 3$, FeO-CaO-SiO$sub 2$-TiO$sub 2$, FeO-CaO-SiO$sub 2$-V$sub 2$O$sub 5$. The activity of FeO in the solution of the oxides was determined by the electrochemical method in concentrated circuits with solid

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<372> CONT.
electrolyte ZrO$sub 2$(+Y$sub 2$O$sub 3$). From the obtained data calculations were made of the following: the relative partial molar and excessive partial molar isobar-isothermal potentials, enthalpy and entropy of mixing of FeO with the melt of the oxides. A comparison of sup($alpha$)FeO in oxide systems was made at constant CaO/SiO$sub 2$ ratio.

EDB SUBJECT CATEGORY: EDB-360204;400201
INIS CATEGORY: B12

<373>
Levinskii, Yu.V.

P--t diagram of the system uranium--nitrogen EDB-77:088914; Sov. At. Energy (Engl. Transl.) (SATEA) 37:(3):929-932 (Sep 1974)

SUBJECT DESCRIPTORS: NITROGEN;PHASE DIAGRAMS: Q1;URANIUM;URANIUM NITRIDES: T1

ABSTRACT: A more complete and detailed version of the p--T phase diagram for the uranium-nitrogen system is proposed.

EDB SUBJECT CATEGORY: EDB-360104;400702

<374>
Li, K.C., Iowa Univ., Iowa City (USA). Dept. of Chemistry

In Lines in the spectrum of $sup 7$LiH (4728--5298 A) ** INS-77:007315;ERA-02:030368;EDB-77:062485; (1976) COO--2326-19

SUBJECT DESCRIPTORS: CRYSTALS;EMISSION SPECTRA: Q1;EXCITED STATES;ISOTOPE ENRICHED MATERIALS;LITHIUM;LITHIUM HYDRIDES: T1;WAVELENGTHS

ABSTRACT: The emission spectra of the A$sup 1$$Sigma$$sup +$--X$sup 1$$Sigma$$sup +$ bands of $sup 7$LiH were photographed in the 4728A - 5298 A region with a 3.4 meter Ebert Spectrograph of theoretical resolution of about 0.07 cm$sup -1$. High purity $sup 7$LiH crystals were obtained from Oak Ridge National Laboratory. The atomic percent of $sup 7$Li in $sup 7$LiH and $sup 7$LiD was 99.93 percent. The discharge source was a demountable stainless steel hollow cathode lamp. The lithium hydride crystals were packed into the cathode. Pressure in the discharge tube was about 10 to 20 torr of H$sub 2$. The discharge was run at about 600 volts and 1.25 to 1.75 amperes. Acceptable spectra were obtained with exposure time of 6 hours. A Westinghouse iron hollow cathode was used to produce the iron spectrum for calibration. The plates were measured on the Gaertner

<374> CONT.
photoplate comparator with an encoder system and on-line computer service at Argonne National Laboratory. The measured lines in the spectra of $sup 7$LiH are given in this repot $sup 9$COO-2326-19). Similar spectra for $sup 6$LiH and $sup 6$LiD are given in companion reports (COO-2326-17) and (COO-2326-18), respectively. The relative intensities of the lines are applicable only to short regions and do not extend over the whole spectrum.

EDB SUBJECT CATEGORY: EDB-400201;640302;400104
INIS CATEGORY: B12;A12;B11

<375>
Liang, W.W.; Elliott, F.

Standard free energy of formation of liquid Na$sub 2$CrO$sub 4$, 1100$sup 0$ to 1220$sup 0$K ERA-01:020230;EDB-76:054371; J. Electrochem. Soc. (JESOA) 123:(5):617-620 (May 1976)

SUBJECT DESCRIPTORS: CHROMATES: T2;FORMATION FREE ENERGY: Q1,Q2;MOLTEN SALTS;SODIUM COMPOUNDS: T1;VERY HIGH TEMPERATURE

ABSTRACT: The standard free energy of sodium chromate was determined employing a reversible cell. Results give 2Na(l) + 5/4 O$sub 2$(g) + 1/2 Cr$sub 2$O$sub 4$(s) = Na$sub 2$CrO$sub 4$(l); $delta$G$sup 0$ = -648,900 + 106.94T (J/mole) and 2Na(l) + 2 O$sub 2$(g) + Cr(s) = Na$sub 2$CrO$sub 4$(l); $delta$G$sup 0$ = -1,209,900 + 233.1T (J/mole). These results are valid in the vicinity of 900$sup 0$C. (auth)

EDB SUBJECT CATEGORY: EDB-400201;360603

<376>
Lindgard, P.

Theory of rare-earth alloys INS-77:017972;EDB-77:146249; Phys. Rev., B (PLRBA) 16:(5):2168-2176 (1 Sep 1977)

SUBJECT DESCRIPTORS: CRITICAL TEMPERATURE;EXCHANGE INTERACTIONS;FIELD THEORIES;PHASE DIAGRAMS: Q1;RARE EARTH ALLOYS: T1;SCALING LAWS

ABSTRACT: A mean-field random alloy theory combined with a simple calculation of the exchange interaction J (c,Q) is shown to quantitatively account for the phase diagrams for alloys of rare-earth metals with Y, Lu, Sc, and other rare-earth metals. A concentration-dependent J (c,Q) explains the empirical 2/3 law and reconstitutes the idea of de Gennes scaling. The phase diagrams exhibit examples of both bicritical and tetracritical points. No significant

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<376> CONT.
deviations from the mean-field calculation can be detected with the present experimental accuracy. A linear interpolation of J (Q) for Gd and Er is found to account for all alloys except the Sc based. The exceptional behavior of the Sc alloys is due to a low density of states for Sc. A brief discussion is given of the effect on the mean-field results of changes in volume or c/a ratio and of critical fluctuations. Since the physical mechanisms of these ideal alloys are well documented they may serve as good candidates for studies of statistical effects such as multicritical phenomena or spin-glass phenomena.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<377>
Litvinov, Yu.G.; Il'yasov, I.I.; Savva, V.I. (Zaochnyj Inst. Sovetskoj Torgovli, Rostov-na-Donu (USSR))

Phase diagram of the ternary system of lithium-, rubidium-, and cesium nitrates AIX-08:292394;EDB-77:069048; Zh. Neorg. Khim. (ZNOKA) 20:(9):2560-2562 (Sep 1975)

SUBJECT DESCRIPTORS: CESIUM NITRATES: T1;EUTECTICS;LITHIUM NITRATES: T2;PHASE DIAGRAMS: Q1,Q2,Q3;RUBIDIUM NITRATES: T3

ABSTRACT: Two congruently melting compounds: LiNO$sub 3$-RbNO$sub 3$, LiNO$sub 3$-CsNO$sub 3$ located at the two edges LiNO$sub 3$-RbNO$sub 3$ and LiNO$sub 3$-CsNO$sub 3$ define the character of the system. The solid solutions (Rb,Cs)NO$sub 3$ with minimum 295 deg C inside the system decompose at near 260 deg C. Two triangular sections separate the system into three phase triangles producing two eutectic and one transition points.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<378>
Loechner, U.; Baernighausen, H.; Corbett, J.D.

Rare earth metal--metal halide systems. 19. Structural characterization of the reduced holmium chloride Ho$sub 5$Cl$sub 11$ ERA-03:010736;EDB-78:017287; Inorg. Chem. (INOCA) 16:(8):2134-2135 (Aug 1977)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CRYSTAL STRUCTURE: Q1;HOLMIUM CHLORIDES: T1;X-RAY DIFFRACTION

ABSTRACT: The reduced holmium chloride Ho$sub 5$Cl$sub 11$, with

<378> CONT.
the correct composition HoCl$sub 2$.$sub 20$, is isomorphous with the monoclinic Dy$sub 5$Cl$sub 11$. The space group is P2$sub 1$/m. The crystal structure can be considered as a one-dimensional superstructure of the fluorite type built from five basic fluorite units with four additional anions per unit cell. The reason for the relatively large difference between the x-ray stoichiometry 2.20 and the analytical stoichiometry 2.14 found previously is tentatively attributed to contamination by monochloride. (JSR)

EDB SUBJECT CATEGORY: EDB-400201

<379>
Lovell, G.H.B.; van Tets, A. (Atomic Energy Board, Pelindaba, Pretoria (South Africa))

Solution studies in the US-UC$sub 2$ system
AIX-08:310011;EDB-77:094376; J. Nucl. Mater. (JNUMA) 64:(1):. 44-48 (Jan 1977)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CRYSTALLOGRAPHY;CUBIC LATTICES;LATTICE PARAMETERS;NEUTRON DIFFRACTION;SOLID SOLUTIONS;SOLUBILITY: Q1,Q2;TETRAGONAL LATTICES;URANIUM CARBIDES: T1;URANIUM SULFIDES: T2;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: The mutual solubility of US and UC$sub 2$ was studied just below 1500$sup 0$C to avoid a change of composition by CS$sub 2$ development. After cooling, the products were analysed by X-ray and neutron diffraction. Their essentially unchanged compositions were checked chemically. UC$sub 2$ was found to be soluble to a large extent in US. To a lesser extent, US is also soluble in the tetragonal UC$sub 2$ phase. A miscibility gap occurs which covers at least the 20 to 50 mol% US range.

EDB SUBJECT CATEGORY: EDB-360201
INIS CATEGORY: B24

<380>
Lufkin, D.A.; Paez, O.A.; Remanick, A.H.; Shaw, M., Whittaker Corp., San Diego, Calif. (USA). Narmco Research and Development Div.

In Electrochemical characterization of nonaqueous systems for secondary battery application. Quarterly report, February--April 1968 ** EDB-77:061394; (17 May 1968) N--68-28554

SUBJECT DESCRIPTORS: CALCIUM;CHEMICAL

<380>

<380> CONT.
REACTIONS;CHLORIDES;ELECTRIC BATTERIES:
T1;ELECTROCHEMISTRY;ELECTRODES: Q1;ELECTROLYTES:
Q1;FLUORIDES;LITHIUM;MAGNESIUM;PERCHLORATES;SOLUBILITY;TESTIN
;WIRES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250903

<381>
Lyall, A.E.; Seiger, H.N.; Orshich, J.; Michaels, R.G., Gulton Industries, Inc., Metuchen, N.J. (USA)

In Lithium--nickel fluoride secondary battery investigation. Quarterly technical progress report No. 1, 27 Apr--27 Jul 1966 ** EDB-76:047839; (Aug 1966) AD--487828

SUBJECT DESCRIPTORS: CARBON BLACK;CARBONIC ACID ESTERS;CATHODES:
Q1;DENSITY;DMSO;ELECTRIC CONDUCTIVITY;ELECTROLYTES:
Q1;FABRICATION;GRAPHITE;LITHIUM;METAL-NONMETAL BATTERIES:
T1;NICKEL FLUORIDES;PERFORMANCE;PHOSPHORUS
FLUORIDES;POTASSIUM FLUORIDES;SODIUM
PHOSPHATES;STARCH;VISCOSITY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250903

<382>
Lynch, D.W.; Olson, C.G. ** Koch, E.E. (ed.)

Rare earth 4d spectra in rare earth trifluorides In Vacuum ultraviolet radiation physics ** ERA-01:024881;EDB-76:067922; (1974) Friedr. Vieweg and Sohn Verlagsgesellschaft mbH

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA:
Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12;CERIUM FLUORIDES:
T2;DYSPROSIUM FLUORIDES: T8;ERBIUM FLUORIDES: T10;FAR
ULTRAVIOLET RADIATION;GADOLINIUM FLUORIDES: T6;HOLMIUM
FLUORIDES: T9;LANTHANUM FLUORIDES: T1;NEODYMIUM FLUORIDES:
T4;PRASEODYMIUM FLUORIDES: T3;SAMARIUM FLUORIDES: T5;TERBIUM
FLUORIDES: T7;THULIUM FLUORIDES: T11;YTTERBIUM FLUORIDES: T12

ABSTRACT: Absorption spectra were measured for LaF$sub 3$, 11 rare earth trifluorides, and SmF$sub 2$ in the 80 to 260 eV range. The data for some of the compounds are shown. A

<382> CONT.
detailed comparison of the spectra with those of the metals will be published elsewhere; the agreement and differences in the data are given in this work. 7 figures. (GHT)

EDB SUBJECT CATEGORY: EDB-640302

<383>
Lyon, W.G.; Osborne, D.W.; Flotow, H.E.; Hoekstra, H.R. (Argonne National Lab., Ill. (USA))

Sodium uranium(V) trioxide, NaUO$sub 3$: heat capacity and thermodynamic properties from 5 to 350 K
AIX-08:305658;EDB-77:107494; J. Chem. Thermodyn. (JCTDA) 9:(3):201-210 (Mar 1977)

SUBJECT DESCRIPTORS: CALORIMETRY;ENTHALPY: Q1,Q2;ENTROPY: Q1,Q2;FREE ENTHALPY: Q1,Q2;LOW TEMPERATURE;MEDIUM TEMPERATURE;SODIUM OXIDES: T1;SPECIFIC HEAT: Q1,Q2;ULTRALOW TEMPERATURE;URANIUM OXIDES: T2;VERY LOW TEMPERATURE

ABSTRACT: The heat capacity of a sample of NaUO$sub 3$ was determined in the temperature range 5 to 350 K by aneroid adiabatic calorimetry. The heat capacity at constant pressure Csub(p)sup(o)(298.15 K), the entropy Ssup(o)(298.15 K), the enthalpy (H$sup 0$(298.15 K) - H$sup 0$(0)) and the function -(G$sup 0$(298.15 K) - H$sup 0$(0))/298.15 K were found to be (108.87 +- 0.11)J K$sup -1$ mol$sup -1$, (132.84 +- 0.13) J K$sup -1$ mol$sup -1$, (20176 +- 20) J mol$sup -1$, and (65.17 +- 0.06) J K$sup -1$ mol$sup -1$, respectively. A non-isothermal peak in the heat capacity, probably correlated with magnetic ordering, was noted at (31 +- 1) k.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<384>
Lyon, W.G.; Osborne, D.W.; Flotow, H.E.; Hoekstra, H.R.

Sodium uranium(V) trioxide, NaUO$sub 3$: heat capacity and thermodynamic properties from 5 to 350 K
ERA-03:004500;EDB-77:146513; J. Chem. Thermodyn. (JCTDA) 9::201-210 (1977)

SUBJECT DESCRIPTORS: LOW TEMPERATURE;MEDIUM TEMPERATURE;SODIUM OXIDES: T1;SPECIFIC HEAT;THERMODYNAMIC PROPERTIES: Q1,Q2;ULTRALOW TEMPERATURE;URANIUM OXIDES: T2

ABSTRACT: The heat capacity of a sample of NaUO$sub 3$ was determined in the temperature range 5 to 350 K by aneroid adiabatic calorimetry. The heat capacity at constant pressure

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<384> CONT.
C$sup 0$/sub p/(298.15 K), the entropy S$sup 0$(298.15 K), the enthalpy [H$sup 0$(298.15 K) - H$sup 0$(0)] and the function - [G$sup 0$(298.15 K) - H$sup 0$(0)]/298.15 K were found to be (108.87 +- 0.11) J K$sup -1$ mol$sup -1$, (132.84 +- 0.13) J K$sup -1$ mol$sup -1$, (20176 +- 20) J mol$sup -1$, and (65.17 +- 0.06) J K$sup -1$ mol$sup -1$, respectively. A non-isothermal peak in the heat capacity, probably correlated with magnetic ordering, was noted at (31 +- 1) K.

EDB SUBJECT CATEGORY: EDB-360603

<385>
Lysy, R.; Duyckaerts, G. (Liege Univ. (Belgium))

Quantitative study of the chemical equilibria in solution in molten LiCl-KCl (70-30 mol.%) by absorption spectrophotometry. Application to neptunium
AIX-07:239659;EDB-77:013693; Inorg. Nucl. Chem. Lett. (INUCA) 12:(2):205-215 (1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;CHEMICAL REACTION KINETICS: Q1;CHEMICAL REACTIONS;EQUILIBRIUM;HIGH TEMPERATURE;LITHIUM CHLORIDES;MOLTEN SALTS;NEPTUNIUM: T1;NEPTUNIUM OXIDES;POTASSIUM CHLORIDES;RADICALS;SOLUTIONS;SPECTROPHOTOMETRY

ABSTRACT: A quantitative study has been made, in a LiCl-KCl (70 to 30 mol. %) melt, of the following reactions: NpO$sub 2$$sup +$ + 4HCl reversible Np$sup 4+$ + 2H$sub 2$O +1/2Cl$sub 2$ + 3Cl$sup -$; and NpO$sub 2$$sup ++$ + Cl$sup -$ reversible NpO$sub 2$$sup +$ + 1/2Cl$sub 2$, in the temperature range of 450 to 600$sup 0$C, by sparging through the melt gas mixtures (H$sub 2$O, HCl, Cl$sub 2$, N$sub 2$) of known composition. The concentrations of the neptunium species were measured by a spectrophotometric method. The equilibrium constants, at 450$sup 0$C, are respectively: K$sub 1$ = (4.1 +- 0.8) 10$sup -6$ atmsup(-3/2); and K$sub 2$ = (52 +- 13) atmsup(1/2). The standard potential Esub(NpO$sub 2$(VI)/NpO$sub 2$(V))sup(0) at 450$sup 0$C equals (0.25 +-0.02) V against the standard chlorine potential.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<386>
Lysy, R.; Duyckaerts, G. (Liege Univ. (Belgium))

Determination of the Np(IV)--Np(III) normal potential in fused LiCl-CsCl (55-45%) by absorption spectrophotometry
AIX-08:346251;EDB-78:028033; Rev. Chim. Miner. (RVCMA) 14:(2):119-126 (1977)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;CATIONS;CESIUM CHLORIDES;ENTHALPY;ENTROPY;HIGH TEMPERATURE;LITHIUM CHLORIDES;MOLTEN SALTS;NEPTUNIUM: T1;REDOX POTENTIAL: Q1;SPECTROPHOTOMETRY

ABSTRACT: The following reaction Np$sup 4+$ + 1/2 H$sub 2$ + Cl$sup -$ reversible Np$sup 3+$ + HCl has been studied quantitatively in fused LiCl-CsCl (55-45 mol %) in the temperature range of 450-600$sup 0$ C, by visible and near IR absorption spectrophotometry. At 450 deg C, the equilibrium constant equals K = 7.4 atmsup(1/2). The mean values of $delta$H and $delta$S in the temperature range of 450-600 deg C are: $delta$H = (35.6+-10.3) kJ mol$sup -1$, $delta$S=(65.5+-13.0)J mol$sup -1$ K$sup -1$.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<387>
MacDonald, P.E.; Thompson, L.B. (eds.), EG and G Idaho, Inc., Idaho Falls (USA)

In MATPRO: Version 09. A handbook of materials properties for use in the analysis of light water reactor fuel rod behavior
** ERA-02:028904;INS-77:007752;EDB-77:065884; (Dec 1976) TREE-NUREG--1005

ABSTRACT: This handbook describes the materials properties correlations and computer subcodes (MATPRO-Version 09) developed for use with various LWR fuel rod behavior analytical programs at the Idaho National Engineering Laboratory. Documentation and formulations that are generally semiempirical in nature are presented for uranium dioxide and mixed uranium-plutonium dioxide fuel, zircaloy cladding, gas mixture, and LWR fuel rod material properties.

EDB SUBJECT CATEGORY: EDB-050700;360204;360203;210100;210200
INIS CATEGORY: B23;E31;E32

<388>

<388>
Maiorova, E.A.; Morachevskii, A.G. (Leningradskij Politekhnicheskij Inst. (USSR))

Thermodynamic properties of diluted sodium solutions in liquid indium AIX-08:334317;EDB-77:140533; Elektrokhimiya (ELKKA) 12:(12):1836-1838 (Dec 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;ELECTROMOTIVE FORCE;HIGH TEMPERATURE;INDIUM ALLOYS: T1;LIQUID METALS;REACTION KINETICS;SODIUM ALLOYS: T2;THERMODYNAMIC PROPERTIES: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B12

<389>
Maiti, H.S.; Subbarao, E.C.

Electrical conduction in CaO-doped thoria electrolytes INS-77:006417;EDB-77:055746; J. Electrochem. Soc. (JESCA) 123:(11):1713-1718 (Nov 1976)

SUBJECT DESCRIPTORS: CALCIUM OXIDES: T2;CHEMICAL COMPOSITION;CRYSTAL DEFECTS;DOPED MATERIALS;ELECTRIC CONDUCTIVITY: Q1,Q2;ELECTROLYTES: Q3;HIGH-TEMPERATURE FUEL CELLS: T3;HOLES;IONIC CONDUCTIVITY;OXYGEN;PRESSURE DEPENDENCE;QUANTITY RATIO;TEMPERATURE DEPENDENCE;THORIUM OXIDES: T1;VACANCIES

ABSTRACT: The electrical conductivity of sintered specimens of nominally pure thoria and thoria doped with 1-15 mole percent (m/o) CaO was measured between 600$sup 0$ and 1400$sup 0$C in the P$sub 02$ range of 1-10$sup -25$ atm. The measured conductivity decreases initially with decreasing P$sub 02$ (mixed conduction region where electron holes and oxygen ions contribute), until it becomes independent of P$sub 02$ (ionic conduction region). The P$sub 02$ corresponding to the transition between these regions is a function of temperature and composition. The variation of conductivity with temperature gives rise to three regions: the high temperature region where the conductivity is attributed to dissociated vacancies, an intermediate temperature range where associated vacancy-impurity complexes dominate, and a low temperature region where grain boundary effects appear to become significant. The activation energy for electrical conduction

<389> CONT.
is a function of composition and P$sub 02$. (7 figures, 31 references)

EDB SUBJECT CATEGORY: EDB-360204;300503
INIS CATEGORY: B23;A16

<390>
Makarov, L.L. (Leningradskij Gosudarstvennyj Univ. (USSR))

Origin of excess entropy of alkali metals halides solid solutions AIX-08:320671;EDB-77:113904; Zh. Fiz. Khim. (ZFKHA) 49:(9):2220-2223 (Sep 1975)

ABSTRACT: The formation of solid solutions of alkali metal halides has been considered in the case of KI-RbI and CsCl-CsBr systems. The difference is determined of the sublattice of the common ion and that of miscible ions one where ion vibration frequencies may vary only under the influence of the force field factor. The kinetic factor Ssup(E)(mu) in Ssup(E), the latter being presented as a sum of two items corresponding to kinetic and potential effects has been calculated. The calculated data are compared with the known experimental values of Ssup(E). An agreement has been observed for all the systems over the whole range of compositions. A change in Ssup(E) reflects correctly a transition from system to system when the common ion is changed and from structure to structure, it allows the origin to be understood of the peculiarities in the behaviour of the excessive entropy of solid solutions due to the reduced mass effect.

EDB SUBJECT CATEGORY: EDB-360603;400201
INIS CATEGORY: B12

<391>
Makhmadmurodov, A.; Dudchik, G.P.; Polyachenok, O.G. (Belorusskij Tekhnologicheskij Inst., Minsk)

Pressure of saturated vapor of rare earth and yttrium bromides AIX-08:282952;EDB-77:037347; Zh. Fiz. Khim. (ZFKHA) 49:(10):2714-2715 (Oct 1975)

SUBJECT DESCRIPTORS: ENTHAIPY;ENTROPY;EQUATIONS;EVAPORATION;HIGH TEMPERATURE;RARE EARTH COMPOUNDS: T1;SUBLIMATION;TEMPERATURE DEPENDENCE;VAPOR PRESSURE: Q1,Q2;YTTRIUM BROMIDES: T2

<391>

<392> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<392>
Mal, H.H. van; Buschow, K.H.J.; Miedema, A.R. (Philips Research Labs., Eindhoven (The Netherlands))

Hydrogen absorption of rare-earth (3d) transition intermetallic compounds AIX-07:278235;EDB-77:030837; J. Less-Common Met. (JCOMA) 49:(1-2):473-475 (Sep 1976)

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE;HYDRIDES;HYDROGEN: T4;INTERMETALLIC COMPOUNDS;RARE EARTH ALLOYS: T1;SOLUBILITY: Q4;SOLVENT PROPERTIES: Q1,Q2,Q3;THORIUM ALLOYS: T2;TRANSITION ELEMENT ALLOYS: T3

ABSTRACT: It is shown that the absorption of large amounts of hydrogen by rare-earth 3d metal compounds and thorium 3d metal compounds is a general phenomenon, not depending much on crystal structure or on the relative concentration of the rare-earth metal.

EDB SUBJECT CATEGORY: EDB-360104;080201
INIS CATEGORY: F22

<393>
Mal'kevich, N.V.; Grishin, I.A.

In Properties of yttrium and scandium basic salts **
ERA-01:026214;INS-76:018800;EDB-76:075637; Uch. Zap. Gor'k. Gos. Univ. (UZGUA) (105):34-38 (1970) ORNL-tr--4199

SUBJECT DESCRIPTORS: PHASE STUDIES;PYROLYSIS: Q1,Q2,Q3,Q4,Q5,Q6;SCANDIUM HYDROXIDES: M1;SCANDIUM SULFATES: M2;THERMAL GRAVIMETRIC ANALYSIS;X-RAY DIFFRACTION;YTTRIUM CHLORIDES: M5;YTTRIUM HYDROXIDES: M3;YTTRIUM NITRATES: M6;YTTRIUM SULFATES: M4

ABSTRACT: Thermographic and x-ray phase analysis methods were used to study the basic salts Sc(OH)$sub 2$.$sub 32$(SO$sub 4$)$sub 0$.$sub 34$, y(OH)$sub 2$(SO$sub 4$)$sub 0$.$sub 5$, y(OH)$sub 2$.$sub 6$Cl$sub 0$.$sub 4$, and y(OH)$sub 2$.$sub 6$(NO$sub 3$)$sub 0$.$sub 4$, schemes for their thermal decay

<394> CONT.
are presented. It is noted that the basic salts have a weak crystalline structure.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<394>
Mal'tsev, V.T.; Cherpillo, V.P.; Machavariani, Z.I. (Rostovskij-na-Donu Inzhenernc-Stroitel'nyj Inst. (USSR))

Phase equilibria in the PbO-GeO$sub 2$-V$sub 2$O$sub 5$ ternary system AIX-07:274861;EDB-77:018943; Zh. Neorg. Khim. (ZNOKA) 20:(7):1961-1964 (Jul 1975)

SUBJECT DESCRIPTORS: EQUILIBRIUM;GERMANIUM OXIDES: T1;LEAD OXIDES: T2;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3;PHASE STUDIES;VANADIUM OXIDES: T3;X-RAY DIFFRACTION

ABSTRACT: Visual-polythermal and X-ray phase analysis techniques have been used to study the ternary system PbO-GeO$sub 2$-V$sub 2$O$sub 5$. There have been defined the fields of primary crystallization of the starting component PbO, binary phases and three ternary congruently melting compounds of the following composition: 15PbOx4GeO$sub 2$x3V$sub 2$O$sub 5$; 19PbPxGeO$sub 2$x2V$sub 2$O$sub 5$; 17PbOx2GeO$sub 2$xV$sub 2$O$sub 5$. It has been established that two compounds with approximately the following compositions: 5PbOx6GeO$sub 2$x9V$sub 2$O$sub 5$ and 6PbOx GeO$sub 2$x2V$sub 2$O$sub 5$ are formed in the subsolidus region. The region of stratification in the liquid phase of the ternary melts, adjacent to the binary system GeO$sub 2$-V$sub 2$O$sub 5$ is limited. The melts adjacent, by composition, to the binary system PbO-GeO$sub 2$ and rich in GeO$sub 2$, as well as those adjacent to the middle portion of the binary system PbO-V$sub 2$O$sub 5$, show a tendency to vitrification.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B12

<395>
Malinin, G.V.; Tolmachev, Yu.M. (Radievyj Inst., Leningrad (USSR))

Thermal decomposition of solid metal oxides EDB-76:037148; Usp. Khim. (USKHA) 44:(5):782-792 (May 1975)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;CHEMICAL REACTION KINETICS;DISSOCIATION;PRASEODYMIUM OXIDES: M2;PYROLYSIS: Q1,Q2;REACTION HEAT;REVIEWS;SOLIDS;URANIUM OXIDES: M1

<395>

<395> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702;400201
INIS CATEGORY: B12

<396>
Malinin, S.D.; Dernov-Pegarev, V.F.

Investigation of calcite solubility in K$sub 2$CO$sub 3$ and Na$sub 2$CO$sub 3$ solutions at temperatures of 200 to 350$sup 0$C EDB-76:033940; Geokhimiya (GEOKA) (3):454-462 (Mar 1974)

SUBJECT DESCRIPTORS: CALCITE: T1;HIGH TEMPERATURE;POTASSIUM CARBONATES;POTASSIUM CHLORIDES;SODIUM CARBONATES;SOLUBILITY: Q1;SOLUTIONS

ABSTRACT: As a result of an experimental study of CaCO$sub 3$ (Iceland spar) in K$sub 2$CO$sub 3$, Na$sub 2$CO$sub 3$ solutions, and mixed solutions- K$sub 2$CO$sub 3$ + KCl and K$sub 2$CO$sub 3$ + Na$sub 2$CO$sub 3$ with concentration from 1 to 15 molal, the existence of the Ca(CO$sub 3$)$sub 2$$sup 2-$ complex has been established. PK/sub c/ = -log K/sub c/ is equal to 4.5 +- 0.5 at 200$sup 0$, 3.8 +- 0.3 at 300$sup 0$ and 3.3 +- 0.2 at 350$sup 0$C. The high solubility of CaCO$sub 3$ in solutions of alkali carbonates attaining 24 g/1000 g in 75 % of K$sub 2$CO$sub 3$ solution at 350$sup 0$C together with data of mineralogical observations gives ground to consider natural carbonate solutions as probable agents giving rise to carbonatite body formation.

EDB SUBJECT CATEGORY: EDB-152001;400201

<397>
Malyshev, V.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii)

Thermodynamic similarity and universal equations of state of hexafluorides AIX-08:334318;EDB-77:141015; Teplofiz. Vys. Temp. (TVYTA) 14:(1):47-55 (Jan 1976)

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;DENSITY;EQUATIONS OF STATE;MOLYBDENUM FLUORIDES: T1;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;THERMODYNAMICS;TUNGSTEN FLUORIDES: T2;URANIUM HEXAFLUORIDE: T3;VAPOR PRESSURE

ABSTRACT: There have been generalized the experimental data on the thermodynamic properties of hexafluorides of sulfur, molybdenum, tungsten, uranium in Van der Waals region. The similarity criteria have been checked up both graphically by

<397> CONT.
plotting the curves with the respective parameters and analytically by determining the coefficients of the appropriate universal equations of state. Seven criteria of thermodynamic similarity have been shown to be realized. There have been found the universal equations for the state of the hexafluorides in the region of the rarefied and thick gas, as well as for vapour saturation, equilibrium densities of vapour and liquid, heat of evaporation.

EDB SUBJECT CATEGORY: EDB-400201;400702
INIS CATEGORY: B12

<398>
Manes, L.; Naegele, J. (Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements) ** Blank, H.; Lindner, R. (eds.)

Electronic properties of actinide oxides In Plutonium 1975 and other actinides ** AIX-08:310014;ERA-02:041829;EDB-77:094387; (1976) North-Holland

SUBJECT DESCRIPTORS: BINDING ENERGY;CHEMICAL BONDS: Q1,Q2,Q3;CHEMICAL COMPOSITION;COVALENCE;CRYSTAL STRUCTURE;ELECTRICAL PROPERTIES;ELECTRONIC STRUCTURE;ENERGY GAP;MAGNETIC PROPERTIES;OPTICAL PROPERTIES;PLUTONIUM OXIDES: T1;SPECTROSCOPY;THERMODYNAMIC PROPERTIES;THORIUM OXIDES: T2;URANIUM OXIDES: T3

ABSTRACT: The available information of a direct nature on the properties of electrons in actinide oxides is critically surveyed. Some critical assessment is made on the new ideas about the bonding of these systems, ideas which have emerged mostly from thermodynamical and structural considerations. The aim in doing this is to a) judge how many of these ideas can be supported by direct experimental evidence on the electronic properties; b) attempt, on the other hand, to imagine which experimental results are needed to confirm or refute them.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B24

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<399>
Mangelmann, M.; Keller, C. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Radiochemie)

Thermal decomposition of intermetallic compounds of platinum with alkaline earth and lanthanide metals at high temperatures AIX-08:303033;EDB-77:082573; J. Inorg. Nucl. Chem. (JINCA) 39:(2):305-309 (1977)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION;DECOMPOSITION;DYSPROSIUM;DYSPROSIUM ALLOYS: T2;EUROPIUM;EUROPIUM ALLOYS: T3;FREE ENTHALPY;GADOLINIUM;GADOLINIUM ALLOYS: T4;HIGH TEMPERATURE;INTERMETALLIC COMPOUNDS;KNUDSEN FLOW;MELTING POINTS;OXIDES;PLATINUM ALLOYS: T1;PYROLYSIS;REDUCTION: Q1,Q2,Q3,Q4,Q5,Q6;SAMARIUM;SAMARIUM ALLOYS: T5;VAPOR PRESSURE;VERY HIGH TEMPERATURE;YTTERBIUM;YTTERBIUM ALLOYS: T6

ABSTRACT: The thermal decomposition of intermetallic compounds of platinum with alkaline earth (A = Mg, Ca, Ba) and lanthanide (A = Sm, Eu, Gd, Dy, Yb) elements obtained by the coupled reduction method, was investigated by using the Knudsen effusion technique. It was demonstrated that the APt$sub 2$(APt$sub 3$) intermetallic compounds are thermally decomposed to yield APt$sub 5$(APt$sub 7$) and Asub((g)), the condensation of which may be used to prepare pure metal A. Furthermore, it was shown that the free molar solution enthalpy of A in APtsub(x): $delta$$sub 1$Gsub(A) $Yields$ APtsub(x) has smaller absolute values for the alkaline earth compounds than for the lanthanide compounds, europium, however, showing a behaviour more characteristic for divalent metals. Data for the free molar solution enthalpy and the vapour pressure of A over APtsub(x) for temperatures up to 2000$sup 0$C are given together with the melting points of the compounds investigated and a critical description for the procedure to prepare the metal A by hydrogen reduction of the oxide AOsub(y) vs APtsub(x)-compounds as intermediates.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<400>
Mar, R.W.; Hastings, J.C., Sandia Labs., Livermore, Calif. (USA)

In Synthesis of UN coatings on uranium **
INS-77:013089;ERA-02:049201;EDB-77:107128; (Apr 1975)
SAND--75-8008

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS: Q1,Q3;CRACKS;FREE ENERGY;MAGNESIUM;MAGNESIUM NITRIDES: M3;NITRIDATION: Q1;PHASE STUDIES;PROTECTIVE COATINGS;SYNTHESIS: Q2;TEMPERATURE DEPENDENCE;THICKNESS;TIME DEPENDENCE;URANIUM: M1;URANIUM

<400> CONT.
NITRIDES: M2;VERY HIGH TEMPERATURE

ABSTRACT: A single-displacement reaction approach was used to form uranium mononitride as a protective coating for uranium; the source of the nitrogen was a solid nitride, and magnesium nitride was chosen as the most attractive candidate for the experiment. While the goal of synthesizing a single-phase uranium mononitride coating at temperatures lower than 1405 K was met, a number of problems inherent in the process were identified. 6 figures, 2 tables.

EDB SUBJECT CATEGORY: EDB-360105;360201;400201
INIS CATEGORY: B15;B23;B12

<401>
Marchant, D.D.; Bowen, H.K. ** Cooper, A.R.; Heuer, A.H. (eds.)

Oxygen redistribution in UO$sub 2$ due to a temperature gradient
In Mass transport phenomena in ceramics **
INS-77:009204;ERA-02:034778;EDB-77:074806; ([nd]) Plenum Publishing Corporation

SUBJECT DESCRIPTORS: ATOM TRANSPORT: Q1;BOUNDARY CONDITIONS;DIFFUSION: Q2;KINETIC EQUATIONS;MASS TRANSFER;MIGRATION;NUCLEAR FUELS;OXYGEN: T2;STOICHIOMETRY;TEMPERATURE EFFECTS;TEMPERATURE GRADIENTS;THERMAL DIFFUSION;URANIUM DIOXIDE: T1

ABSTRACT: Uranium dioxide exhibits a wide range of stoichiometry, with the deviation from stoichiometry, x, ranging from --0.31 to +0.24. The observation of oxygen redistribution in uranium dioxide-based fuels in a nuclear reactor and the consequent effect on operational performance parameters has prompted investigation of the migration of oxygen in a temperature gradient. Laboratory studies consist in annealing the samples in a temperature gradient, quenching to room temperature, and measuring the resulting composition profiles. The results have been interpreted in terms of an effective heat of transport relating concentration changes to the temperature gradient for the particular experimental conditions.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B23

<402>

<402>
Markov, B.F.; Khorlbekk, V.; Lojchenko, V.Ya. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Diagram of excess free energy of the PbCl$sub 2$-CsCl-ZnCl$sub 2$ system EDB-76:042587; Ukr. Khim. Zh. (UKZHA) 41:(3):245-248 (Mar 1975)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;DIAGRAMS;ELECTRIC POTENTIAL;FREE ENERGY: Q1,Q2,Q3;LEAD CHLORIDES: T2;MOLTEN SALTS;ZINC CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<403>
Markov, B.G.

Speed of ultrasound and the thermophysical properties of the liquid metals Sn, Pb, Cd and of their binary alloys Pb:Sn and Pb:Cd ERA-01:023779;EDB-76:065751; High Temp. (USSR) (Engl. Transl.) (HITEA) 13:(5):1027-1030 (Sep 1975)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CADMIUM: T1;CADMIUM ALLOYS: T2;COMPRESSIBILITY: Q1,Q2,Q3,Q4,Q5,Q6;DENSITY;LEAD: T4;LEAD ALLOYS: T6;LIQUID METALS;SPECIFIC HEAT: Q1,Q2,Q3,Q4,Q5,Q6;TEMPERATURE DEPENDENCE;THERMAL EXPANSION: Q1,Q2,Q3,Q4,Q5,Q6;TIN: T3;TIN ALLOYS: T5;ULTRASONIC WAVES: Q1,Q2,Q3,Q4,Q5,Q6

ABSTRACT: The temperature dependence of the speed of sound in the liquid metals Sn, Pb, and Cd, as well as in binary mixtures of them was determined. The compressibility and specific heat of the metals was also studied. (AIP)

EDB SUBJECT CATEGORY: EDB-360104

<404>
Maroni, V.A.; Calaway, W.F.; Veleckis, E.; Yonco, R.M., Argonne National Lab., Ill. (USA)

In Solution behavior of hydrogen isotopes and other non-metallic elements in liquid lithium **
INS-76:018261;ERA-01:026208;EDB-76:075630; (1976)
CONF-760503--5

SUBJECT DESCRIPTORS: HIGH TEMPERATURE;IMPURITIES: Q4;LITHIUM;LITHIUM: T4;LITHIUM DEUTERIDES: T1;LITHIUM HYDRIDES: T2;LITHIUM NITRIDES: T5;LITHIUM TRITIDES: T3;PHASE

<404> CONT.
DIAGRAMS;REMOVAL;SEPARATION PROCESSES;SOLUBILITY: Q1,Q2,Q3,Q5

ABSTRACT: Results of experimental studies to measure selected thermodynamic properties for systems of lithium with non-metallic elements are reported. Investigations of the Li-H, Li-D, and Li-T systems have led to the elucidation of the dilute solution behavior and the H/D/T isotope effects. In the case of the Li-H and Li-D systems, the principal features of the respective phase diagrams have been delineated. The solubility of Li-D in liquid lithium has been measured down to 200$sup 0$C. The solubility of Li$sub 3$N in liquid lithium and the thermal decomposition of Li$sub 3$N have also been studied. From these data, the free energy of formation of Li$sub 3$N and the Sieverts' constant for dissolution of nitrogen in lithium have been determined. Based on studies of the distribution of non-metallic elements between liquid lithium and selected molten salts, it appears that molten salt extraction offers promise as a means of removing these impurity elements (e.g., H, D, T, O, N, C) from liquid lithium.

EDB SUBJECT CATEGORY: EDB-400201;700209;060200
INIS CATEGORY: B12;A14;B11

<405>
Maroni, V.A.; Calaway, W.F.; Veleckis, E.; Yonco, R.M.; Cafasso, F.A.; Burris, L., Argonne National Lab., Ill. (USA)

In Physical research on liquid-metal systems. Annual report, July 1975--June 1976 **
ERA-03:001146;INS-77:018009;EDB-78:004542; (1976) ANL--76-106

SUBJECT DESCRIPTORS: HIGH TEMPERATURE;ISOTOPE EFFECTS;LIQUID METALS;LITHIUM: T1;LITHIUM DEUTERIDES: T3;LITHIUM HYDRIDES: T2;LITHIUM TRITIDES: T4;PRESSURE DEPENDENCE;SOLUBILITY: Q1,Q2,Q3,Q4;THERMONUCLEAR REACTOR MATERIALS;VERY HIGH TEMPERATURE

ABSTRACT: Physicochemical and thermodynamic studies of liquid-lithium-containing systems have continued. Pressure-composition isotherms for the Li-H system measured by a gravimetric technique are found to be in reasonably good agreement with earlier tensimetric results. Plateau-pressure studies of the Li-H, Li-D, and Li-T systems have been made at temperatures above and below the monotectic. The observed isotope effects were found to be near the predicted values. Measurements of the solubility of LiD in liquid lithium gave results in good agreement with prior data for the solubility of LiH in lithium and confirmed that the limits on cold trapping of lithium hydrides from lithium are too high for projected fusion reactor applications. Determination of the

<405>

<405> CONT.
solubility of Li$sub 2$O in liquid lithium is nearing completion. Solubility values measured to date are slightly lower than, but in the range of, prior measurements.

EDB SUBJECT CATEGORY: EDB-360105;700209
INIS CATEGORY: B15;A14

<406>
Martinot, L. (Liege Univ. (Belgium))

Some thermodynamic properties of dilute solutions of actinide chlorides in (Li-K)Cl and in (Na-K)Cl eutectics
AIX-07:236205;EDB-76:092883; J. Inorg. Nucl. Chem. (JINCA) 37:(12):2525-2528 (Dec 1975)

SUBJECT DESCRIPTORS: ELECTROMOTIVE FORCE;ENTROPY;EUTECTICS;FORMATION HEAT;FREE ENTHALPY;LITHIUM CHLORIDES: M2;NEPTUNIUM CHLORIDES;PLUTONIUM CHLORIDES: M3;POTASSIUM CHLORIDES;REACTION KINETICS;SODIUM CHLORIDES;SOLUTIONS;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;URANIUM CHLORIDES: M1

ABSTRACT: The activity coefficients at infinite dilution of UCl$sub 3$, UCl$sub 4$, NpCl$sub 3$, NpCl$sub 4$, PuCl$sub 3$ in (Li-K)Cl and of UCl$sub 3$ and UCl$sub 4$ in (Na-K)Cl are reported. The Gibbs free energy and entropy of formation of these compounds in dilute solution are calculated from e.m.f. data. A comparison between the cited thermodynamic quantities and the activation energy for the diffusion of the + 3 and + 4 actinide ions is also presented.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<407>
Martinot, L.; Bohet, J.; Duyckaerts, G. (Liege Univ. (Belgium)); Muller, W.

Thermodynamic properties of dilute solutions of ThCl$sub 4$ in (Li-K)Cl and (Na-K) eutectics AIX-08:332016;EDB-78:022423; Inorg. Nucl. Chem. Lett. (INUCA) 13:(7):315-319 (1977)

SUBJECT DESCRIPTORS: DILUTION;ELECTROMOTIVE FORCE;EUTECTICS;FORMATION FREE ENTHALPY: Q1;LITHIUM CHLORIDES;MOLTEN SALTS;POTASSIUM CHLORIDES;SODIUM CHLORIDES;SOLUTIONS;THORIUM CHLORIDES: T1

ABSTRACT: The Gibbs free energy of formation of ThCl$sub 4$ in (Li-K)Cl is reported and a comparison is made with similar data obtained in (Na-K)Cl. The thermodynamic data have been

<407> CONT.
obtained from e.m.f. measurements extrapolated down to infinite dilution. The standard potentials of the Th(IV-O) system at 400, 450 and 500$sup 0$C are respectively equal to 2.52, 2.50 and 2.47 volts vs. Cl$sub 2$/2Cl$sup -$ in the m.f. scale.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<408>
Martinot, L.; Duyckaerts, G. (Liege Univ. (Belgium))

Diffusion of uranium species in several molten chlorides
AIX-08:332017;EDB-78:022424; Inorg. Nucl. Chem. Lett. (INUCA) 13:(7):321-327 (1977)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T2;DIFFUSION: Q1;EUTECTICS;IONS;LITHIUM CHLORIDES: T3;MOLTEN SALTS;PERMEABILITY: Q2,Q3,Q4;RUBIDIUM CHLORIDES: T4;URANIUM: T1;URANIUM COMPOUNDS

ABSTRACT: The chronopotentiometric diffusion coefficients of U(III) and U(IV) have been measured in (Li-Cs)Cl and in (Rb-Cs)Cl eutectics. Taking into account previous data it is concluded that the molten salts 'holes' model proposed for the self-diffusion in pure molten salts is also able to interpret qualitatively interdiffusion in eutectic melts.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<409>
Masson, J.P.; Desmoulin, J.P.; Charpin, P.; Bougon, R.

Synthesis and characterization of a new uranium(V) compound: H$sub 3$O$sup +$UF$sub 6$$sup -$ INS-77:005830;EDB-77:044531; Inorg. Chem. (INOCA) 15:(10):2529-2531 (Oct 1976)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1,Q2;COMPARATIVE EVALUATIONS;CUBIC LATTICES;ELECTRON SPIN RESONANCE;EMISSION SPECTRA;FORMATION HEAT;INFRARED SPECTRA;OXONIUM IONS: T;PHYSICAL PROPERTIES: Q1,Q2;RAMAN SPECTRA;URANIUM COMPOUNDS: T2;URANIUM FLUORIDES: T1;X-RAY DIFFRACTION

ABSTRACT: The reaction of equimolar amounts of UF$sub 5$ and H$sub 2$O in hydrogen fluoride results in the partial dissolution of UF$sub 5$, yielding a blue-green solution from which the new salt oxonium hexafluorouranate(V) (H$sub 3$O$sup +$UF$sub 6$$sup -$) could be isolated as a green crystalline solid. Calorimetric measurements showed H$sub 3$O$sup

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<409> CONT.
+UFsub 6$$sup -$ to decompose at about 68$sup 0$C and its heat of formation to be equal to -628 +- 2 kcal mol. Its ionic nature in the solid state and in HF solutions was demonstrated from vibrational and electronic spectra. The electronic spectrum is closely similar to those of LiUF$sub 6$, NaUF$sub 6$, and CsUF$sub 6$ and differs from those of RbUF$sub 6$ and KUF$sub 6$. This adduct shows a strong ESR signal, with g = -0.78 +- 0.10, characteristic of UF$sub 6$$sup -$ salts. Based on its x-ray powder diffraction pattern, H$sub 3$O$sup +$UF$sub 6$$sup -$ is cubic with a = 5.2229 +- 0.0005 A.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<410>
Matthews, G.E. Jr.; Crawford, J.H. Jr.

Ionic-thermocurrent study of the dipole relaxation and equilibrium in Gd-doped SrF$sub 2$
INS-77:003555;ERA-02:017832;EDB-77:026274; Phys. Rev., B (PLRBA) 15:(1):55-60 (1 Jan 1977)

SUBJECT DESCRIPTORS: DIPOLES: Q1;ENTHALPY;GADOLINIUM IONS;INTERSTITIALS;LOW TEMPERATURE;POLARIZATION;RELAXATION;STRONTIUM FLUORIDES: I1;TEMPERATURE DEPENDENCE

ABSTRACT: By means of thermal depolarization (ionic thermocurrent) measurements, the population of nearest-neighbor (type-I) and next-nearest-neighbor (type-II) Gd$sup 3+$ interstitial fluoride ion dipoles have been observed as functions of temperature from 180 to 210 K, the region of the type-II dipole relaxation peak. The ratio of type-II to type-I concentration varies exponentially with reciprocal polarization temperature, indicating that at each temperature the two dipole species reach equilibrium within the polarization period, chosen to be at least six times the type-II dipole relaxation time. The enthalpy difference between the two species was determined to be 0.046 eV. The shift in the populations with temperature suggests that reorientation of the type-II dipole proceeds by means of the flucride passing through a nearest-neighbor (type-I) site, in accordance with the accepted model. By assuming that the total number of dipoles remains constant, the ratio of the dipole moments of the two species is found to be 2.4. (AIP)

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B24

<411>
McClelland, J.F., Ames Lab., Iowa (USA)

In Electromodulation spectroscopy of sc and fcc phase TlCl and TlBr ** ERA-01:026159;EDB-76:075467; (Jun 1976) IS-T--721

SUBJECT DESCRIPTORS: BAND THEORY;CARRIERS;CRYSTAL LATTICES;ELECTRONIC STRUCTURE: Q1,Q2;EXCITED STATES;EXCITONS;FCC LATTICES;MODULATION;THALLIUM BROMIDES: T2;THALLIUM CHLORIDES: T1

ABSTRACT: Electromodulation measurements were made on these compounds and the spectra were reduced to the electric field induced changes in the dielectric function. The results indicate the importance of photocarrier effects in both theory and experiment in the electromodulation of exciton states. In the future, calculations should include the effect of photocarriers on the field seen by the exciton and experimentally samples should be developed with known and reproducible photocarrier properties with temperature control between liquid helium and nitrogen temperatures and bipolar modulation fields. The abnormal (fcc) phase electroabsorption (EA) measurements have demonstrated the usefulness of the modulation method in resolving exciton states by determining the n = 2 energy in TlBr. This has enabled a number of quantities to be calculated from the Wannier exciton model. The resolution of the n = 2 energy in TlCl is probably also possible with an EA measurement and patience with the signal to noise problem. The $alpha$ and $beta$ features are still unassigned but the unusual EA lineshape and sample preparation sensitivity found in this investigation may prove useful in making definitive assignments in conjunction with future work.

EDB SUBJECT CATEGORY: EDB-360603

<412>
McClure, D.S. (Princeton Univ., N.J. (USA). Dept. of Chemistry)

Progress in the spectroscopy of rare earth and transition metal ions AIX-07:253199;ERA-02:023428;EDB-77:096450; J. Lumin. (JLUMA) 12-13::67-78 (Mar 1976)

SUBJECT DESCRIPTORS: BIBLIOGRAPHIES;ELECTRON TRANSFER;ELECTRONIC STRUCTURE;ENERGY SPECTRA;ION SPECTROSCOPY;IONS;LIGANDS;LUMINESCENCE: Q1,Q2;MOLECULES;RARE EARTHS: T1;REVIEWS;TRANSITION ELEMENTS: T2

ABSTRACT: Several areas in which there has been progress in spectroscopy of transition metal and rare earth ions of relevance to luminescence are reviewed. These are, structure of impurity centers in crystals, radiationless processes,

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molecular spectra, charge transfer spectra and high energy spectra. The aim of the reviews is not to be comprehensive, but is to note unusual things and to suggest directions where further progress would be most valuable.

EDB SUBJECT CATEGORY: EDB-640302
INIS CATEGORY: A12

<413>
McDiarmid, R.

Assignments in the electronic spectrum of UF$sub 6$
INS-76:016568:EDB-76:061836; J. Chem. Phys. (JCPSA) 65:(1):168-173 (1 Jul 1976)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;ELECTRONIC STRUCTURE;ENERGY-LEVEL TRANSITIONS;ULTRAVIOLET SPECTRA: Q1;URANIUM HEXAFLUORIDE: T1

ABSTRACT: The absorption spectrum of gaseous UF$sub 6$ was recorded from 1200--4200 A (83 300--23 800 cm$sup -1$). Eight electronic transitions were observed with intensities ranging from 0--20 000 1/molexcm. Based on correlations between this spectrum and those of UF$sub 6$$sup -$, UCl$sub 6$$sup -$, MoF$sub 6$, and WF$sub 6$ and the photoelectron spectrum of UF$sub 6$, the experimental spectrum was assigned. (AIP)

EDB SUBJECT CATEGORY: EDB-640302
INIS CATEGORY: A12

<414>
McElroy, D.L. (Oak Ridge National Lab., Tenn. (USA)); Haines, H.R.; Hall, R.O.A.; Lee, J.A. (UKAEA Research Group, Harwell. Atomic Energy Research Establishment) ** Blank, H.; Lindner, R. (eds.)

Specific heat of PuCsub(1-x) and Pu$sub 2$C$sub 3$ from 10 to 300 K In Plutonium 1975 and other actinides **
AIX-08:310020;ERA-02:041841;EDB-77:094419; (1976) North-Holland

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;DEBYE TEMPERATURE;ENTROPY;LAMBDA POINT;LATTICE PARAMETERS;LOW TEMPERATURE;MEDIUM TEMPERATURE;ORDER PARAMETERS;PLUTONIUM CARBIDES: T1;SCHOTTKY EFFECT;SPECIFIC HEAT: Q1;TEMPERATURE DEPENDENCE;ULTRALOW TEMPERATURE;VERY LOW TEMPERATURE

ABSTRACT: The specific heat, Csub(p), of PuCsub(0.82), PuCsub(0.90), and PuCsub(1.51) was determined from 10 to 300K using adiabatic technique. Characterization of the arcmelted

<414> CONT.
and heat-treated samples included chemical, X-ray and metallographic analyses. The Csub(p)-T values for PuCsub(0.82) and PuCsub(0.90) were accurate to +-1.3% and conclusively reveal anomalous Csub(p) behaviour below 150K where neutron diffraction has shown magnetic ordering to occur before rising in a normal manner to values of 46.06 J.mol$sup -1$K$sup -1$ (PuCsub(0.82)), which is 0.3% below the one literature value for PuCsub(0.81) and 47.92 (PuCsub(0.90) at 298.15K. The normal behaviour above 150K was fitted to better than 1% for both PuCsub(0.82), and PuCsub(0.90), by a simple Debye model, with a Debye temperature of 400K and electronic coefficients of 0.015 J.mol$sup -1$K$sup -2$ and 0.135 J.mol$sup -1$K$sup -2$, respectively. The difference between the calculated and measured curves below 150K show a basic Schottky transition for the PuCsub(0.82) with a superimposed lambda-type contribution in the case of PuCsub(0.90): i.e. the transition initiates as a nonco-operative excitation, becoming co-operative in its later stages.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<415>
McElroy, D.L.; Haines, H.R.; Hall, R.O.A.; Lee, J.A. **
Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Specific heat of PuCsub(1-x) and Pu$sub 2$C$sub 3$ from 10 to 300 K In 5th international conference on plutonium and other actinides ** AIX-07:233144;EDB-76:087311; (1975) AED-Conf--75-417-020

SUBJECT DESCRIPTORS: DEBYE TEMPERATURE;HIGH TEMPERATURE;MATHEMATICAL MODELS;MEDIUM TEMPERATURE;PLUTONIUM CARBIDES: T1;SPECIFIC HEAT: Q1;TEMPERATURE DEPENDENCE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

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<416>
McElroy, W.N.; Ulseth, J.A.; Lippincott, E.P.; Matsumoto, W.Y.; Kellogg, L.S., Hanford Engineering Development Lab., Richland, Wash. (USA)

In Fission rates, burnup, and neutron flux-fluence-spectra characterization for mixed oxide fuel experiments in the EBR-II ** ERA-01:013010;EDB-76:052407; (Jan 1976) HEDL-TME--75-74

SUBJECT DESCRIPTORS: BURNUP;EBR-2 REACTOR: T1;FFTF REACTOR;FUEL PINS;IRRADIATION;LMFBR TYPE REACTORS;NEUTRON FLUENCE;NEUTRON FLUX: Q1;NEUTRON SPECTRA;PERFORMANCE TESTING;PLUTONIUM DIOXIDE;URANIUM DIOXIDE

ABSTRACT: Analysis of a mixed oxide fuel experiment (PNL-11) has been completed and results for fission rates, burnup, neutron flux, fluence, anti-E and S.S. damage correlation parameters have been derived from dosimetry measurements. The results demonstrated successful dosimetry characterization at the +- 5 percent (1sigma) uncertainty level or better for fission rates, burnup, and fluence, and at the +- 10 percent (1sigma) level or better for flux-spectra values. Values of burnup based on activation dosimeters ($sup 140$Ba) were in good agreement with $sup 148$Nd measurements made on neighboring fuel pins using recommended ENDF/B-IV fission yield values. Good agreement, to within 3 percent, between the reactor midplane multiple foil dervied value of total flux and an ANL estimate was obtained. Based on this study, current uncertainty estimates are set at +- 5 percent (1sigma) for fission rate, burnup, and fluence measurements for short term controlled ''test sample'' irradiations of mixed oxide fuel in EBR-II. It is concluded, however, that additional tests and standardizations are required to reduce current uncertainties of 5 to 10 percent to the 2 to 5 percent level.

EDB SUBJECT CATEGORY: EDB-210500
INIS CATEGORY: E35

<417>
McLachlan, A.D., La Trobe Univ., Bundoora (Australia)

In Photoelectron spectroscopic studies of some transition metals and alloys ** AIX-07:256684;EDB-77:013002; (1974) La Trobe University

SUBJECT DESCRIPTORS: CADMIUM;COPPER: T1;ELECTRONIC STRUCTURE;GOLD: T3;GOLD ALLOYS: T6;PALLADIUM ALLOYS: T5;PHOTOELECTRON SPECTROSCOPY: Q1,Q2,Q3,Q4,Q5,Q6;SAMPLE PREPARATION;SILVER: T2;SILVER BASE ALLOYS: T4;ZINC

ABSTRACT: Photoelectron spectra of polycrystalline samples of

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Cu, Ag and Au at photon energies of 21.22, 40.81 eV and 1487 eV were measured. The corrected 40.81 eV results were compared to theoretical band structure calculations and monochromatized x-ray photoelectron results. Correlation of hitherto unresolved peaks in the 40.81 eV spectra was observed. Comparison of the relative intensities of the spectral d bands and the theoretical calculations revealed discrepancies which were assigned to matrix element modulation effects in the photoelectron emission process. Experimental measurements and theories of the electronic structure of disordered alloy systems were reviewed. The 21.22 eV and 40.81 eV photoelectron spectra of some AgPd and AgAu alloys were measured. The spectra were compared with previous x-ray photon results, and with theoretical calculations based on the Coherent Potential Approximation (CPA) model of disordered alloy systems. The present results were found to give more clearly defined spectral details, with differences in the comparison reflecting the simplifying assumptions of the CPA calculation.

EDB SUBJECT CATEGORY: EDB-360102;400104
INIS CATEGORY: A13

<418>

McQuillan, A.D. (Birmingham Univ. (UK). Dept. of Physical Metallurgy and Science of Materials)

Comparative study of systems of heavier rare-earth metals with hydrogen [Gd, Tb, Dy, Lu] AIX-07:278251;EDB-77:031167; J. Less-Common Met. (JCOMA) 49:(1-2):431-438 (Sep 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION: Q1,Q2,Q3,Q4;COMPARATIVE EVALUATIONS;DYSPROSIUM;DYSPROSIUM HYDRIDES: T3;GADOLINIUM HYDRIDES: T1;HYDROGEN ADDITIONS;LUTETIUM HYDRIDES: T4;SOLID SOLUTIONS;SOLUBILITY;SOLUTION HEAT;TEMPERATURE DEPENDENCE;TERBIUM HYDRIDES: T2

ABSTRACT: Hydrogen equilibrium pressures as a function of hydrogen content of the metal and temperature have been measured for gadolinium, terbium, dysprosium and lutetium, in the primary solid-solution range up to and including the two-phase region with the dihydride phase. All systems show strong similarities, and all are marked by a decrease in heat of solution of hydrogen in the metal with decreasing hydrogen concentration.

EDB SUBJECT CATEGORY: EDB-360603;080800
INIS CATEGORY: B22

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<419>
Mehlhorn, B.; Hoppe, R. (Giessen Univ. (F.R. Germany). Inst. fuer Anorganische und Analytische Chemie)

New hexafluorozirconates(IV): BaZrF$sub 6$, PbZrF$sub 6$, EuZrF$sub 6$, SrZrF$sub 6$ AIX-08:289289;EDB-77:069132; Z. Anorg. Allg. Chem. (ZAACA) 425:(2):180-188 (Sep 1976)

SUBJECT DESCRIPTORS: BARIUM FLUORIDES: T1;CHEMICAL PREPARATION;COORDINATION NUMBER;EUROPIUM FLUORIDES: T2;INTERATOMIC DISTANCES;LATTICE PARAMETERS;LEAD FLUORIDES: T3;MONOCRYSTALS;ORTHORHOMBIC LATTICES;SPACE GROUPS;STRONTIUM FLUORIDES: T4;STRUCTURAL CHEMICAL ANALYSIS: Q1,Q2,Q3,Q4,Q5;X-RAY DIFFRACTION;ZIRCONIUM FLUORIDES: T5

ABSTRACT: The new compounds BaZrF$sub 6$, PbZrF$sub 6$, EuZrF$sub 6$ and SrZrF$sub 6$ (all colorless) crystallize according to single crystal investigations orthorhombic. From the determination of crystal structure of BaZrF$sub 6$ results, that similar to K$sub 2$ZrF$sub 6$, there are sub(infinite)sup(1)[ZrFsub(4/2)Fsub(4/1)]-chains. Zr$sup 4+$ is therefore surrounded by eight fluorine atoms. The Madelung part of lattice energy aswell as the effective coordination numbers are alculated and discussed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<420>
Mehrotra, G.M.; Frohberg, M.G.; Kapoor, M.L. (Technische Univ. Berlin (F.R. Germany). Inst. fuer Metallforschung)

Activities of lead and bismuth in their molten alloys EDB-76:081857; Z. Metallkd. (ZEMTA) 67:(3):186-188 (Mar 1976)

SUBJECT DESCRIPTORS: BISMUTH: T2;BISMUTH ALLOYS;BISMUTH OXIDES;CHEMICAL COMPOSITION;ELECTROMOTIVE FORCE;EQUATIONS;EQUILIBRIUM;LEAD: T1;LEAD ALLOYS;LEAD OXIDES;LIQUID METALS;METAL-METAL OXIDE BATTERIES;SLAGS;THERMODYNAMIC PROPERTIES: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: From distribution equilibria and emf-measurements of cells of scheme [Pb-Bi]/(PbO-Bi$sub 2$O$sub 3$)//ZrO$sub 2$ (+ CaO)// FeO, Fe, the activities of lead and bismuth in their molten alloys at 900$sup 0$C have been determined. The results of the present investigation agree well with the

<421> CONT.
known data. The method presented here can be used to determine and to simultaneously obtain the activities in the alloy phase in equilibrium with the oxide melt.

EDB SUBJECT CATEGORY: EDB-400400;360104

<421>
Merrill, L.

Behavior of the AB-type compounds at high pressures and high temperatures INS-78:002256;EDB-78:027693; J. Phys. Chem. Ref. Data (JPCRB) 6:(4):1205-1252 (Oct 1977)

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE;CRYSTAL-PHASE TRANSFORMATIONS: Q1,Q2;MELTING: Q1,Q2;PHASE DIAGRAMS;VERY HIGH PRESSURE;X-RAY DIFFRACTION

ABSTRACT: The results of the published work on the high pressure-high temperature properties of the AB-type compounds have been compiled and evaluated. All pressure studies above the range of 1 kilobar have been included with an emphasis on the accurate charterization of the solid-solid phase boundaries and the experimental melting curves. Whenever x-ray diffraction data are available for the high pressure phases, they have also been reviewed. Phase diagrams are included for all compounds in which measurement of more than one point along the phase boundary was made. This review discusses a total of 87 compounds and 212 distinct high pressure-high temperature phases.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<422>
Meyer, A.; Stott, M.J.; Young, W.H. (Queen's Univ., Kingston, Ontario (Canada). Dept. of Physics)

Densities of electronic states in liquid transition metals AIX-07:245437;EDB-76:071328; Philos. Mag. (PHMAA) 33:(2):381-385 (Feb 1976)

SUBJECT DESCRIPTORS: CHROMIUM;COBALT;CRYSTAL STRUCTURE;DENSITY;ENERGY-LEVEL DENSITY: Q1;ENTROPY;EQUATIONS OF STATE;FERMI LEVEL;IRON;LIQUID METALS;MANGANESE;NICKEL;PALLADIUM;PLATINUM;TITANIUM;TRANSITIO ELEMENTS: T1;VANADIUM;ZIRCONIUM

ABSTRACT: Measured structure factors and entropies are used to obtain, very directly, the electronic contributions to be

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<422> CONT.
entropies and hence the densities of states at the Fermi levels in some liquid transition metals.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<423>
Meyer, A.S. ** Lyon, W.S. (comp.), Oak Ridge National Lab., Tenn. (USA)

Energy programs: molten-salt reactor program In Analytical Chemistry Division annual progress report for period ending November 30, 1975 **
ERA-01:013775;INS-76:014730;EDB-76:049027; (Feb 1976)
ORNL--5100

SUBJECT DESCRIPTORS: CATIONS;CHEMICAL ANALYSIS: Q1;CHEMICAL REACTIONS;MOLTEN SALTS: T1;VALENCE

ABSTRACT: Progress is reported in studies on electrochemical in-line measurements in fuel systems. Results of studies of the electrochemical behavior of Fe, and Te in fuel melts are given. At the Coolant-Salt Technology Facility (CSTF), first measurements were made on the tritium distribution within the system. Spectrophotometric methods were used to identify and characterize various oxidation states and compounds of actinide ions. (JGB)

EDB SUBJECT CATEGORY: EDB-400104;400400
INIS CATEGORY: B11

<424>
Michaille, P.; Kikindai, T. (Ecole Centrale des Arts et Manufactures, 92 - Chatenay-Malabry (France))

Effect of fluoride ions on the kinetics of the oxidation of uranium(IV) by cerium(IV) AIX-08:312240;EDB-77:095034; J. Inorg. Nucl. Chem. (JINCA) 39:(3):493-497 (1977)

SUBJECT DESCRIPTORS: ANIONS;CERIUM COMPLEXES;CERIUM FLUORIDES;CERIUM HYDROXIDES;CHEMICAL REACTION KINETICS;OXIDATION: Q1;SPECTROPHOTOMETRY;URANIUM: T1;URANIUM COMPOUNDS

ABSTRACT: The equilibrium constants of the two fluoro-complexes of the cerium(IV) ion were calculated from spectrophotometric measurements; at [HClO$sub 4$] = 0.5 M, I = 2.0 M (adjusted by NaClO$sub 4$) and t = 20$sup 0$C, the values K$sub 1$ =[CeOHF$sup 2+$][H$sup +$]/[CeOH$sup 3+$][HF] = 41000 + 2000 and K$sub 2$ = [CeF$sub 2$$sup 2+$]/CeOHF$sup 2+$][HF] = 3120

<424> CONT.
+- 50 M$sup -1$ were found. These values were used to interpret the effect of the fluoride ions on the kinetics of the Ce(IV)-U(IV) reaction studied in the same conditions with a stopped-flow spectrophotometer: a maximum of the rate constant is obtained when two fluoride ions are involved, but the reaction cannot proceed through reaction paths involving more fluoride ions; the reaction paths that involve one or two fluoride ions also involve one hydroxyl ion; the rate law that takes into account the predominant reactive species may be written: -d[Cesup(IV)]/dt = v$sub 0$[CeOH$sup 3+$][U$sup 4+$] + vsub(I)[CeOHF$sup 2+$][U$sup 4+$] + vsub(II)[CeOHF$sup 2+$][UF$sup 3+$], where v$sub 0$ = 14600 M$sup -1$sec$sup -1$, vsub(I) = 38670 M$sup -1$sec$sup -1$ and vsub(II) = 70570 M$sup -1$sec$sup -1$. A bridge mechanism is discussed from the comparison of these results with those obtained at low sulfate concentrations.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<425>
Miedema, A.R. (Philips Research Labs., Eindhoven, Netherlands); de Boer, F.R.; Boom, R. ** Lundin, C.E. (ed.)

Heat of formation of solid and liquid alloys of transition metals In Proceedings of the 12th rare earth research conference. Vol. II **
ERA-02:060317;INS-77:017495;EDB-77:140388; (1976) Univ. of Denver

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE: Q1;FORMATION HEAT: Q1;LIQUID METALS;MATHEMATICAL MODELS;TRANSITION ELEMENT ALLOYS: T1

ABSTRACT: Energy effects in alloys of transition metals are shown to be predominantly nearest-neighbor effects whereas both crystal structure and entropy effects are relatively unimportant. The model description predicts the sign of $delta$H (is the interaction repulsive or attractive) for binary systems with 99% accuracy. Progress is made toward the prediction of numerical values for both heats of formation of solid compounds and heats of mixing of liquid alloys. (GHT)

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

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<426>
Mikhailichenko, A.I.; Abramov, L.A.; Dozhdeva, N.M.

Tetrad effect in the extraction of the lanthanides with neutral oxygen-containing compounds EDB-76:066299; Sov. Radiochem. (Engl. Transl.) (SVRDA) 17:(3):349-351 (1975)

SUBJECT DESCRIPTORS: ATOMIC NUMBER;CHEMICAL PROPERTIES: Q1;CHLORIDES;DISTRIBUTION FUNCTIONS: Q1;NITRATES;PETROLEUM PRODUCTS;RARE EARTHS: M1;SOLVENT EXTRACTION: Q1;SULFOXIDES;TBP;THIOCYANATES

ABSTRACT: The distribution of the lanthanides in the extraction of their nitrates, chlorides, and thiocyanates by neutral oxygen-containing extraction reagents (in 12 systems) was studied. In all the systems on the curves of the distribution coefficient versus atomic number of the element, four subgroups of the elements (four tetrads) appear: La, Ce, Pr, Nd; Pm, Sm, Eu, Gd; Gd, Tb, Dy, Ho; and Er, Tm, Yb, Lu. Between Nd and Pm there is a junction of the first and second tetrads, and between Ho and Er that of the third and fourth. The second and third tetrads are in contact on Gd, and moreover, Gd is the last element of the second tetrad and simultaneously the first element of the third tetrad.

EDB SUBJECT CATEGORY: EDB-400201;400105

<427>
Mikhajlov, M.A.; Ehpov, D.G.; Shchetinina, G.P.; Barinova, M.V. (AN SSSR, Vladivostok. Inst. Khimii)

Thermogravimetric investigation of interaction of some rare earth oxides with ammonium bifluoride EDB-76:036914; Izv. Sib. Otd. Akad. Nauk SSSR, Ser. Khim. Nauk (IZSKA) (9):114-119 (Jul 1974)

SUBJECT DESCRIPTORS: AMMONIUM COMPOUNDS: T6;CHEMICAL REACTION KINETICS: Q1,Q2,Q3,Q4,Q5,Q6;CHEMICAL REACTIONS;DYSPROSIUM OXIDES: T5;FLUORIDES;FORMATION HEAT;GADOLINIUM OXIDES: T4;INFRARED SPECTRA;NEODYMIUM OXIDES: T2;OXIDES;PRASEODYMIUM OXIDES: T1;RARE EARTH COMPOUNDS;SAMARIUM OXIDES: T3;THERMAL GRAVIMETRIC ANALYSIS;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<428>
Mintz, M.H.; Hadari, Z. (Israel Atomic Energy Commission, Beersheba. Nuclear Research Center-Negev); Bixon, M. (Tel Aviv Univ. (Israel). Dept. of Chemistry)

Thermodynamic study of the neptunium-hydrogen system
AIX-08:280946;EDB-77:037068; J. Less-Common Met. (JCOMA) 48:(1):183-186 (Jul 1976)

SUBJECT DESCRIPTORS: FORMATION FREE ENERGY;FORMATION HEAT;HYDROGEN;NEPTUNIUM;NEPTUNIUM HYDRIDES: T1;PHASE STUDIES: Q1

ABSTRACT: The neptunium-hydrogen system has been investigated previously by Mulford and Fiewandt (1965) who found two hydride phases. One phase, NpH$sub 2$+x (0 < x < 0.7) has a fcc crystal structure and the other phase, NpHsub(3-x), has a hcp structure. An anomalous behavior of the cubic NpH$sub 2$ phase was found at the lower composition limit as the hydrogen content increases with increasing temperature. Another anomalous trend may be shown to exist in the thermodynamic values calculated from the pressure-composition isotherms. When partial molal enthalpies and entropies are calculated for the homogeneity range of the cubic, non-stoichiometric NpHsub(2+x) (by plotting log P vs. 1/T, for a fixed value of x), it is found that $delta$H values are independent of hydrogen composition (x), whereas $delta$S decreases (becomes more negative) with increasing x. Both results contradict conventional statistical-thermodynamic derivations which are applied to metal-hydrogen systems. The present note reinvestigates the neptunium-hydrogen system and establishes whether such anomalous thermodynamic behavior really exists.

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B22

<429>
Montgomery, R.L., Bureau of Mines, Reno, Nev. (USA)

In Electronegativities of the rare-earth elements **
EDB-77:120756; (May 1959) BM-RI--5567

SUBJECT DESCRIPTORS: ELECTRONEGATIVITY: Q1;FORMATION HEAT;HALIDES;HYDRIDES;NITRIDES;OXIDES;RARE EARTHS: T1;SULFATES;SULFIDES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201

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<430>
Morachevskii, A.G.; Demidov, A.I.; Gerasimenko, L.N.; Bikina, G.V.

In Current yield during separation of lithium on a liquid bismuth cathode ** ERA-02:001179;EDB-76:081853; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) 17:(3):94-95 (1974) UCRL-Trans--11105

SUBJECT DESCRIPTORS: CURRENT DENSITY;EFFICIENCY: Q2;ELECTRODEPOSITION: Q1;ELECTROLYTIC CELLS: T2;EUTECTICS;LITHIUM: T1;LITHIUM CHLORIDES;LITHIUM FLUORIDES;MOLTEN SALTS

ABSTRACT: The current efficiency in a fused eutectic LiCl--LiF electrolytic cell was studied as a function of current density, volumetric concentration of Li, and surface concentration of Li. The curve for the current density dependence passes through a maximum and therefore at high current densities the current yield decreases. For both the volumetric and surface Li concentrations there is first a slow decrease in current yield followed by a sharp decrease. (JSR)

EDB SUBJECT CATEGORY: EDB-400400;400105

<431>
Moravec, J.; Sara, V.; Sourkova, L.

Quantitative determination of UO$sub 2$, and ThO$sub 2$ in powdery mixtures by infrared spectrometry EDB-76:036856; J. Radioanal. Chem. (JRACB) 28:(1-2):119-123 (1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTROSCOPY: Q1,Q2;COMPUTER CODES;INFRARED SPECTRA;NUCLEAR FUELS;PLUTONIUM DIOXIDE;POWDERS;QUANTITATIVE CHEMICAL ANALYSIS;THORIUM OXIDES: T1;URANIUM DIOXIDE: T2

ABSTRACT: Infrared spectra of powdery mixtures of UO$sub 2$ and ThO$sub 2$ were quantitatively evaluated with a computer. The computer program was tested using the spectra of sulfates. Preliminary results were given and a possible use of this method for analyzing the mixtures of UO$sub 2$ with PuO$sub 2$ was suggested. (auth)

EDB SUBJECT CATEGORY: EDB-400104

<432>
Moret, J.M.; Lacroix, R. (Geneva Univ. (Switzerland))

Effect of temperature on the fine structure of Eu$sup 2+$ in KCl and KI AIX-07:276246;EDB-77:027679; Helv. Phys. Acta (HPACA) 49:(3):313-323 (18 Jun 1976)

SUBJECT DESCRIPTORS: DOPED MATERIALS;ELECTRON SPIN RESONANCE;ENERGY-LEVEL TRANSITIONS;EUROPIUM IONS: T1;FINE STRUCTURE: Q1,Q2,Q3;LOW TEMPERATURE;MEDIUM TEMPERATURE;ORTHORHOMBIC LATTICES;POTASSIUM CHLORIDES: T2;POTASSIUM IODIDES: T3;TEMPERATURE DEPENDENCE;ULTRALOW TEMPERATURE;VERY LOW TEMPERATURE

ABSTRACT: The effects of temperature variation (between 5 and 296$sup 0$K) and isotropic pressure variation (between 1 and 75 kgf/mm$sup 2$) on the fine structure parameters bsub(k)sup(q) of Eu$sup 2+$ in KCl and KI has been studied by electron paramagnetic resonance. The symmetry of the centre is orthorhombic (Csub(2$gamma$)) and only variations of b$sub 2$$sup 0$, b$sub 2$$sup 2$ and b$sub 4$$sup 2$ are important. A microscopic description of bsub(k)sup(q) is proposed, the temperature dependence is attributed partly to lattice dilatation and partly to two local modes which are revealed by vibronic structure of optical (f-d) transitions of Eu$sup 2+$.

EDB SUBJECT CATEGORY: EDB-640302
INIS CATEGORY: A12

<433>
Morozov, A.I. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Pressure and composition of vapors over alkali metal tetrachloroferrates in chlorine atmosphere EDB-76:036733; Zh. Neorg. Khim. (ZNOKA) 20:(4):955-960 (Apr 1975)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;CHEMICAL COMPOSITION;CHLORINE;IRON CHLORIDES: T2;MOLTEN SALTS;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1,Q2;VAPOR PRESSURE;VAPORS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B12

<434>

<434>
Morozov, A.I.; Kanashvili, N.V.; Morozov, I.S.; Gaprindashvili, V.N. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

NdCl$sub 3$-AlCl$sub 3$-NaCl system AIX-08:295345;EDB-77:056225; Zh. Neorg. Khim. (ZNOKA) 21:(7):1909-1912 (Jul 1976)

SUBJECT DESCRIPTORS: ALUMINIUM CHLORIDES: T1;CRYSTALLIZATION;HIGH TEMPERATURE;NEODYMIUM CHLORIDES: T2;PHASE DIAGRAMS: Q1,Q2,Q3;QUANTITY RATIO;SODIUM CHLORIDES: T3;TEMPERATURE DEPENDENCE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<435>
Morozov, A.I.; Maksyukova, E.V. (AN SSSR, Moscow. Inst. Obshchei i Neorganicheskoi Khimii)

FeCl$sub 3$-MeCl systems AIX-07:265084;EDB-77:013486; Zh. Neorg. Khim. (ZNOKA) 20:(7):2001-2003 (Jul 1975)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CESIUM CHLORIDES: T1;IRON CHLORIDES: T2;LITHIUM CHLORIDES: T3;MELTING POINTS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;RUBIDIUM CHLORIDES: T4;THERMAL ANALYSIS

ABSTRACT: Phase diagrams of FeCl$sub 3$-MeCl(Me-Li,Rb,Cs) systems was studied by thermal analysis. Investigated systems belong to the congruence melted type. Compound LiFeCl$sub 4$ is melted at 163$sup 0$C, RbFeCl$sub 4$ -330$sup 0$C, CsFeCl$sub 4$ -383$sup 0$C.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<436>
Moser, Z.; Zakulski, W.

Interaction parameters in the Zn--Pb--Sn system at low zinc concentration ERA-01:016577;EDB-76:042162; J. Electrochem. Soc. (JESOA) 122:(5):691-698 (May 1973)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;ELECTROMOTIVE FORCE;LEAD ALLOYS: T2;LIQUID METALS;TERNARY ALLOY SYSTEMS;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;TIN ALLOYS: T3;ZINC ALLOYS: T1

ABSTRACT: The thermodynamic properties of liquid dilute zinc

<436> CONT.
solutions at a lead concentration of X/sub Pb/ = 0.01 to 0.7 molar fraction were determined by means of emf measurements of concentration cells. These investigations combined with previous analogical experiments at a tin concentration of X/sub Sn/ = 0.01 to 0.1 molar fraction enabled the calculation of ternary interaction parameters. The binary end-points were determined from separate measurements carried out on Zn--Sn and Zn--Pb systems at concentrations up to 0.1 molar fraction of zinc. Experimental results were interpreted by means of Krupkowski's formalism and attempts were made to calculate the interaction parameters on the basis of limiting values of activity coefficients of components of binary systems Zn--Sn, Zn--Pb, and Pb--Sn.

EDB SUBJECT CATEGORY: EDB-360102;360104

<437>
Moshnerova, I. (Statni Vyzkumny Ustav pro Stavbu Stroju, Bechovice (Czechoslovakia)) ** AN Belorusskoj SSR, Minsk. Inst. Teplo- i Massoobmena

Periodically variable wall temperature effect on heat transfer in liquid metals In Abstracts of papers and communications submitted to the 5. all-union heat and mass transfer conference ** AIX-08:299402;EDB-77:075738; (1976) INIS-mf--3284

SUBJECT DESCRIPTORS: ANALYTICAL SOLUTION;BOUNDARY CONDITIONS;HEAT TRANSFER: Q1;LIQUID METALS: T1;TEMPERATURE EFFECTS;TIME DEPENDENCE;TUBES;WALLS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-420400
INIS CATEGORY: E11

<438>
Mueller-Buschbaum, H., Kiel Univ. (Germany, F.R.). Inst. fuer Anorganische Chemie

In Structural or solid state chemistry of rare earth sesquioxides from Goldschmidt to the present time ** AIX-07:262557;EDB-77:050763; (1976) AED-Conf--76-033-004

SUBJECT DESCRIPTORS: CHEMISTRY;CRYSTAL STRUCTURE: Q1,Q2;LANTHANUM OXIDES: T1;PHASE DIAGRAMS;PHASE TRANSFORMATIONS;RARE EARTH COMPOUNDS: T2;SOLIDS;VALENCE

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<438> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<439>
Mukhina, I.Yu.

Some regularities of the corrosion behavior of binary magnesium alloys EDB-77:132810; Izv. Akad. Nauk SSSR, Met. (IZNMA) (2):206-213 (1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;CORROSION: Q1,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18,Q9,Q20,Q21,Q22,Q23;CORROSIVE EFFECTS: Q2;ELECTROCHEMISTRY;MAGNESIUM ALLOYS: T1;SODIUM CHLORIDES: T2;SOLUBILITY;STABILITY

ABSTRACT: A study is made of the influence of 26 alloying elements Li, Cu, Ag, Be, Ca, Zn, Cd, Al, Ga, In, Tl, Sc, Y, La, Ce, Pr, Nd, Sm, Si, Sn, Pb, Sb, Bi, Ti, Zr and Mn on: (a) the corrosion rate of magnesium in a 3% solution of sodium chloride and in a moist atmosphere; (b) the change in the potentials of polarization characteristics and hydrogen overvoltage in a 3% sodium chloride solution. A regular change in the corrosion properties of Mg-Me alloys was found as a function of atomic number of the alloying metal and its position in the periodic table. The corrosion resistance of the alloys studied improves in each group of the periodic table with increasing atomic number of the alloying element, decreasing electronegativity, increasing solubility in magnesium and decreasing stability of intermetallic compounds formed with magnesium. The electrochemical characteristics also change regularly in all groups and periods according to the change in corrosion resistance. These regularities in the change in corrosion properties of alloys in binary systems are explained by three factors: the electrochemical factor, valence of the dissolved element and the volumetric factor. 5 References.

EDB SUBJECT CATEGORY: EDB-360105

<440>
Munir, Z.A.; Veerkamp, G.R., California Univ., Davis (USA). Dept. of Engineering

In Investigation of the parameters influencing the microstructure of hot-pressed boron carbide **
INS-08:019475;ERA-02:001058;EDB-76:087293; (Nov 1975)
UCRL--13673

SUBJECT DESCRIPTORS: ALUMINIUM;ALUMINIUM FLUORIDES;BORON CARBIDES: T1;COMPACTS;DENSITY;ELECTRON PROBES;FRACTURE PROPERTIES;GRAIN SIZE;HOT PRESSING;MAGNESIUM;MECHANICAL PROPERTIES;MICROHARDNESS;MICROSTRUCTURE: Q1;PHASE DIAGRAMS;SOLUBILITY;VERY HIGH TEMPERATURE

ABSTRACT: An investigation was conducted to determine the influence of various parameters on the microstructure of hot-pressed boron carbide compacts. It was determined that a critical temperature (approximately 2200$sup 0$C) was necessary to suppress exaggerated grain growth, and that exaggerated growth was also enhanced at higher pressures within the pressure range investigated. Microhardness examinations and twin density analyses were also performed, both of which demonstrated a primary dependence on grain size, with a secondary dependence occurring between microhardness and pressure and twin density and temperature. Fracture analysis indicated a mixed intergranular-transgranular fracture mode, with transgranular fracture predominating at smaller grain sizes. Also, observed bend strengths of fracture specimens are in resonable agreement with reported values. Electron microprobe scanning was performed on B$sub 4$C, B$sub 4$C + AlF$sub 3$, and B$sub 4$C + MgF$sub 2$. The results indicated a solubility of Al and Mg in the lattice. X-ray analysis was also conducted on B$sub 4$C + 10 percent AlF$sub 3$ specimens, and tended to confirm the formation of a B$sub 12$C$sub 2$Al compound, which apparently assumes an expanded B$sub 4$C unit cell configuration.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<441>
Murch, G.E. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences)

Monte Carlo analysis of diffusion and thermodynamics in UO/sub 2+x/
AIX-07:236459;EDB-76:092581; Philos. Mag. (PHMAA) 32:(6):1129-1140 (Dec 1975)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CRYSTAL DEFECTS;DIFFUSION: Q1,Q2;ENTROPY;MATHEMATICAL MODELS;MONTE

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<441> CONT.
CARLO METHOD;OXYGEN: T2;TRACER TECHNIQUES;URANIUM DIOXIDE: T1;VARIATIONS;VERY HIGH TEMPERATURE

ABSTRACT: The variation of the tracer oxygen diffusion coefficient with composition has been investigated using a modified Monte Carlo method. A model which assumes a distribution of Willis 2:2:2 defect clusters subject to a short-range defect-defect interaction gives reasonable agreement with available tracer diffusion data at 800$sup 0$C. Satisfactory agreement with entropy data can also be obtained with the same model provided that a realistic electronic contribution is included.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<442>
Murch, G.E.; Thorn, R.J. (Argonne National Lab., Ill. (USA))

Thermodynamics of non-stoichiometry. A model for UC/sub x/
AIX-07:272434;EDB-77:026229; Philos. Mag. (PHMAA) 34:(2):299-309 (Aug 1976)

SUBJECT DESCRIPTORS: CARBON;CRITICAL TEMPERATURE;CRYSTAL MODELS;ENTHALPY;ENTROPY;FCC LATTICES;MONTE CARLO METHOD;SQUARE-WELL POTENTIAL;TEMPERATURE DEPENDENCE;THERMODYNAMICS: Q1;URANIUM CARBIDES: T1

ABSTRACT: The partial molar properties of carbon in UCsub(x), 1greater than or equal to x less than or equal to2.0 described in terms of an f.c.c. lattice gas model in which the C$sub 2$ groups attract only when they are nearest neighbours. A modified Monte Carlo method is used to calculate directly the chemical potential as a function of x and temperature. Satisfactory agreement is obtained between the calculated and experimental values of the partial molar entropy and enthalpy of carbon. The nearest neighbour interaction energy (attractive) is -1.91 kcals mole$sup -1$ and was calculated from the critical temperature.

EDB SUBJECT CATEGORY: EDB-360204;400702
INIS CATEGORY: B12

<443>
Nafikova, S.Kh.; Reshetnikova, L.P.; Novoselova, A.V. (Moskovskij Gosudarstvennyj Univ. (USSR). Kafedra Neorganicheskoj Khimii)

RbF-NdF$sub 3$ system AIX-08:286120;EDB-77:044316; Zh. Neorg. Khim. (ZNOKA) 21:(9):2521-2524 (Sep 1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;CHEMICAL COMPOSITION;DIFFERENTIAL THERMAL ANALYSIS;LATTICE PARAMETERS;NEODYMIUM FLUORIDES: T1;PHASE DIAGRAMS: Q1,Q2;RUBIDIUM FLUORIDES: T2;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<444>
Nafikova, S.Kh.; Reshetnikova, L.P.; Efremov, V.A.; Novoselova, A.V.

Interaction of rubidium and cesium fluorides with lutetium trifluorides AIX-08:292423;EDB-77:050879; (VMUKAVestn. Mosk. Univ., Ser. II. Khim.) 17:(4):506 (Jul 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<445>
Nagai, S.; Hatakeyama, F.; Furuya, H.; Koizumi, M. (Power Reactor and Nuclear Fuel Development Corp., Tokai, Ibaraki (Japan). Tokai Works)

Vaporization behavior of UO$sub 2$ AIX-08:315109;ERA-02:045119;EDB-77:105137; Koon Gakkai-Shi (KGAKD) 2:(3):144-147 (May 1976)

SUBJECT DESCRIPTORS: CATIONS;CHEMICAL REACTION KINETICS;EQUILIBRIUM;EVAPORATION;IONIZATION;TEMPERATURE DEPENDENCE;URANIUM DIOXIDE: T1;VAPORIZATION HEAT: Q1;VERY HIGH TEMPERATURE

ABSTRACT: The vaporization of UO$sub 2$ was investigated by mass spectrometric method over the range of temperature 1836$sup 0$C to 2036$sup 0$C. From the temperature dependence of the

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<445> CONT.
ion intensities of UO$sub 2$$sup +$, heat of vaporization of UO$sub 2$ was 136.7 +- 6 kcal/mole.

EDB SUBJECT CATEGORY: EDB-050700;360204
INIS CATEGORY: B23

<446>
Nagibina, L.E.; Vakhobov, A.V.; Dzhuraev, T.D. (AN Tadzhikskoj SSR, Dushanbe. Inst. Khimii)

Calculation of thermodynamic activity of components in strontium liquid alloys AIX-08:283331;EDB-77:036738; Zh. Fiz. Khim. (ZFKHA) 50:(3):806 (Mar 1976)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;EQUILIBRIUM;INTERMETALLIC COMPOUNDS;LIQUID METALS;PHASE DIAGRAMS;STRONTIUM ALLOYS: T1;THERMODYNAMIC PROPERTIES: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<447>
Nair, V.R.; Mishra, S.L.; Murthy, T.K.S., Bhabha Atomic Research Centre, Bombay (India). Chemical Engineering Div.

In Determination of thorium in rare earths chloride: coprecipitation with cerium (IV) iodate and spectrophotometric determination with thoron **
ERA-01:020178;EDB-76:054243; (1975) BARC--814

SUBJECT DESCRIPTORS: CARRIERS;CHEMICAL ANALYSIS: Q2;CHLORIDES;COPRECIPITATION;RARE EARTH COMPOUNDS: T2;SPECTROPHOTOMETRY: Q1;THORIUM: T1;THORIUM 234;TRACER TECHNIQUES

ABSTRACT: A method for the determination of small amounts of thorium in rare earth chloride is described. This is based on the coprecipitation of thorium as iodate using cerium(IV) as carrier and final spectrophotometric determination with thoron. The efficiency of the precipitation has been checked by using $sup 234$Th as tracer. (auth)

EDB SUBJECT CATEGORY: EDB-400104

<448>
Naito, K.; Kamegashira, N. ** Henley, E.J. (ed.)

High temperature chemistry of ceramic nuclear fuels with emphasis on nonstoichiometry In Advances in nuclear science and technology. Vol. 9 **
INS-77:009011;ERA-02:035846;EDB-77:072620; (1976) Academic Press Inc.

SUBJECT DESCRIPTORS: BIBLIOGRAPHIES;CRYSTAL DEFECTS;CRYSTAL STRUCTURE;DIFFUSION;ELECTRIC CONDUCTIVITY;EVAPORATION;NUCLEAR FUELS: T3;PHASE DIAGRAMS: Q1,Q2;PHASE TRANSFORMATIONS;STOICHIOMETRY;THERMODYNAMIC PROPERTIES: Q3;URANIUM CARBIDES: T2;URANIUM OXIDES: T1

ABSTRACT: Phase equilibria of ceramic nuclear fuels are reviewed. Sections are included on phase equilibria and defect structures, diffusion, and vaporization. (JRD)

EDB SUBJECT CATEGORY: EDB-050700;360202
INIS CATEGORY: B23

<449>
Nakagawa, I. (Government Industrial Research Inst., Nagoya (Japan))

Electrode potentials of tantalum chlorides in a molten NaCl-KCl eutectic AIX-07:254856;EDB-76:071599; Nippon Kagaku Kaishi (NKAKB) 1975:(6):958-962 (Jun 1975)

SUBJECT DESCRIPTORS: EQUILIBRIUM;EUTECTICS;MOLTEN SALTS;POTASSIUM CHLORIDES;REDOX POTENTIAL: Q1;SODIUM CHLORIDES: T1;TANTALUM CHLORIDES;TEMPERATURE DEPENDENCE

ABSTRACT: The electrode potentials of tantalum chlorides in an eutectic mixture of molten sodium and potassium chlorides were measured against a silver-silver chloride reference electrode. Potential of the reference electrode was referred to a chlorine electrode at the temperature range between 750 and 850$sup 0$C. In equilibrium state with Ta metal, Ta(IV)+Ta=2Ta(II) was considered at relatively low concentration of tantalum ions in the melt. The standard potentials, E$sup 0$sub(Ta/Ta(II)) and E$sup 0$sub(Ta/Ta(IV)) and the redox potential, E$sup 0$sub(Ta(II)/Ta(IV)) were determined as follows: E$sup 0$sub(Ta/Ta(II)/V$sub 0$(+))=-1.81+5.6x10$sup -4$ T/$sup 0$K E$sup 0$sub(Ta/Ta(IV)/V$sub 0$(+))=-1.80+7.7x10$sup -4$ T/$sup 0$K E$sup 0$sub(Ta(II)/Ta(IV)/V$sub 0$(+))=-1.79+9.8x10$sup -4$ T/$sup 0$K where T is absolute temperature. The equilibrium constant, K, of the reaction Ta(IV)+Ta=2Ta(II) in the melt

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<449> CONT.
was expressed in the following equation, logK=-(13/T)+0.54 (auth.).

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<450>
Nakagawa, I. (Government Industrial Research Inst., Nagoya (Japan))

Electrochemistry of niobium and tantalum, (5). Anodic dissolution of tantalum and the average valence of tantalum ions in molten KCl AIX-08:300854;EDB-77:089305: Nagoya Kogyo Gijutsu Shikensho Hokoku (NKGSA) 25:(2-3):64-69 (Feb 1976)

SUBJECT DESCRIPTORS: ANODES;CATIONS;CURRENT DENSITY;DISSOLUTION;ELECTROCHEMISTRY: Q1;ELECTROLYSIS;EQUILIBRIUM;MOLTEN SALTS;POTASSIUM CHLORIDES;QUANTITY RATIO;TANTALUM: T1;TANTALUM CHLORIDES;VALENCE

ABSTRACT: The average valence of the dissolved Ta ions was determined by coulometry. It was 3--4 in case of the mole fraction of the Ta being below 10$sup -3$, the anodic current density less than 80 mA/cm$sup 2$ and the temperature 800$sup 0$C. The average valence increased with increase in the quantity of electricity, and decreased with increase in the surface area ratio of the tantalum anode to the tantalum cathode. At tantalum mole fraction concentrations of above 10$sup -3$ and anodic current densities of more than 80 mA/cm$sup 2$, Ta(V) ion was predominantly generated. The equilibrium between tantalum ions and tantalum metal can be described as: Ta(IV) + Ta(S) = 2Ta(II) (auth.).

EDB SUBJECT CATEGORY: EDB-400400
INIS CATEGORY: B12

<451>
Nakagawa, I. (Government Industrial Research Inst., Nagoya (Japan)); Kirihara, T.

Electrochemistry of niobium and tantalum. VI. Electrode potentials of tantalum chlorides in molten KCl AIX-08:305613;EDB-77:107434; Nagoya Kogyo Gijutsu Shikensho Hokoku (NKGSA) 25:(2):70-75 (Feb 1976)

SUBJECT DESCRIPTORS: CURRENT DENSITY;ELECTROCHEMISTRY: Q2;ELECTROLYSIS;EQUILIBRIUM;MOLTEN SALTS;POTASSIUM CHLORIDES;REDOX POTENTIAL: Q1;TANTALUM: T2;TANTALUM CHLORIDES: T1;TEMPERATURE DEPENDENCE;VALENCE

<451> CONT.

ABSTRACT: The electrode potentials of tantalum chlorides in molten potassium chloride were measured by using a silver-silver chloride reference electrode. Potentials of the reference electrode were referred to a chlorine electrode in the temperature range from 775 to 875$sup 0$C. The standard potentials, E$sup 0$sub(Ta/Ta(II)), and E$sup 0$sub(Ta/Ta(IV)), and the redox potential E$sup 0$sub(Ta(II)/Ta(IV)) were determined as follows: (A) E$sup 0$sub(Ta/Ta(II))/V$sub 0$(+) = -1.67+6.4x10$sup -4$T/K (up to 4x10$sup -4$mol. fract.), E$sup 0$sub(Ta/Ta(IV))/V$sub 0$(+) = -2.01+7.7x10$sup -4$T/K, and E$sup 0$sub(Ta(II)/Ta(IV))/V$sub 0$(+) = -2.35+9.0x10$sup -4$T/K; (B) E$sup 0$sub(Ta/Ta(II))/V$sub 0$(+) = -1.74+7.2x10$sup -4$T/K (above 4x10$sup -4$mol. fract.), E$sup 0$sub(Ta/Ta(IV))/V$sub 0$(+) = -1.65+5.0x10$sup -4$T/K, and E$sup 0$sub(Ta(II)/Ta(IV))/V$sub 0$(+) = -1.56+2.8x10$sup -4$T/K. The equilibrium constants (K) of the reaction Ta(IV)+Ta=2Ta(II) in the melt were expressed in the following equations, (A) log K = -2.6 - 6817/T, and (b) log K = -4.4 + 1804/T.

EDB SUBJECT CATEGORY: EDB-400400
INIS CATEGORY: B12

<452>

Nakajima, T.; Nakanishi, K.; Watanabe, N. (Kyoto Univ. (Japan). Faculty of Engineering)

Dispersion of metallic lithium in various molten salts

AIX-07:259592;EDB-77:030776; Nippon Kagaku Kaishi (NKAKB) 1975:(4):617-621 (Apr 1975)

SUBJECT DESCRIPTORS: CALCIUM CHLORIDES;DISPERSIONS: Q1;EUTECTICS;GASES;LITHIUM: T1;LITHIUM CHLORIDES;LITHIUM FLUORIDES;LITHIUM NITRIDES;LITHIUM OXIDES;MOLTEN SALTS;NITROGEN;OXYGEN;POTASSIUM CHLORIDES;POTASSIUM FLUORIDES;SODIUM CHLORIDES;SOLUBILITY

ABSTRACT: The dispersion of metallic lithium in various molten salts was studied at constant partial pressures of nitrogen or oxygen gas. The increase of dispersed lithium amounts in the presence of nitrogen gas was more rapid than that in the presence of oxygen gas. A large amounts of lithium dispersed in LiCl and LiCl-KCl eutectic mixture where the solubilities of lithium oxide or nitride were almost euqal to those in liquid lithium. On the other hand, the amounts of dispersed lithium were small in LiF-LiCl, LiF-KF and NaCl-CaCl$sub 2$

<452>

<452> CONT.
systems, where the solubilities of oxide or nitride were much different from those in lithium.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B12

<453>
Natsume, H.; Matsuura, S.; Okashita, H.; Umezawa, H.; Ezure, H., International Atomic Energy Agency, Vienna (Austria)

In Collection of gamma spectra data of irradiated light water moderated reactor spent fuel and study of the applicability of the methods for fuel identification. Final report for the period 1 February 1972--October 1975 **
AIX-07:242718;ERA-01:025733;EDB-76:074101; (Oct 1975)
IAEA-R--1119-F

SUBJECT DESCRIPTORS: BURNUP;COMPARATIVE EVALUATIONS;DATA;DESTRUCTIVE TESTING;FISSION PRODUCTS;GAMMA FUEL SCANNING: T,Q1,Q2;GAMMA SPECTRA;ISOTOPE RATIO;JPDR REACTOR: T1;MASS SPECTROSCOPY;NONDESTRUCTIVE ANALYSIS;REACTOR OPERATION;SPENT FUEL ELEMENTS: T2;SPENT FUELS;TRANSURANIUM ELEMENTS;URANIUM

ABSTRACT: The gamma spectrometric data are obtained non-destructively on 96 points of a spent fuel assembly of the JPDR-1 by using an on-site gamma scanning facility in the fuel storage pond. Destructive gamma spectrometric, alpha spectrometric, chemical and mass spectrometric analyses are also performed for uranium, transuranium elements and some fission products on the selected 24 samples among the 96 non-destructively measured points. The feasibility of the non-destructive measurements is examined by comparing those results with the results of destructive analyses. Isotopic ratios of various combinations of fission products or heavy nuclides are studied in relation to burn-up and Pu/U ratios. The results show that the relationships are affected by reactor characteristics of BWR and the operation history. The applicability of the isotopic correlations technique is discussed from the standpoint of analysing reactor characteristics and applying them to safeguarding of nuclear materials.

EDB SUBJECT CATEGORY: EDB-210100;400103
INIS CATEGORY: E36

<454>

Nazare, S.; Ondracek, G.; Schulz, B. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung) ** Kernforschungszentrum Karlsruhe (Germany, F.R.). Projekt Nukleare Sicherheit

Properties of corium melts In Semiannual report 1975/2 **
AIX-08:293632;ERA-02:034485;EDB-77:073861; (Jun 1976)
KFK--2262

SUBJECT DESCRIPTORS: CORIUM: T1;DATA;MELTDOWN: T,Q2;MELTING POINTS;PHYSICAL PROPERTIES: Q1;REACTOR CORES: T2;REACTOR MATERIALS;SPECIFIC HEAT;STEELS;THERMAL CONDUCTIVITY;THERMODYNAMIC PROPERTIES;URANIUM DIOXIDE;VISCOSITY;ZIRCALOY

ABSTRACT: In order to describe the behaviour of the molten core as a consequence of a LOCA, data on properties of such melts are required. The properties are however dependent on the chemical composition and structural characteristics of the melts which in turn depend on the oxidation potential of the environment. Available experimental evidence was used to define 4 types of melts based on interaction products between varying compositions of UO$sub 2$-Zry-Steel in either inert, partially or totally oxidizing conditions. A critical review of theoretical and experimental results on properties such as viscosity, heat capacity and thermal conductivity (in the liquid state) was used as a basis to estimate these properties for the various types of Corium melts.

EDB SUBJECT CATEGORY: EDB-220900;360104
INIS CATEGORY: E11

<455>

Nicholson, E.L. Jr., Oak Ridge National Lab., Tenn. (USA)

In PuO$sub 2$ dissolution problem for LWR plutonium recycle and LMFBR fuels: fabrication and reprocessing problems and their resolution ** ERA-02:058488;EDB-77:137284; (Jul 1977)
ORNL/TM--5903

SUBJECT DESCRIPTORS: BWR TYPE REACTORS;CRITICALITY;DISSOLUTION: Q1;FUEL CYCLE: Q2,Q3;FUEL FABRICATION PLANTS;FUEL REPROCESSING PLANTS;LMFBR TYPE REACTORS: T3;PLUTONIUM DIOXIDE: T1;PWR TYPE REACTORS;SOLUBILITY;URANIUM DIOXIDE;WATER COOLED REACTORS: T2

ABSTRACT: A survey was made of the information reported to date for laboratory-scale dissolution experiments on PuO$sub 2$-UO$sub 2$ fuels, of reprocessing plant problems that might be encountered with these fuels, and of the fabrication methods for producing these fuels. The possibility of

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<455> CONT.
producing fuels that will be highly soluble in pure nitric acid without resorting to the use of corrosive fluorides for complete dissolution is examined. The report concludes that production of highly soluble fuel is possible, that it is probably economically justifiable, and that fluorides are not necessary for dissolution. Highly soluble fuel would likely have minimal impact on reprocessing criticality and waste disposal problems. Reactor specifications for PuO$sub 2$-UO$sub 2$ fuels seemingly permit a greater degree of nonhomogeneity than is desirable for achieving high solubility. A fuel solubility criteria is therefore proposed that would limit the amount of insoluble PuO$sub 2$ in irradiated fuels to less than or equal to 0.01 percent of the total amount of plutonium present.

EDB SUBJECT CATEGORY: EDB-050800;050700

<456>
Nickerson, G.M.; Kastenberg, W.E. (California Univ., Los Angeles (USA). Dept. of Energy and Kinetics)

Preliminary assessments of carbide fuel pins during mild overpower transients in LMFBRs
AIX-07:257871;ERA-02:010052;EDB-77:006616; Nucl. Eng. Des. (NEDEA) 32:(2):209-233 (Feb 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;FUEL PINS: T2;GRAIN BOUNDARIES;H CODES;LMFBR TYPE REACTORS: T1;PLUTONIUM CARBIDES;SPECIFIC HEAT;THERMAL CONDUCTIVITY;THERMAL EXPANSION;TRANSIENTS: Q1,Q2;URANIUM CARBIDES

ABSTRACT: Mixed carbide fuel has been proposed for advanced liquid metal fast breeder reactors (LMFBRs). The general characteristics of carbide fuel are reviewed and a survey of available data for use in safety studies is presented. A preliminary investigation of the unprotected transient overpower accident sequence postulated for a large carbide fueled reactor is also presented. The HOPE computer code is the computational tool used to analyse a conceptual core design fueled with mixed carbides of uranium and plutonium. The details of this design are presented and compared with those of the Clinch River Breeder Reactor Plant. Results of HOPE calculations for both helium and sodium bonded carbide fueled cores are presented and compared with a similar study performed on an oxide core. Conclusions are drawn based on

<457> CONT.
the findings of the preliminary transient overpower studies conducted.

EDB SUBJECT CATEGORY: EDB-220900;210500
INIS CATEGORY: E35

<457>
Nisel'son, L.A.; Lyzlov, Y.N.; Solov'ev, S.I.

Phase equilibrium in NdCl$sub 3$-KCl system
AIX-08:339952;EDB-78:017337; Zh. Neorg. Khim. (ZNOKA) 22:(1):180-183 (Jan 1977)

SUBJECT DESCRIPTORS: CRYSTALLIZATION;EQUILIBRIUM: Q1,Q2;LIQUIDS;NEODYMIUM CHLORIDES: T1;PHASE TRANSFORMATIONS;POTASSIUM CHLORIDES: T2;QUANTITY RATIO;VAPORS;VOLATILITY

ABSTRACT: Liquid-steam equilibrium in the NdCl-KCl system has been studied by the boiling point method. A considerable negative deviation of the system from ideal conditions has been established. Concentration dependence of the relative volatility coefficients $alpha$ on liquid phase composition has been found. $alpha$sub(real) decreases monotonously from 4.2 to 1.5 with increasing NdCl$sub 3$ concentration. The equilibrium distribution coefficient has been determined for equilibrium crystals-liquid in the system studied with the aid of directed crystallization. In the region of pure neodymium trichloride the coefficient is equal to 0.24.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<458>
Nisel'son, L.A.; Sokolova, T.D.; Leonov, A.M. (Gosudarstvennyj Nauchno-Issledovatel'skij i Proektnyj Inst. Redkometallicheskoj Promyshlennosti, Moscow (USSR))

Density and viscosity of distillable products from ZrCl$sub 4$ and HfCl$sub 4$ interaction with POCl$sub 3$
AIX-08:295353;EDB-77:056166; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (2):102-103 (1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<459>

<459>
Noda, Y.; Naito, K. (Nagoya Univ. (Japan). Faculty of Engineering)

Thermal conductivity and diffusivity of U$sub 4$Osub(9-y) from 250 to 415 K AIX-08:324324;EDB-77:132966; J. Nucl. Mater. (JNUMA) 66:(1):. 17-22 (1977)

SUBJECT DESCRIPTORS: CRYSTAL LATTICES;INTERSTITIALS;MEAN FREE PATH;MEDIUM TEMPERATURE;PHASE TRANSFORMATIONS;PHONONS;POROSITY;SPECIFIC HEAT;THERMAL CONDUCTIVITY: Q1;THERMAL DIFFUSIVITY: Q1;URANIUM OXIDES: T1

ABSTRACT: The thermal conductivity and diffusivity of U$sub 4$Osub(9-y) with various O/U ratios (2.227, 2.234, 2.254) were measured by means of a scanning temperature method in the temperature range from 250 to 415 K. An anomaly of the second-order phase transition type was revealed by the thermal diffusivity measurements, and the peak temperature for each O/U ratio was in good agreement with that previously obtained from heat capacity measurements. The anomaly was not as clearly observed in the thermal conductivity data as in the thermal diffusivity data. The measured values for thermal conductivity of U$sub 4$Osub(9-y) were very low: from 10$sup -2$ to 2 X 10$sup -2$ W K$sup -1$ cm$sup -1$ over the temperature range investigated, and varied little with temperature. The phonon mean free path values calculated from the thermal conductivity data were very small, and all fell within the range 2.5 to 5.5 A, being higher in the specimens with the lower oxygen content. Mean free path values decreased with increase in temperature, and the rate of decrease was greater in the region of the transition.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<460>
Novikov, I.I.; Proskurin, V.B.; Spiridonova, T.N. (AN SSSR, Moscow. Inst. Metallurgii)

Some structural characteristics of rubidium and cesium in the vicinity of their melting points AIX-07:278273;EDB-77:030829; Zh. Fiz. Khim. (ZFKHA) 50:(7):1657-1660 (Jul 1976)

SUBJECT DESCRIPTORS: CESIUM: T1;COMPARATIVE EVALUATIONS;COMPRESSIBILITY;DENSITY;ELECTRONIC STRUCTURE: Q1,Q2;LIQUID METALS;MELTING POINTS;RUBIDIUM: T2;SOUND WAVES;VELOCITY

<460> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<461>
Novikov, N.I.; Novichkov, V.Kh.; Rybkina, R.D. ** Poletaev, I.F.; Rubajlova, K.M. (eds.), Gosudarstvennyj Nauchno-Issledovatel'skij i Proektnyj Inst. Redkometallicheskoj Promyshlennosti, Moscow (USSR)

Electric conductivity of melts of the LiF-misch metal fluoride system In Rare earth metals ** AIX-08:292433;EDB-77:074898; (1976) INIS-mf--3315

SUBJECT DESCRIPTORS: CERIUM FLUORIDES: T1;ELECTRIC CONDUCTIVITY: Q1,Q2,Q3,Q4,Q5;LANTHANUM FLUORIDES: T2;LITHIUM FLUORIDES: T3;MISCH METAL;MOLTEN SALTS;NEODYMIUM FLUORIDES: T4;PHASE DIAGRAMS;PRASEODYMIUM FLUORIDES: T5;QUANTITY RATIO;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B12

<462>
Novikov, N.I.; Rybkina, R.D.; Novichkov, V.Kh. ** Poletaev, I.F.; Rubajlova, K.M. (eds.), Gosudarstvennyj Nauchno-Issledovatel'skij i Proektnyj Inst. Redkometallicheskoj Promyshlennosti, Moscow (USSR)

Misch metal solubility in melt of LiF-BaF$sub 2$ system In Rare earth metals ** AIX-08:292434;EDB-77:074899; (1976) INIS-mf--3315

SUBJECT DESCRIPTORS: BARIUM FLUORIDES: T2;LITHIUM FLUORIDES: T3;MISCH METAL: T1;MOLTEN SALTS;NEODYMIUM ALLOYS;PRASEODYMIUM ALLOYS;QUANTITY RATIO;SOLUBILITY: Q1;SOLVENT PROPERTIES: Q2,Q3;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603;360104
INIS CATEGORY: B12

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<463>
Novokhatskii, I.A.; Arkharov, V.I.; Prokopenko, V.K. (AN Ukrainskoj SSR, Donetsk. Fiziko-Tekhnicheskij Inst.)

NMR study on structural microinhomogeneity of fluoride-oxide melts AIX-07:271652;EDB-77:018942; Fiz. Tverd. Tela (FTVTA) 17:(5):1520-1522 (May 1975)

SUBJECT DESCRIPTORS: FLUORIDES: T1;FLUORINE 19;HIGH TEMPERATURE;LEAD FLUORIDES;MICROSTRUCTURE: Q1,Q2;NUCLEAR MAGNETIC RESONANCE;ORDER-DISORDER TRANSFORMATIONS;OXIDES: T2;QUANTITY RATIO;SILICON OXIDES;SOLID CLUSTERS;SPECTRA;TEMPERATURE DEPENDENCE;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: A13

<464>
Nowotny, H.; Seifert, K. (Vienna Univ. (Austria). Inst. fuer Physikalische Chemie)

3. Zirconium compounds with non-metals In Zirconium: Physico-chemical properties of its compounds and alloys ** At. Energy Rev., AIX-07:277855;EDB-77:031075; (1976) IAEA

ABSTRACT: The crystal structure and density of various Zr-compounds with non-metals (H, B, C, Si, Ge, N, P, As, Sb, O, S, Se, Te, F, Cl, Br, I) are listed in table form. The values are taken from the literature (Chemical Abstracts up to 1973, references given). Structural type and atomic parameters, crystal system, unit cell dimensions and density of the compounds are given. Lattice parameters are given for some of the compounds as a function of temperature or chemical composition (diagrams). The tables are arranged in the order binary compounds, ternary compounds and complex compounds.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<465>
O'Donnell, T.A.; Waugh, A.B.; Randall, C.H. (Melbourne Univ., Parkville (Australia))

Reactivity of transition metal fluorides. IX. Protactinium pentafluoride and tetrafluoride AIX-08:346257;EDB-78:028035; J. Inorg. Nucl. Chem. (JINCA) 39:(9):1597-1600 (1977)

SUBJECT DESCRIPTORS: CHLORIDES;OXIDATION: Q1;PROTACTINIUM

<465> CONT.
FLUORIDES: T1;REDUCTION: Q1;THERMODYNAMIC ACTIVITY

ABSTRACT: In a continuing survey of the relative reactivities of higher fluorides of d- and f-transition elements, redox reactions of protactinium pentafluoride with selected reductants have been studied. Halogen-exchange reactions with covalent chlorides have been investigated for both the pentafluoride and tetrafluoride. The results of these reactions are correlated with those from previous investigations. Special attention was given to preparative and reaction techniques because of the radioactive nature and because of the small quantities of the compounds available for this work compared with the scale of earlier related studies in this series.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<466>
O'Hare, P.A.G.; Boerio, J.

Cesium nitrate. Standard enthalpies of solution and formation and the standard entropy at 298.15 K
ERA-01:011161;EDB-76:036956; J. Chem. Thermodyn. (JCTDA) 7::937-941 (1975)

SUBJECT DESCRIPTORS: CESIUM NITRATES: T1;ENTROPY: Q1;FORMATION HEAT: Q1;MEDIUM TEMPERATURE;MONOCRYSTALS;SOLUTION HEAT: Q1

ABSTRACT: Calorimetric measurements on single-crystal CsNO$sub 3$ have yielded the standard enthalpy of solution at 298.15 K, $delta$H$sup 0$/sub soln/ = (9639 +- 10) cal/sub th/mol$sup -1$. Based on this value, the standard enthalpy of formation, $delta$H$sup 0$/sub f/(CsNO$sub 3$, c, 298.15 K) was calculated to be -(120.88 +- 0.12)kcal/sub th/mol$sup -1$. Solubility and activity coefficient data for CsNO$sub 3$ gave 779 cal/sub th/mol$sup -1$ for the standard Gibbs energy of solution, $delta$G$sup 0$/sub soln/. Thence, the standard entropy, S$sup 0$(CsNO$sub 3$, c, 298.15 K), was deduced to be (37.1 +- 0.2)cal/sub th/K$sup -1$ mol$sup -1$. (auth)

EDB SUBJECT CATEGORY: EDB-400201

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<467>
O'Hare, P.A.G.; Johnson, G.K.

Lithium nitride (Li$sub 3$N): standard enthalpy of formation by solution calorimetry ERA-01:013733;EDB-76:048938; J. Chem. Thermodyn. (JCTDA) 7::13-20 (1975)

SUBJECT DESCRIPTORS: AMMONIUM CHLORIDES;CALORIMETRY;CHEMICAL REACTIONS;ENTHALPY;FORMATION HEAT: Q1;HYDROCHLORIC ACID;LITHIUM CHLORIDES;LITHIUM NITRIDES: T1;SOLUTION HEAT;WATER

ABSTRACT: The enthalpies of reaction of a carefully prepared and characterized specimen of lithium nitride, Li$sub 3$N, with H$sub 2$O and with HCl(aq) were found to be -(581.62 +- 1.42) kJ mol$sup -1$ [-(139.01 +- 0.34) kcal/sub th/ mol$sup -1$] and -(803.50 +- 1.26) kJ mol$sup -1$ +-(192.04 +- 0.30) kcal/sub th/ mol$sup -1$], respectively. Enthalpies of solution of LiCl and NH$sub 4$Cl were also measured. Combination of the measured results with auxiliary thermochemical data from the literature yielded values of -(165.14 +- 1.55) kJ mol$sup -1$ [-(39.47 +- 0.37) kcal/sub th/ mol$sup -1$] and -(164.77 +- 1.51) kJ mol$sup -1$ [-(39.38 +- 0.36) kcal/sub th/ mol$sup -1$], respectively, for the standard enthalpy of formation, $delta$H$sup 0$/sub f/(Li$sub 3$N, c, 298.15$sup 0$K). A weighted mean value, -(164.93 +- 1.09) kJ mol$sup -1$ [-(39.42 +- 0.26) kcal/sub th/ mol$sup -1$], is recommended for $delta$H$sup 0$/sub f/(Li$sub 3$N, c, 298.15$sup 0$K). This result differs by about 8 kcal/sub th/ mol$sup -1$ from previous determinations. (auth)

EDB SUBJECT CATEGORY: EDB-360603

<468>
Oden, L.L.; Sanker, P.E.; Babitzke, H.R.; Sumner, D.H., Bureau of Mines, Albany, Oreg. (USA). Albany Metallurgy Research Center

In Phase relations in the alkaline earth fluoride-yttria systems (in three parts). 1. The CaF$sub 2$--Y$sub 2$O$sub 3$ phase diagram ** EDB-77:120762; (Oct 1970) BM-RI--7437

SUBJECT DESCRIPTORS: CALCIUM FLUORIDES: T1;DIFFERENTIAL THERMAL ANALYSIS;ELECTRON MICROPROBE ANALYSIS;PHASE STUDIES: Q1,Q2;YTTRIUM OXIDES: T2

ABSTRACT: The Bureau of Mines is developing melting data for binary combinations of the alkaline earth fluorides and yttria to facilitate the formulation of slag compositions. The present report deals with the CaF$sub 2$--Y$sub 2$O$sub 3$ system for which solidus and liquidus temperatures and

<468> CONT.

solid solubilities were determined. The information is presented as the phase diagram. All specimen compositions were blended from high-purity materials and encapsulated in Mo or Pt20Rh prior to heat treatment. Liquidus temperatures were determined by ceramographic examination of heat-treated and quenched specimens. Solidus temperatures were determined by differential thermal analysis and by electron microprobe analysis of quenched specimens. Terminal solid solubilities were derived by parametric methods. The peritectic system was found to be pseudobinary due to the formation of yttrium oxyfluoride at temperatures near the liquidus. The peritectic point occurs at 7 mole pct Y$sub 2$O$sub 3$ and 1,438$sup 0$ +- 5$sup 0$C. The terminal solid solubility of Y$sub 2$O$sub 3$ in CaF$sub 2$ decreases from 7 mole pct at 1,438$sup 0$C to 1 mole pct at 1,100$sup 0$C, and the solubility of CaF$sub 2$ in Y$sub 2$O$sub 3$ decreases from 9.5 to 7 mole pct over the same temperature interval.

EDB SUBJECT CATEGORY: EDB-400201;360202

<469>

Oden, L.L.; Sanker, P.E.; Babitzke, H.R.; Sumner, D.H., Bureau of Mines, Albany, Oreg. (USA). Albany Metallurgy Research Center

In Phase relations in the alkaline earth fluoride-yttria systems (in three parts). 2. The BaF$sub 2$--Y$sub 2$O$sub 3$ phase diagram ** EDB-77:120763; (Oct 1970) BM-RI--7438

SUBJECT DESCRIPTORS: BARIUM FLUORIDES: T1;BINARY MIXTURES;EUTECTICS;PHASE STUDIES: Q1,Q2;THERMAL ANALYSIS;X-RAY DIFFRACTION;YTTRIUM OXIDES: T2

ABSTRACT: The Bureau of Mines is developing melting data for binary combinations of the alkaline earth fluorides and yttria to facilitate the formulation of slag composition. Liquidus and solidus temperatures and solid solubilities were determined for the BaF$sup 2$--Y$sub 2$O$sub 3$ system, and the information is presented as the phase diagram. The phase diagram was constructed from data obtained by ceramography, x-ray diffraction, and thermal analysis of specimens encapsulated in small molybdenum ampoules. The data indicate a simple eutectic system with maximum terminal solid solubilities of less than 1 mole pct. The eutectic temperature is 1,343$sup 0$C, and the composition of the eutectic is less than 1 mole pct Y$sub 2$O$sub 3$.

EDB SUBJECT CATEGORY: EDB-400201;360202

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<470>
Odoj, R.; Hilpert, K.; Nuernberg, H.W. (Kernforschungsanlage Juelich G.m.b.H. (F.R. Germany)); Foerthmann, R.; Naoumidis, A. (Kernforschungsanlage Juelich G.m.b.H. (F.R. Germany). Inst. fuer Reaktorwerkstoffe und Heisse Zellen)

Study of the retention of Ba in UO$sub 2$ nuclear fuel particles by ZrO$sub 2$ as getter
AIX-07:263502;ERA-02:016547;EDB-77:023622; J. Nucl. Mater. (JNUMA) 60:(2):216-222 (May 1976)

SUBJECT DESCRIPTORS: BARIUM;BARIUM OXIDES;COATED FUEL PARTICLES: Q1,T2;FISSION PRODUCTS;GETTERS: Q2;HTGR TYPE REACTORS: T1;MASS SPECTROSCOPY;URANIUM DIOXIDE;ZIRCONIUM OXIDES

ABSTRACT: A new concept to retain solid fission products in the coated particles of gas-cooled high-temperature reactors is the addition of refractory oxides to the fuel kernels as a getter. The suitability of this concept for the retention of BaO by ZrO$sub 2$ was determined. Therefore, the evaporation of BaZrO$sub 3$ was studied by high temperature mass spectrometry with a Knudsen cell made of Mo and the loss of Ba from model kernels heated for 100 h at different temperatures in a furnace was determined. From the results obtained with each of the two methods which were carefully discussed by theoretical consideration it follows independently that Ba can be retained by ZrO$sub 2$ but that Al$sub 2$O$sub 3$ is even more efficient for the retention of Ba than ZrO$sub 2$. Moreover, it could be shown that BaO is the main species in the gaseous phase over BaZrO$sub 3$.

EDB SUBJECT CATEGORY: EDB-210300
INIS CATEGORY: E33

<471>
Offer, H.P. ** Hill, M.R. (comp.), Oak Ridge National Lab., Tenn. (USA)

Metallurgical characterization of prototypic tubesheet forging In Mechanical properties test data for structural materials. Quarterly progress report for period ending April 30, 1977
** ERA-03:004358;EDB-78:004440; (Jun 1977) ORNL--5287

SUBJECT DESCRIPTORS: ANNEALING;CHROMIUM-MOLYBDENUM STEELS: M1;HIGH TEMPERATURE;LMFBR TYPE REACTORS;MECHANICAL PROPERTIES;REACTOR MATERIALS;TENSILE PROPERTIES: Q1;VERY HIGH TEMPERATURE

ABSTRACT: Room and elevated temperature tensile tests have been performed on the prototype lower tubesheet forging procured by GE from Cameron Iron Works (CIW). These preliminary tensile tests were performed on tubesheet specimens given

<471> CONT.
either a full anneal plus a 40 hour 727$sup 0$C (1340$sup 0$F) post weld heat treatment (PWHT) (designated heat treatment P), or a full anneal plus this PWHT plus a 1000 hour 510$sup 0$C (950$sup 0$F) thermal aging/embrittlement treatment (designated heat treatment Q). The results are given in Table 8.2.1 along with the room temperature results supplied by CIW for heat treatment P.

EDB SUBJECT CATEGORY: EDB-360103

<472>
Ofitserov, A.A.; Golubtsov, V.V.; Dubrovin, M.N. et al. (Moskovskii Inst. Stali i Splavov (USSR))

Determination of surface tension of a metal with high vapor pressure AIX-07:270426;EDB-77:030766; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (4):171-172 (1975)

SUBJECT DESCRIPTORS: EQUATIONS;LEAST SQUARE FIT;LIQUID METALS: T1;SURFACE TENSION: Q1;TELLURIUM;TEMPERATURE DEPENDENCE;VAPOR PRESSURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<473>
Ohno, H.; Furukawa, K. (Molten Materials Laboratory, Japan Atomic Energy Research Institute, Tokai, Ibaraki, Japan)

Phase diagrams in the pseudobinary systems of Li$sub 2$BeF$sub 4$, alkali fluoroborates and alkali fluorides AIX-08:310031;EDB-77:094499; J. Nucl. Mater. (JNUMA) 64:(1):. 37-43 (Jan 1977)

ABSTRACT: The phase diagrams in the systems Li$sub 2$BeF$sub 4$-NaBF$sub 4$, Li$sub 2$BeF$sub 4$-KBF$sub 4$, NaBF$sub 4$-LiBF$sub 4$, NaI-LiI, NaBF$sub 4$-LiF and NaBF$sub 4$-KF were examined. The systems LI$sub 2$BeF$sub 4$-NaBF$sub 4$, Li$sub 2$BeF$sub 4$-KBF$sub 4$ and NaBF$sub 4$-LiF have a miscibility gap in the liquid phase. The much greater miscibility in the Li$sub 2$BeF$sub 4$-NaBF$sub 4$ system compared to the Li$sub 2$BeF$sub 4$-KBF$sub 4$ system can be attributed to the smaller difference in the radii of the cations. The solubility of LiF in molten NaBF$sub 4$ at 500$sup 0$ C is about 1 mole% and it is slightly greater than that in the KBF$sub 4$-LiF system. The good similarity of the phase diagrams of the systems RF-R'BF$sub 4$ and RF-R'I(R,R' = Li, Na and K) is also explained by the fact that the BF$sub

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<473> CONT.
4$$sup -$ ion has nearly the same ionic radius as the I$sup -$ ion.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B24

<474>
Ohse, R.W.; Babelot, J.F.; Kinsman, P.R. (Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements); Brumme, G.D. (Technische Hochschule Darmstadt (Germany, F.R.). Inst. fuer Angewandte Physik)

Vapor pressure studies over liquid uranium oxide and uranium plutonium oxide up to 5,000 K
AIX-08:289670;ERA-02:024848;EDB-77:049773; Ber. Bunsenges. Phys. Chem. (BBPCA) 80:(8):780-786 (Aug 1976)

SUBJECT DESCRIPTORS: ABSORPTION;FUNCTIONAL MODELS;LASER-RADIATION HEATING;LIQUIDS;LMFBR TYPE REACTORS: T1;MELTDOWN: M2,Q1;MIXTURES;NUCLEAR FUELS;OPTICAL PYROMETERS;PLUTONIUM;PLUTONIUM DIOXIDE: T4;PULSED IRRADIATION;SUBLIMATION HEAT;TEMPERATURE DEPENDENCE;THERMODYNAMICS: Q2;URANIUM DIOXIDE: T3;VAPOR PRESSURE: Q3,Q4;VAPORIZATION HEAT;VERY HIGH TEMPERATURE

ABSTRACT: The estimation of the energy release in a hypothetical fast breeder reactor core meltdown accident requires a detailed analysis of the disassembly process. Since the vapour pressure presents the ultimate shut-down mechanism, the required data are given by the equation of state of the irradiated fuel. The pressure over the ternary uranium-plutonium oxide was determined to log p(atm) = 7,966 - 28,137/T, yielding a heat of evaporation of $delta$Hsub(evap) = 128.7 kcal/mol, fully consistent with the heat of sublimation of $delta$Hsub(sub) = 148.4 kcal/mol below the melting point, and the heat of fusion of 19.4 kcal/mol. The corresponding equation for liquid UO$sub 2$ was determined as log p(atm) = 7.7 - 27,900/T, with a heat of evaporation of $delta$Hsub(evap) = 127.6 kcal/mol, again in consistency with the assessed data below the melting point of $delta$Hsub(sub) = 144.1 kcal/mol, and the heat of fusion of 17.7 kcal/mol. For this a new high-energy laser technique, including fast temperature recording in the microsecond range, was developed. The first quantitative measurements on (U,Pu)O$sub 2$ above 4,000 K were reported to the IAEA Symposium on Thermodynamics of Nuclear Materials in Vienna. The investigation of the total temperature range from 3,000 K to Tsub(c) = 7,560 K revealed two principle experimental difficulties, a liquid layer movement at temperatures below 4,000 K, and optical absorption due to increasing thermal

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ionisation above 5,000 K. A new double intensity laser pulse technique is presented, which allows the extension of measurements to below 4,000 K. In addition a multi-wavelength pyrometer technique has been developed to eliminate, and at a later stage to determine, spectral emissivities above the melting point, during laser heating within pulse times of micro and nanoseconds.

EDB SUBJECT CATEGORY: EDB-220900;210500;360204
INIS CATEGORY: B23

<475>
Ohse, R.W.; Berrie, P.G. (Commission of the European Communities, Karlsruhe (F.R. Germany). European Inst. for Transuranium Elements); Bogensberger, H.G.; Fischer, E.A. (Kernforschungszentrum Karlsruhe (F.R. Germany). Inst. fuer Angewandte Systemanalyse)

Extension of vapour pressure measurements of nuclear fuels (U,Pu)O$sub 2$ and UO$sub 2$ to 7000 K for fast reactor safety analysis AIX-07:244140;ERA-02:006655;EDB-77:000340; J. Nucl. Mater. (JNUMA) 59:(2):112-124 (Feb 1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;FUSION HEAT;LASERS;MELTDOWN;OPTICAL PYROMETERS;PLUTONIUM DIOXIDE: T1;RADIATION HEATING;SOLID FUELS;SUBLIMATION HEAT;TEMPERATURE DEPENDENCE;TEMPERATURE MEASUREMENT;ULTRAHIGH TEMPERATURE;URANIUM DIOXIDE: T2;VAPOR PRESSURE: Q1,Q2;VAPORIZATION HEAT;VERY HIGH TEMPERATURE

ABSTRACT: A new high-energy laser technique, including fast temperature recording in the microsecond range, was developed for measuring the vapour pressure of fast breeder uranium-plutonium oxide fuels up to 7000 K. In the ternary system, the pressure of uranium-plutonium oxide above its melting point was determined to be log p (atm)=7.966 - (28137/T), yielding a high-temperature heat of evaporation of 128.7 kcal/mol. Measurement of the UO$sub 2$ partial pressure over the solid gave log p (atm)=9.365 - (32436/T), resulting in a heat of sublimation of 148.4 kcal/mol. The difference of these heats yields the heat of fusion 19.7 kcal/mol, which is in good agreement with the literature value of 19.4 kcal/mol. In the binary UO$sub 2$ system, the pressure above the melting point was determined to be log p (atm)=7.7 - (27900/T), giving a heat of evaporation of 127.6 kcal/mol. An assessment of literature data for below the melting point yielded log p (atm)=8.846 - (31506/T), and a heat of sublimation of 144.1 kcal/mol. The resulting heat of fusion,

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<475> CONT.
16.5 kcal/mol, is only slightly below the published value of 17.7 kcal/mol.

EDB SUBJECT CATEGORY: EDB-050700;360202
INIS CATEGORY: B23

<476>
Chse, R.W.; Berrie, P.G. (Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements); Brumme, G.D. (Technische Hochschule Darmstadt (Germany, F.R.)) ** Blank, H.; Lindner, R. (eds.)

Advances in vapour pressure studies over liquid uranium plutonium oxides up to 5000K In Plutonium 1975 and other actinides ** AIX-08:310032;ERA-02:041845;EDB-77:094423; (1976) North-Holland

SUBJECT DESCRIPTORS: EVAPORATION: Q1,Q2;LASER-RADIATION HEATING;LIQUID CRYSTALS;PHASE TRANSFORMATIONS;PLUTONIUM OXIDES: T2;PYROMETERS;ULTRAHIGH TEMPERATURE;URANIUM OXIDES: T1;VAPOR PRESSURE: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: Vapour pressure measurements over liquid (Usub(0.80)Pusub(0.20))Osub(1.95) between 4000 K and 5000 K have been extended below 4000 K. In previous studies a radial displacement of liquid and subsequent crater formation, caused by the recoil force of the vapour jet during laser heating, prevented meaningful measurements below 4000 K. This effect could be eliminated by restricting the liquid layer thickness to the minimum value at the final steady state temperature, by shortening the rise time of the temperature, using a new double intensity laser pulse heating technique with a high initial density, and by focal spot enlargement. The new series of measurements, applying a high-speed multi-wavelength pyrometer, waveform analyzing and data processing system, confirmed the previously presented equation: log p(atm) = 7.966 - 28.137/T. and heat of evaporation $delta$Hsub(evap) = 128.7 kcal/mol below 4000 K.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<477>

Ohse, R.W.; Berrie, P.G.; Bogensberger, H.G.; Fischer, E.A., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Neutronenphysik und Reaktortechnik; Kernforschungszentrum Karlsruhe (Germany, F.R.). Projekt Schneller Brueter

In Vapour pressure measurements to 7,000 K and equation of state of oxide fuels for fast reactor safety analysis. I. Extension of vapour pressure measurements of nuclear fuels (U,PU)O$sub 2$ and UO$sub 2$ to 7,000 K **
AIX-07:278368;ERA-02:025985;EDB-77:053597; (May 1976)
KFK--2272

SUBJECT DESCRIPTORS: BINARY MIXTURES;FBR TYPE REACTORS;FUSION HEAT;MELTDOWN;NUCLEAR FUELS;PLUTONIUM DIOXIDE: T1;REACTOR SAFETY;SUBLIMATION HEAT;ULTRAHIGH TEMPERATURE;URANIUM DIOXIDE: T2;VAPOR PRESSURE: Q1,Q2;VAPORIZATION HEAT

ABSTRACT: A new high-energy laser technique, including fast temperature recording in the microsecond range, was developed for measuring the vapour pressure of fast breeder uranium-plutonium oxide fuels up to 7,000 K. In the ternary system, the pressure of uranium-plutonium oxide above its melting point was determined to be log p (atm) = 7.966 - (28,137/T), yielding a high-temperature heat of evaporation of 128.7 kcal/mol. Measurement of the UO$sub 2$ partial pressure over the solid gave log p (atm) = 9.365 - (32,436/T), resulting in a heat of sublimation of 148.4 kcal/mol. The difference of these heats yields the heat of fusion of 19.7 kcal/mol, which is in good agreement with the literature value of 19.4 kcal/mol. In the binary UO$sub 2$ system, the pressure above the melting point was determined to be log p (atm) = 7.7 - (27,900/T), giving a heat of evaporation of 127.6 kcal/mol. An assessment of literature data for below the melting point yielded log p (atm) = 8.846 - 31,506/T, and a heat of sublimation of 144.1 kcal/mol. The resulting heat of fusion of 16.5 kcal/mol, is only slightly below the published value of 17.7 kcal/mol.

EDB SUBJECT CATEGORY: EDB-050700;360204
INIS CATEGORY: B23

<478>

Ohse, R.W.; Berrie, P.G.; Kinsman, P.R.; Brumme, G.D., Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

In Vapour pressure studies over liquid uranium plutonium oxides up to 5,000 K ** AIX-07:278369;EDB-77:050519; (1976)
AED-Conf--76-087-016

SUBJECT DESCRIPTORS: DIAGRAMS;LASER RADIATION;LIQUIDS;MELTING

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<478> CONT.
POINTS;PLUTONIUM OXIDES: T1;PRESSURE DEPENDENCE;PULSE TECHNIQUES;TEMPERATURE DEPENDENCE;TEMPERATURE MEASUREMENT;TERNARY ALLOY SYSTEMS;URANIUM OXIDES: T2;VAPOR PRESSURE: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: The pressure over the ternary uranium-plutonium oxide was determined, yielding a heat of evaporation fully consistent with the heat of sublimation below the melting point, and with the heat of fusion. The corresponding equation for liquid UO$sub 2$ was determined with a heat of evaporation again in consistency with the assessed data below the melting point and with the heat of fusion. For this, a new high-energy laser technique, including fast temperature recording in the microsecond range, was developed. The investigation of the total temperature range from 3,000 K to T/sub /c/ = 7,560 K revealed two principal experimental difficulties, a liquid layer movement at temperatures below 4,000 K, and optical absorption due to increasing thermal ionisation above 5,000 K. A new double intensity laser pulse technique is presented which allows the extension of measurements to below 4,000 K. In addition a multi-wavelength pyrometer technique has been developed in order to eliminate, and at a later stage to determine, spectral emissivities above the melting point during laser heating with pulse times of micro and nanoseconds.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B23

<479>

Ohse, R.W.; Capone, F. ** Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Evaporation behaviour of the ternary uranium plutonium carbides
In 5th international conference on plutonium and other actinides ** AIX-07:233148;EDB-76:087310; (1975)
AED-Conf--75-417-018

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;EVAPORATION: Q1,Q2;PLUTONIUM CARBIDES: T1;SUBLIMATION HEAT;TEMPERATURE DEPENDENCE;URANIUM CARBIDES: T2;VAPOR PRESSURE;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<480>
Ohse, R.W.; Capone, F. (Commission of the European Communities, Karlsruhe (F.R. Germany). European Inst. for Transuranium Elements)

Evaporation behaviour of the ternary uranium plutonium carbides
In Reactor conference, Duesseldorf, 30.3.-2.4.1976. Section 2: Fuel elements, fuel cycle and isotope technique **
AIX-07:242008;EDB-76:092583; (1976) ZAED

SUBJECT DESCRIPTORS: COMPATIBILITY;HEAT TREATMENTS;HEATING;MASS SPECTROSCOPY;MIXTURES;NUCLEAR FUELS;PHASE DIAGRAMS;PLUTONIUM CARBIDES: T1;SOLID SOLUTIONS;SUBLIMATION HEAT: Q1,Q2;TEMPERATURE DEPENDENCE;TUNGSTEN;URANIUM CARBIDES: T2;VAPOR PRESSURE;VERY HIGH TEMPERATURE

ABSTRACT: Simultaneous measurement of total and partial pressures; variation of plutonium pressure with 1/T in the single phase region MC from C/M = 1.014 to 1.15 and two-phase region MC + M$sub 2$C$sub 3$ from C/M = 1.15 to 1.30 from 2,000 K to 2,500 K and determination of the corresponding sublimation heat from the measured values; pressure composition diagram of the ternary (U,Pu) carbides giving the phase boundaries between MC and MC + M$sub 2$C$sub 3$ phase fields.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B23

<481>
Ohse, R.W.; Capone, F. (Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements) ** Blank, H.; Lindner, R. (eds.)

Evaporation behaviour of the ternary uranium plutonium carbides
In Plutonium 1975 and other actinides **
AIX-08:310033;ERA-02:041846;EDB-77:094424; (1976) North-Holland

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;COMPATIBILITY;EVAPORATION: Q1,Q2;IMPURITIES;KNUDSEN FLOW;MASS SPECTROSCOPY;MICROSTRUCTURE;PHASE STUDIES;PLUTONIUM CARBIDES: T1;SEGREGATION;SUBLIMATION;SUBLIMATION HEAT;TEMPERATURE DEPENDENCE;URANIUM CARBIDES: T2;VAPOR PRESSURE: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: The evaporation behaviour of uranium plutonium carbides (Usub(0.80)Psub(0.20)Csub(1+-x) was studied by a combined application of mass spectrometry, using the uranium isotope U-233, and the Knudsen effusion target collection technique in the temperature range from 1500$sup 0$C to the

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<481> CONT.
liquids temperature measured at 2458$sup 0$C and the composition range from C/M = 0.95 to 1.4. High temperature compatibility tests were made with W-cells, carburized Ta and TaC-liners up to 2500$sup 0$C. The influence of oxygen and nitrogen impurities on vapour pressure, and composition changes in continued evaporation of the the mixed carbides were investigated. The effects of plutonium depletion and segregation were studied.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B24

<482>
Ohse, R.W.; Ciani, V.

Evaporation behavior and high-temperature thermal analysis of substoichiometric plutonium oxide in the composition range from O/Pu = 1.51 to 2.00 In High temperature technology ** EDB-77:120461; (1969) Butterworths

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION;EVAPORATION: Q1;PLUTONIUM DIOXIDE: T1;STOICHIOMETRY;THERMAL ANALYSIS;VAPOR PRESSURE;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: None.

EDB SUBJECT CATEGORY: EDB-360204;050700

<483>
Ohwada, K. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment)

IR spectroscopic study of dipotassium and dicesium uranyl tetrabromides AIX-08:346258;EDB-78:028036; J. Inorg. Nucl. Chem. (JINCA) 39:(9):1601-1605 (1977)

SUBJECT DESCRIPTORS: CESIUM BROMIDES;CHEMICAL BONDS: Q1;INFRARED SPECTRA: Q1;POTASSIUM BROMIDES;URANYL COMPOUNDS: T1;VALENCE;VIBRATIONAL STATES

ABSTRACT: The IR spectra of dipotassium and dicesium uranyl tetrabromides (K$sub 2$UO$sub 2$Br$sub 4$, Cs$sub 2$UO$sub 2$Br$sub 4$) have been measured in the region from 4000 down to 30 cm$sup -1$. A normal coordinate analysis of the (UO$sub 2$Br$sub 4$)$sup 2-$ ion apart from the K$sup +$ and Cs$sup +$ ions has been made using Wilson's FG matrix method. The force constants associated with the U-O and U-Br bonds have been obtained on the basis of the two force models of modified Urey-Bradley and valence force fields. An effort has been directed towards the understanding of a negative

<483> CONT.
force constant of the U-O bond-bond interaction which plays an important role in the calculations of symmetric and asymmetric U-O vibrations, and detailed discussion has been made on it from the point of view of the mutual polarizability between the two U-O bonds.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<484>
Olson, C.G.; Piacentini, M.; Lynch, D.W. ** Koch, E.E. (ed.)

Optical properties of rare earth trifluorides In Vacuum ultraviolet radiation physics ** ERA-01:023970;EDB-76:066061; (1974) Friedr. Vieweg and Sohn Verlagsgesellschaft mbH

SUBJECT DESCRIPTORS: CERIUM FLUORIDES: T2;DYSPROSIUM FLUORIDES: T4;ENERGY-LEVEL TRANSITIONS;FAR ULTRAVIOLET RADIATION;GADOLINIUM FLUORIDES: T5;LANTHANUM FLUORIDES: T1;MONOCRYSTALS;PRASEODYMIUM FLUORIDES: T3;REFLECTIVITY: Q1,Q2,Q3,Q4,Q5;SPECTRA

ABSTRACT: The reflectivity spectra of single crystals of the trifluorides of La, Ce, Pr, and Dy and of polycrystalline GdF$sub 3$ were measured in the 4 to 30 eV range using synchrotron radiation. The transmission of thin films of these salts on LiF substrates was measured. (GHT)

EDB SUBJECT CATEGORY: EDB-360204;640302

<485>
Olson, J.J., California Univ., San Diego, La Jolla (USA). Dept. of Physics

In KKR analysis of the Anderson-McMillan theory of electronic structure of liquid metals. Technical report ** ERA-02:010428;EDB-77:007024; (Apr 1976) AD-A--024386

SUBJECT DESCRIPTORS: BAND THEORY;DISPERSION RELATIONS;ELECTRONIC STRUCTURE: Q1;LIQUID METALS: T1;SOLIDS

ABSTRACT: The method of Anderson and McMillan (AM) has recently been demonstrated to fail for resonant scatterers while nevertheless providing a useful band structure approximation for non-resonant scatterers. The authors explain this behavior by using the formalism of Korringa, Kohn, and Rostoker (KKR) to relate the AM method to well known approximations in the band theory of crystalline solids. In particular the authors show that the AM method for the

<485>

<485> CONT.
dispersion relation of a liquid metal is essentially an optimized single-orthogonalized-plane-wave approximation to the band structure of a crystal at the same density. (GRA)

EDB SUBJECT CATEGORY: EDB-360104

<486>
Oosterbroek, M.; van de Braak, H.P.; Gellings, P.J. (Technische Hogeschool Twente, Enschede (Netherlands)) ** Evans, R.; Greenwood, D.A. (eds.)

Improved model for solutions of nonmetals in liquid alkali metals. Calculation of enthalpy of solution and electrical resistivity In Liquid metals, 1976 **
AIX-08:320690;EDB-77:120825; (1977) Institute of Physics

SUBJECT DESCRIPTORS: ALKALI METALS: T1;ELECTRIC CONDUCTIVITY;LIQUID METALS;MATHEMATICAL MODELS;NONMETALS: T2;SOLUTION HEAT: Q2;SOLUTIONS;SOLVENT PROPERTIES: Q1

ABSTRACT: A new model is proposed for the calculation of the enthalpy of solution of electronegative elements and noble gases in liquid alkali metals. This is based on the difference between the internal energies of the pure metal and of the solution. Contributions to those energies arise from free-electron terms and the Madelung energy, expressed in terms of simple model potentials and partial structure factors. Screening is accounted for by the band-structure energy. Satisfactory agreement between experimental and calculated values is obtained using pure metal empty-core radii and crystal radii for the dissolved atoms in the model potentials and adjusting hard-sphere diameters in Percus-Yevick calculations for the structure factors. The model is able to explain the positive enthalpy of solution of the noble gases. Volume effects give an important contribution to corrections to the Madelung energy. The volume dependence of the electron-gas and band-structure terms are relatively small. The electrical resistivity is obtained from Ziman's formula using identical structure factors and form factors based on the model potentials as used in the enthalpy calculations. Reasonable values for the resistivity change on dissolving the nonmetal are obtained but the nearly complete lack of experimental data makes verification practically impossible at this moment.

EDB SUBJECT CATEGORY: EDB-400201;360104
INIS CATEGORY: B12

<487>
Osborne, D.W.; Flotow, H.E.

Half-life of $sup 242$Pu from precise low-temperature heat capacity measurements
INS-76:020557;ERA-02:002060;EDB-76:083721; Phys. Rev., C (PRVCA) 14:(3):1174-1178 (Sep 1976)

SUBJECT DESCRIPTORS: ALPHA DECAY: Q1;HALF-LIFE;LOW TEMPERATURE;MEDIUM TEMPERATURE;PLUTONIUM 242: T1;PLUTONIUM FLUORIDES: T3;PLUTONIUM OXIDES: T2;SPECIFIC HEAT: Q2,Q3;ULTRALOW TEMPERATURE;VERY LOW TEMPERATURE

ABSTRACT: Heat capacity measurements on three pure compounds, PuF$sub 3$, PuF$sub 4$, and PuO$sub 2$, made from 99.91 at.% $sup 242$Pu, have been used to evaluate the power produced by radioactive decay. The mean specific power was found to be (0.12099 +- 0.00024) mW per gram of plutonium in the samples. The contribution of nuclides other than $sup 242$Pu to the power was calculated to be (5.15 +- 0.11) muW per gram of plutonium, and so the specific power of pure $sup 242$Pu is (0.115 94 +- 0.000 26) mW g$sup -1$. A correction for the (5.50 x 10$sup -4$) % spontaneous fission branching reduces the specific power due to $alpha$ decay to (0.11591 +- 0.00026) mW g$sup -1$. Combining this value of the specific power with the total disintegration energy of (4.9823 +- 0.0012) MeV, we obtain (3.763 +- 0.009) x 10$sup 5$ years as the $alpha$ half-life of pure $sup 242$Pu. (AIP)

EDB SUBJECT CATEGORY: EDB-652022;360104
INIS CATEGORY: A34;B22

<488>
Oyamada, R. (Nagasaki Univ. (Japan), Faculty of Education); Yoshida, S.

Raman spectra of solid ThCl$sub 4$ and fused ThCl$sub 4$--KCl system AIX-07:266529;EDB-77:007484; Nippon Seirigaku Zasshi (NISEA) 38:(6):1786 (Jun 1975)

SUBJECT DESCRIPTORS: ANIONS;CHEMICAL SHIFT;COMPLEXES;LASERS;MOLTEN SALTS;POTASSIUM CHLORIDES: T1;RAMAN EFFECT: Q1,Q2;SPECTRA;SPECTRAL SHIFT;THORIUM CHLORIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: A13

<489>

<489>
Papatheodorou, G.N.

Raman spectroscopic studies of yttrium (III) chloride--alkali metal chloride melts and of Cs$sub 2$NaYCl$sub 6$ and YCl$sub 3$ solid compounds INS-77:008015;ERA-02:032799;EDB-77:074216; J. Chem. Phys. (JCPSA) 66:(7):2893-2900 (1 Apr 1977)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS: T2;BINARY MIXTURES: Q1,Q2,T3;CHLORIDES;EMISSION SPECTRA;MOLTEN SALTS;RAMAN EFFECT: Q1,Q2,Q3;YTTRIUM CHLORIDES: T1

ABSTRACT: The Raman spectra of molten YCl$sub 3$--A Cl (A=Cs, K, Li) mixtures have been measured at different compositions and temperatures up to 890 degreeC. The Raman spectra of polycrystalline Cs$sub 2$NaYCl$sub 6$ and YCl$sub 3$ were also measured from 25 degreeC to temperatures above melting. The factor group analysis of crystalline Cs$sub 2$NaYCl$sub 6$ was used to identify the three Raman active modes ($nu$$sub 1$, $nu$$sub 2$, $nu$$sub 5$) of the YCl$sub 6$$sup -3$ octahedra. For liquid mixtures rich in alkali halide, the predominant features of the spectra are characterized by a polarized and a depolarized band with frequencies near the $nu$$sub 1$ and $nu$$sub 5$ frequencies of the YCl$sub 6$$sup -3$ octahedron and thus indicates the existence of such species in the melt. In melts containing above 25% YCl$sub 3$ a new polarized band D appears in the spectra which shifts continuously and rapidly to higher energies with increasing YCl$sub 3$ concentration. The frequency shift is attributed to a continuous distortion mechanism of the YCl$sub 6$$sup -3$ octahedra by the neighboring yttrium ions. The continuous frequency shift of the D band and a comparison of the liquid and solid Raman spectra of yttrium chloride suggest the existence of lattice-type modes in these melts.

EDB SUBJECT CATEGORY: EDB-360000;360602
INIS CATEGORY: B20;B24

<490>
Partashnikova, M.Z.; Oboznenko, V.A.; Khrepinyuk, T.E.

Differential-spectrophotometric determination of niobium in its compounds EDB-76:054265; Zh. Anal. Khim. (ZAKHA) 31:(1):187-189 (Jan 1976)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS;ALKALINE EARTH METAL COMPOUNDS;CHEMICAL ANALYSIS: Q2;NIOBATES: T2;NIOBIUM: T1;QUANTITATIVE CHEMICAL ANALYSIS;RARE EARTH COMPOUNDS;SPECTROPHOTOMETRY: Q1

ABSTRACT: A method has been developed of differential-spectrophotometric determination of niobium in

<490> CONT.
niobates of alkali, alkaline earth, and rare earth metals from absorbance of a peroxide complex of niobium in a medium of concentrated sulfuric acid.

EDE SUBJECT CATEGORY: EDB-400104

<491>
Pathak, N.L.; Sen, S.C. (Indian Inst. of Tech., Kanpur. Dept. of Physics)

Effect of luminescence centers on optical absorption, excitation and fluorescence spectra of CsCl:Pb
AIX-07:236142;EDB-76:054157; Indian J. Pure Appl. Phys. (IJOPA) 13:(5):288-291 (May 1975)

SUBJECT DESCRIPTORS: ABSORPTION;BAND THEORY;CESIUM CHLORIDES: T1;COLOR CENTERS;ELECTRONIC STRUCTURE;EMISSION SPECTRA;ENERGY-LEVEL TRANSITIONS;EXCITATION;FLUORESCENCE: Q1,Q2;LEAD CHLORIDES: T2;PHOSPHORS

ABSTRACT: The optical absorption, excitation and fluorescence spectra of CsCl containing lead of different concentrations have been studied. Absorption bands have been observed at approximately 5.55 and 4.40 eV at room temperature as well as at liquid nitrogen temperature. Four fluorescence bands have been observed at approximately 4.00, 3.50, 3.07 and 2.15 eV at liquid nitrogen temperature, being efficiently excited by their excitation bands at approximately 4.67, 4.40, 4.72 and 4.28 eV, respectively. The different excitation and fluorescence bands have been attributed to the different luminescence centers, i.e. Pb$sup 2+$-vacancy pairs (dipoles), trimers and pentamers.

EDE SUBJECT CATEGORY: EDB-360605
INIS CATEGORY: B12

<492>
Peacock, R.D. (King's Coll., London (UK). Dept. of Chemistry) ** Dunitz, J.D. (ed.) (Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Organische Chemie); Hemmerich, P. (ed.) (Konstanz Univ. (F.R. Germany). Fachbereich Biologie); Holm, R.H. (ed.) (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Chemistry); Ibers, J.A. (ed.) (Northwestern Univ., Evanston, Ill. (USA). Dept. of Chemistry); Joergensen, C.K. (ed.) (Geneva Univ. (Switzerland). Dept. de Chimie Minerale et Analytique); Neilands, J.B. (ed.) (California Univ., Berkeley (USA). Dept. of Biochemistry); Reinen, D. (ed.) (Marburg Univ. (F.R. Germany). Fachbereich Chemie); Williams, R.J.P. (ed.) (Oxford Univ. (UK). Inorganic Chemistry Lab.)

<492>

<492> CONT.
Intensities of lanthanide f-f transitions In Rare earths **
Structure and Bonding, AIX-07:257201;EDB-77:007478; (1975)
Springer

SUBJECT DESCRIPTORS: COUPLING;DIPOLE MOMENTS;ELECTRIC DIPOLES;ELECTRONIC STRUCTURE;ENERGY-LEVEL TRANSITIONS: Q1;F STATES;MATHEMATICS;MATRICES;PRASEODYMIUM COMPOUNDS;QUADRUPOLE MOMENTS;RARE EARTH COMPOUNDS;RARE EARTHS: T1;REVIEWS;SPECTRA;TENSORS

ABSTRACT: Forced electric dipole transitions and the Judd-Ofelt theory, other multipole transitions, the success of the Judd-Ofelt theory, hypersensitive transitions, the exceptional behaviour of praseodymium(III), the $sup 5$D$sub 0$ - $sup 7$F$sub 0$ transitions of europium(III), and structural implications are treated.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<493>
Permyakov, P.G.; Korshunov, B.G.; Krokhin, V.A. (Moskovskij Inst. Stali i Splavov (USSR); Gosudarstvennyj Inst. Redkikh Metallov, Moscow (USSR))

Lanthanum chloride interaction with magnesium oxide
AIX-07:277861;EDB-77:031066; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (3):93-95 (1975)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS;DIFFERENTIAL THERMAL ANALYSIS;LANTHANUM CHLORIDES: T1;MAGNESIUM OXIDES: T2;PHASE DIAGRAMS: Q1,Q2;QUANTITY RATIO;SOLUBILITY

ABSTRACT: Chlorides of rare-earth elements, obtained as a result of chlorination of complex ores, enter into complex reactions with the oxygen-containing components of the charge and refractories. This work was aimed, in particular, at studying the interaction of components of a ternary system LaCl$sub 3$ + MgO reversible LaOCl + MgCl$sub 2$. The study was based on differential-thermographic analysis. The melting-point curve of this ternary system is given. It is concluded that the lanthanum chloride formed as a result of chlorination of a raw material containing rare-earth elements may interact with MgO and, most probably, with other basic oxides forming part of the charge or refractories. The lanthanum hydroxychloride formed in the reaction is highly soluble in lanthanum and magnesium chlorides. A higher concentration of magnesium chloride in the melt enhances the solubility of LaOCl, which

<493> CONT.
should be taken into account when selecting the composition of the melt for chlorination.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<494>
Permyakov, P.G.; Korshunov, B.G.; Krokhin, V.A. (Moskovskii Inst. Stali i Splavov (USSR); Gosudarstvennyi Inst. Redkikh Metallov, Moscow (USSR))

Interaction of neodymium- and yttrium chlorides with magnesium oxide AIX-07:265089;EDB-77:031426; Zh. Neorg. Khim. (ZNOKA) 20:(7):1965-1969 (Jul 1975)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS: Q1,Q2,Q3;DIFFERENTIAL THERMAL ANALYSIS;MAGNESIUM OXIDES: T1;NEODYMIUM CHLORIDES: T2;PHASE DIAGRAMS;X-RAY DIFFRACTION;YTTRIUM CHLORIDES: T3

ABSTRACT: By differential-thermographic and roentgenographic analysis interaction of neodymium and yttrium chlorides with magnesium oxide was studied. Diagrams of reversible system NdCl$sub 3$+MgO $Yields$ NdOCl+MgCl$sub 2$,YCl$sub 3$+MgO $Yields$ YOCl+MgCl$sub 2$ fusibility were plotted. Compound of the assumed composition 3MgCl$sub 3$x2NdOCl is formed in the MgCl$sub 2$-NdOCl system.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<495>
Permyakov, P.G.; Korshunov, B.G.; Krokhin, V.A. (Moskovskij Inst. Stali i Splavov (USSR); Gosudarstvennyj Inst. Redkikh Metallov, Moscow (USSR))

Solubility of rare earth and yttrium oxochlorides in molten salts - MCl$sub 2$(M-Mg, Ca, Sr, Ba)
AIX-08:298331;EDB-77:069031; Zh. Neorg. Khim. (ZNOKA) 20:(8):2184-2187 (Aug 1975)

SUBJECT DESCRIPTORS: CALCIUM COMPOUNDS: M1;DIFFERENTIAL THERMAL ANALYSIS;LANTHANUM COMPOUNDS: M2;MOLTEN SALTS;NIOBATES: M3;OXYGEN COMPOUNDS;PHASE DIAGRAMS: Q1,Q2,Q3;RARE EARTH COMPOUNDS;SATURATION;SOLUBILITY;STRONTIUM CHLORIDES

ABSTRACT: The results of phase equilibria studying in the CaNb$sub 2$O$sub 6$-LaNb$sub 3$O$sub 9$ system in the temperature range from 1.250 deg C to the melting point are summarized in this paper. A phase diagram of the system has been constructed from the results of X-ray and

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crystal-optical analyses, which reveals its eutectic nature with a melting point of 1.345+-10 deg C at 36 mol.% LaNb$sub 3$O$sub 9$ and 64 mol.% CaNb$sub 2$O$sub 6$, as well as limited solid solutions based on the starting compounds with the following content of the dissolved components: 10+-2.5 mol.% LaNb$sub 3$O$sub 9$ and 25+-2.5 mol.% CaNb$sub 2$O$sub 6$.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<496>
Permyakov, P.G.; Korshunov, B.G.; Krokhin, V.A. (Moskovskij Inst. Stali i Splavov (USSR); Gosudarstvennyj Nauchno-Issledovatel'skij i Proektnyj Inst. Redkometallicheskoj Promyshlennosti, Moscow (USSR))

Interaction of thorium chloride with calcium oxide AIX-08:295591;EDB-77:069323; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (3):95-97 (1976)

SUBJECT DESCRIPTORS: CALCIUM OXIDES: T1;CHEMICAL REACTIONS: Q1,Q2;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;FREE ENERGY;MOLTEN SALTS;PHASE DIAGRAMS;QUANTITY RATIO;THORIUM CHLORIDES: T2;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B16

<497>
Perov, P.A.; Nedyak, S.V.; Mal'tsev, A.A. (Moskovskii Gosudarstvennyi Univ. (USSR). Kafedra Fizicheskoi Khimii)

Investigation into absorption infrared spectra of vapors under ScBr$sub 3$, YCl$sub 3$, LaCl$sub 3$, GdCl$sub 3$, ErCl$sub 3$, LuCl$sub 3$ by means of isolation method in rare gas matrix AIX-07:265090;EDB-77:031416; Vestn. Mosk. Univ., Ser. II. Khim. (VMUKA) 16:(3):281-283 (May 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;COMPARATIVE EVALUATIONS;ERBIUM CHLORIDES: T5;FREQUENCY DEPENDENCE;GADOLINIUM CHLORIDES: T4;INFRARED SPECTRA: Q1,Q2,Q3,Q4,Q5,Q6;LANTHANUM CHLORIDES: T3;LUTETIUM: T6;RARE GASES;SCANDIUM BROMIDES: T1;VERY LOW TEMPERATURE;VIBRATIONAL STATES;YTTRIUM CHLORIDES: T2

ABSTRACT: Infra red spectra of ScBr$sub 3$, YCl$sub 3$, LaCl$sub 3$, GdCl$sub 3$, ErCl$sub 3$ and LuCl$sub 3$ molecules in the

<497> CONT.
inert gas matrix at 20-30$sup 0$ K was studied. Comparison of the results with published data shows that frequencies $nu$$sub 2$, $nu$$sub 3$, $nu$$sub 4$, of the Sc, Y, La, trihalogen series, are gradually decreasing from Sc-trihalogen to La-trihalogen. In the lanthanum trihalogen series (Gd....La) tendency was observed of the frequency increasing with the increasing of the atomic weight of the metal central atom. Estimation of the oscillation frequencies for the trihalogens of scandium, yttrium, lanthanum and some lanthanide trichlorides experimentally not investigated was made by comparative method.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<498>
Perrin, A. (Rennes-1 Univ., 35 (France))

Preparational, structural and vibrational study of M$sub 2$U$sub 2$O$sub 5$Cl$sub 4$, 2H$sub 2$O(M = Rb,Cs). Detection of a tetranuclear anion [(UO$sub 2$)$sub 4$O$sub 2$Cl$sub 8$(H$sub 2$O)$sub 2$]$sup 4-$ AIX-08:337074;EDB-77:141188; J. Inorg. Nucl. Chem. (JINCA) 39:(7):1169-1172 (1977)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES;CHEMICAL BONDS: Q1;CHEMICAL PREPARATION: Q1;INFRARED SPECTRA;MOLECULAR STRUCTURE;RAMAN SPECTRA;RUBIDIUM CHLORIDES;URANYL COMPLEXES: T1;X-RAY DIFFRACTION

ABSTRACT: The interaction between M$sub 2$UO$sub 2$Cl$sub 4$. nH$sub 2$O (M = Rb.Cs) and UO$sub 2$(OH)$sub 2$ leads to new complexes M$sub 2$U$sub 2$O$sub 5$Cl$sub 4$, 2H$sub 2$O; however, structural determination by X-ray diffraction exhibits discrete tetranuclear anions [(UO$sub 2$)$sub 4$O$sub 2$Cl$sub 8$(H$sub 2$O)$sub 2$]$sup 4-$: uranyl groups are bonded together in their equatorial plane by O/O or O/Cl double bridges in which oxygen atom is tricoordinated with U-O (bridge) distances lying between 2.20 and 2.29 A. Vibrational spectra are recorded and interpreted and hydrogen bonds discussed.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

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<499>
Pervov, V.S. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Energies of valence states of atoms in halides
AIX-08:336995;EDB-78:009992; Koord. Khim. (KOKHD) 2:(9):1164-1171 (Sep 1976)

SUBJECT DESCRIPTORS: ATOMIC MODELS;BERYLLIUM FLUORIDES: T1;BINDING ENERGY: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8;BORON FLUORIDES: T2;ELECTRONIC STRUCTURE;FORMATION HEAT;GASES;MOLYBDENUM CHLORIDES: T3;NIOBIUM CHLORIDES: T4;STRONTIUM FLUORIDES: T5;TANTALUM CHLORIDES: T6;TUNGSTEN FLUORIDES: T7;VALENCE;VANADIUM CHLORIDES: T8

ABSTRACT: Variation in energy of valence states (E) in alternate-valence series involving the elements of the groups 5-7 of the periodic system has been first considered on the basis of review of experimental data on the formation heat of gaseous halides (Be, Sr, B, W fluorides and Mo, V, Ta, Nb chlorides). The dependences are compared with calculation data for E. The principal reasons of non-monotonous variation of E in alternate-valence series of multivalence metals are discussed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<500>
Pervov, V.S.; Nikolaev, N.C. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Progress in fluorine calorimetry
AIX-08:314936;EDB-77:101149; Usp. Khim. (USKHA) 45:(4):640-660 (Apr 1976)

SUBJECT DESCRIPTORS: BERYLLIUM;CADMIUM;CALORIMETRY: Q1;CHEMICAL REACTIONS: Q2;FLUORINATION: T1;FLUORINE: T2;FORMATION HEAT;MEASURING METHODS;REVIEWS;TRANSITION ELEMENTS;URANIUM

ABSTRACT: The development of a new area of thermochemistry (the calorimetry of fluorination reactions) is reviewed. The high reactivity of fluorine offers some important advantages over alternative reagents, but at the same time it introduces some experimental difficulties. We have attempted to generalise the practical problems of fluorine calorimetry by systematically examining a number of specific thermochemical investigations by the most widely adopted modification of the method: fluorine bomb calorimetry. Current developments and

<500> CONT.
possible new applications are reviewed, and the basic experimental procedures and apparatus are described.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<501>
Peterson, J.R., Tennessee Univ., Knoxville (USA). Dept. of Chemistry

In Physical--chemical studies of transuranium elements. Progress report, April 1, 1976--March 31, 1977 **
INS-77:006516;ERA-02:027159;EDB-77:056434; (1977)
ORO--4447-048

SUBJECT DESCRIPTORS: BERKELIUM: T6;BERKELIUM CHLORIDES: T1;CALIFORNIUM BROMIDES: T5;CALIFORNIUM CHLORIDES: T2;CHEMICAL PROPERTIES;EINSTEINIUM BROMIDES: T4;EINSTEINIUM CHLORIDES: T3;PHYSICAL PROPERTIES;RESEARCH PROGRAMS: Q7;STRUCTURAL CHEMICAL ANALYSIS: Q1,Q2,Q3,Q4,Q5,Q6;TRANSURANIUM ELEMENTS: T7

ABSTRACT: Major advances in our continuing program to determine, interpret, and correlate the basic chemical and physical properties of the transuranium elements are summarized for the period April 1, 1976, through March 31, 1977. Implementation of data reduction programs and acquisition of a CRT time-sharing graphics terminal/stand-alone computer have advanced significantly the handling capabilities of single-beam spectral data obtained by our microscope spectrophotometer. EsCl$sub 3$, EsBr$sub 3$, and EsI$sub 3$ have been well characterized spectroscopically, and limited X-ray diffraction data have been obtained from EsBr$sub 3$ and EsI$sub 3$. The reduction of mixed Es-lanthanide trihalides has produced what might be Es(II). Dimorphism in BkCl$sub 3$, CfCl$sub 3$, and BkBr$sub 3$ has been studied spectrophotometrically and the results confirmed by X-ray analysis. Our solution microcalorimeter was improved by reducing the system-generated electrical noise and developing a novel sample container. The operating sensitivity was determined to be within the desired 0.1 percent precision requirement. The necessary hardware was obtained and software development was initiated for the capability to acquire, store, and analyze the heat of solution data automatically. A very sensitive apparatus (SQUID) for the determination of magnetic susceptibility has been constructed and is being evaluated. Our device should greatly facilitate the study of

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<501> CONT.
microgram-sized samples of transuranium elements and compounds.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<502>
Pfann, J. (Ustav Jaderneho Vyzkumu, Rez (Czechoslovakia))

New description of liquid metal heat transfer in closed conduits
AIX-08:332735;EDB-78:022544; Nucl. Eng. Des. (NEDEA) 41:(2):149-163 (Apr 1977)

SUBJECT DESCRIPTORS: BOUNDARY CONDITIONS;CIRCULAR CONFIGURATION;CONTINUITY EQUATIONS;ERRORS;FRICTION;HEAT TRANSFER: Q1;INTEGRALS;LAMINAR FLOW;LIQUID FLOW;LIQUID METALS: T1;NUSSELT NUMBER;PRANDTL NUMBER;ROUGHNESS;THERMAL CONDUCTIVITY;TUBES;TURBULENT FLOW;VELOCITY;VISCOSITY

ABSTRACT: Heat transfer with liquid metals in conduits with fully developed flow is analyzed. Four typical regions are distinguished for which different equations hold. The influence of the Prandtl number and of the relative roughness are investigated. Physical conclusions are illustrated for circular tubes and computed results compared with liquid metal heat transfer formulae currently in use. A new formula for the friction factor is proposed.

EDB SUBJECT CATEGORY: EDB-420400
INIS CATEGORY: E11

<503>
Pialoux, A.; Dode, M.

In Contribution to the establishment of the phase diagram for the U--O--C system by means of x-ray diffractometry at high temperatures and under controlled pressure **
ERA-03:001162;EDB-78:009578; J. Nucl. Mater. (JNUMA) 56::221-228 (1975) ORNL-tr--4327

SUBJECT DESCRIPTORS: GRAPHITE;PHASE DIAGRAMS: Q1,Q2;REDUCTION;URANIUM CARBIDES: M2;URANIUM DIOXIDE;URANIUM OXIDES: M1;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: During the progressive reduction of uranium dioxide by graphite under known pressures of carbon monoxide, we have measured the lattice parameters of the compounds ''UO$sub 2$'' (fcc), $alpha$-''UC$sub 2$'' (tetragonal) and ''UC'' (fcc), and have evaluated the compositions of these nonstoichiometric phases near 1770$sup 0$C. By this means,

<503> CONT.
and for the first time thanks to these direct measurements at such high temperatures, it has been possible to establish with precision the range of the main univariant phase fields [''UO$sub 2$'', C, $alpha$-''UC$sub 2$'', CO] and [''UO$sub 2$'', $alpha$-''UC$sub 2$'', ''UC'', CO]. The part of the U--C--O diagram thus mapped out completes the earlier isotherm for 1700$sup 0$C determined by Henry et al. 48 refs.

EDB SUBJECT CATEGORY: EDB-360202;C50700

<504>
Plakhotnik, V.N.; Steba, V.K. (Dnepropetrovskij Inst. Inzhenerov Zheleznodorozhnogo Transporta (Ukrainian SSR))

Influence of salt background on kinetics of BF$sub 4$$sup -$ alkali hydrolysis AIX-08:339958;EDB-78:017360; Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. (IVUKA) 20:(2):306 (1977)

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;ANIONS;BORON FLUORIDES: T1;CHEMICAL REACTION KINETICS: Q2,Q3;CORRELATIONS;ENTROPY;HYDROLYSIS: Q1;MEDIUM TEMPERATURE;QUANTITY RATIO;SODIUM CHLORIDES: T2;SODIUM PERCHLORATES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<505>
Podafa, E.P.; Dubovoi, P.G.

Thermodynamic analysis of melting point diagrams of systems consisting of alkali metal chlorides, thallium chloride and beryllium chloride AIX-07:277868;EDB-77:031091; Ukr. Khim. Zh. (UKZHA) 42:(4):430-432 (Apr 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602;400201
INIS CATEGORY: B12

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<506>
Podafa, B.P.; Dubovoi, P.G.; Barchuk, V.T. (AN Ukrainskoj SSR, Kiev, Inst. Obshchej i Neorganicheskoj Khimii)

Meltability diagram of RbCl-BeCl$sub 2$ system
AIX-08:286145;EDB-77:044215; Zh. Neorg. Khim. (ZNOKA) 20:(8):2289-2290 (Aug 1975)

SUBJECT DESCRIPTORS: BERYLLIUM CHLORIDES: T1;BINARY MIXTURES;CHEMICAL ANALYSIS;CHEMICAL COMPOSITION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;MELTING POINTS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2;RUBIDIUM CHLORIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<507>
Bolart, J.; Degobert, P.; Bloch, O.

Intensity-voltage curves of hydrogen diffusion electrodes in eutectic LiCl--KCl EDB-76:064854; C. R. Hebd. Seances Acad. Sci. (COREA) 255:(3):515-517 (16 Jul 1962)

SUBJECT DESCRIPTORS: ANODES;ELECTRICAL PROPERTIES;ELECTROCHEMISTRY;ELECTROLYTES: Q1;EUTECTICS;HYDROGEN FUEL CELLS: T1;LITHIUM CHLORIDES;POTASSIUM CHLORIDES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-300503

<508>
Politis, C., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung

In Thermal lattice dilatation of some transition metal compounds
** AIX-07:230587;EDB-76:087319; (Aug 1975) KFK--2168

SUBJECT DESCRIPTORS: DATA;DIAGRAMS;DILATOMETRY;GRUENEISEN CONSTANT;HAFNIUM CARBIDES: T1;HAFNIUM NITRIDES: T2;LATTICE PARAMETERS;TANTALUM CARBIDES: T3;TANTALUM NITRIDES: T4;THERMAL EXPANSION: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;THORIUM CARBIDES: T5;THORIUM NITRIDES: T6;URANIUM CARBIDES: T7;URANIUM NITRIDES: T8;VERY HIGH TEMPERATURE;X-RAY DIFFRACTOMETERS;ZIRCONIUM CARBIDES: T9;ZIRCONIUM NITRIDES: T10

ABSTRACT: The report deals with the thermal lattice dilatation of cubic transition metal compounds. The thermal dilatation

<508> CONT.
is determined through the variation of the lattice constants. The measurements are carried out 'in situ' by use of a high-temperature X-ray diffractometer chamber. The evaluation relates to both the linear thermal expansion coefficient $alpha$ and, for some compounds, the specific heat at constant volume Csub(V) and the Grueneisen constant $gamma$. In general a higher thermal dilatation is observed for nitrides than for carbides with the compounds formed by the transition metals belonging to the IVA and VA groups. The influence exerted by vacancies and by the oxygen dissolved in the lattice on the thermal dilatation of carbonitrides of zirconium, hafnium and tantalum is explained by the more pronounced anharmonic character of atomic vibrations in the crystal lattice.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<509>
Politis, C. (Kernforschungszentrum Karlsruhe (F.R. Germany). Inst. fuer Material- und Festkoerperforschung)

Phase analysis on simulated LWR fuel rods and its evaluation with the aid of constitution studies in the system uranium-zirconium-oxygen In Reactor conference, Duesseldorf, 30.3.-2.4.1976. Section 1: Reactor design and experiments ** AIX-07:240832;ERA-02:013001;EDB-77:017547; (1976) ZAED

SUBJECT DESCRIPTORS: BWR TYPE REACTORS: T2;CRYSTAL STRUCTURE;FUEL ELEMENTS: T,Q1,Q2;OXYGEN;PHASE DIAGRAMS;PHASE STUDIES;PHASE TRANSFORMATIONS;PWR TYPE REACTORS: T1;SIMULATION;TEMPERATURE DEPENDENCE;URANIUM;ZIRCALOY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-210100;210200
INIS CATEGORY: E23

<510>
Politis, C. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung) ** Nuclear Energy Agency, 75 - Paris (France)

Phase analysis at simulated LWR fuel rods and their interpretation by constitution investigations in the uranium-zirconium-oxygen system In Specialists' meeting on the behaviour of water reactor fuel elements under accident conditions ** AIX-07:277870;ERA-02:026935;EDB-77:055249; ([nd]) INIS-mf--3224

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<510> CONT.
SUBJECT DESCRIPTORS: BWR TYPE REACTORS;FUEL CANS;FUEL PELLETS;FUEL RODS;FUEL-CLADDING INTERACTIONS;MELTDOWN;OXYGEN: T1;PHASE DIAGRAMS;PHASE STUDIES: Q1,Q2,Q3;PWR TYPE REACTORS;SIMULATORS;URANIUM: T2;URANIUM DIOXIDE;VERY HIGH TEMPERATURE;ZIRCONIUM: T3;ZIRCONIUM OXIDES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360102;210100;050700
INIS CATEGORY: B12

<511>
Poluehktov, N.S.; Mishchenko, V.T. (AN Ukrainskoi SSR, Odessa. Inst. Obshchei i Neorganicheskoi Khimii)

Use of oscillator strengths of ''supersensitive'' ion transfers of lanthanides for calculation of some parameters determining the intensity of their absorption spectra
AIX-08:280676;EDB-77:031391; Teor. Eksp. Khim. (TEKHA) 10:(5):681-684 (Sep 1974)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;COMPARATIVE EVALUATIONS;CORRELATIONS;DIAGRAMS;ELECTRIC FIELDS;ENERGY-LEVEL TRANSITIONS;IONS;OSCILLATOR STRENGTHS;RARE EARTH COMPOUNDS: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<512>
Polukhin, V.A.; Gel'chinskii, B.R.; Evseev, A.M.; Sryvalin, I.T.; Ukhov, V.F.; Vatolin, N.A.; Esin. O.A.

Using molecular dynamics method for the evaluation of Fe-Ni and Al-Zn melts structure properties AIX-09:349516;EDB-78:027556; Izv. Akad. Nauk SSSR, Met. (IZNMA) (3):35-37 (May 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360103;360102
INIS CATEGORY: B22

<513>
Pong, R.; Donaghey, L.F.

Thermodynamic studies of gallium--indium liquid alloys by solid state electrochemistry with oxide electrolytes
INS-76:019916;ERA-02:001031;EDB-76:087226; J. Chem. Eng. Data (JCEAA) 21:(3):370-374 (Jul 1976)

SUBJECT DESCRIPTORS: ELECTROLYTIC CELLS;ENTROPY;GALLIUM ALLOYS: T1;INDIUM ALLOYS: T2;LIQUID METALS;MIXING HEAT;THERMODYNAMIC PROPERTIES: Q1,Q2

ABSTRACT: The activity of gallium in Ga--In liquid alloys was studied in a high temperature galvanic cell using calcia stabilized zirconia as an oxide electrolyte. The measured activity data for gallium in the Ga-In melts were used to calculate the interaction coefficient in the liquid alloy, which has the form $alpha$/sub GaIn/ = In $gamma$/sub Ga//(1 --x/sub Ga/)$sup 2$ = 0.2862 + 0.0352 x/sub Ga/ + (398.3 + 220.0x/sub Ga/)T$sup -1$. The derived expressions for the enthalpy and excess entropy of mixing were found to be given by $delta$H/sup M/ = (791.4 + 218.6 x/sub Ga/(1 -- x/sub Ga/) and $delta$S/sup xs/ = --(0.568 -- 0.0350x/sub Ga/) x/sub Ga/(1 -- G/sub a/). The enthalpy of mixing reaches a maximum of 226 cal/mol at a gallium mole fraction of 0.53 at x/sub Ga/. Results are compared to thermodynamic data obtained by other methods. Experimental techniques and limitations are critically reviewed.

EDB SUBJECT CATEGORY: EDB-360104;400400
INIS CATEGORY: B22;B12

<514>
Popel, S.I.; Spiridonov, M.A.

Structure of In$sub 2$Bi melted compound
AIX-09:349517;EDB-78:027523; Izv. Akad. Nauk SSSR, Met. (IZNMA) (3):47-50 (May 1976)

SUBJECT DESCRIPTORS: BISMUTH ALLOYS: T1;CRYSTAL STRUCTURE: Q1,Q2;DISTRIBUTION;ELECTRON DIFFRACTION;INDIUM ALLOYS: T2;INTERATOMIC DISTANCES: Q1,Q2;INTERMETALLIC COMPOUNDS;LIQUID METALS

ABSTRACT: Based on the study of the long-range maxima of the atom radial distribution function, interatomic distances have been revealed in a molten compound In$sub 2$Bi. Comparison of model curves describing electron diffraction activity with an experimental curve points to the existence of the following four structural elements in the melt: spherical regions with a statistical distribution of various types of atoms (20%), clusters of atoms of pure Indium and Bismuth (40 and 10%

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<514> CONT.
respectively), and a chain quasi-structure of various types of atoms (30%).

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<515>
Popov, B.N. (Skoplje Univ. (Yugoslavia) Tehnolosko-Metalurski Fakultet)

Electrochemical reduction of molybenum oxychloride in molten lithium chloride - potassium chloride eutectic
AIX-08:339961;EDB-78:017436; Bull. Tokyo Inst. Technol. (Engl. Ed.) (BTITA) 41:(3):. 99-105 (1976)

SUBJECT DESCRIPTORS: CURRENT DENSITY;ELECTRODEPOSITION;EUTECTICS;LITHIUM CHLORIDES;MOLYBDENUM COMPOUNDS: T1;OXYCHLORIDES: T2;POTASSIUM CHLORIDES;POTENTIOMETRY;QUANTITY RATIO;REDUCTION: Q1,Q2

ABSTRACT: Chronopotentiometric study of the electrochemical reduction of MoO$sub 2$Cl$sub 2$ (I) in molten LiCl-KCl eutectic revealed one irreversible reduction step. Quarter-wave potential vs. a Pt(II)/Pt reference electrode was found to be - 0.351+0.003 V. Reduction of I is diffusion controlled with the diffussion coefficient estimated to be 1.008x10$sup -5$cm$sup 2$s$sup -1$. The product of electrochemical reduction of I obtained by constant current electrolysis as a brownish-violet deposit was identified as MoO$sub 2$ by chemical analysis and X-ray powder method.

EDB SUBJECT CATEGORY: EDB-400400
INIS CATEGORY: B12

<516>
Posypaiko, V.I.; Shter, G.E.; Vasina, N.A.; Gryzalova, E.S.; Trunin, A.S. (Vsesoyuznyj Zaochnyj Politekhnicheskij Inst., Moscow (USSR); Kujbyshevskij Meditsinskij Inst. (USSR); Kujbyshevskij Politekhnicheskij Inst. (USSR))

Practical application of conversion method in study of five-component mutual system consisting of nine salts NaF, Na$sub 2$MoO$sub 4$, Na$sub 2$WO$sub 4$, KF, K$sub 2$MoO$sub 4$, K$sub 2$WO$sub 4$, BaF$sub 2$, BaMoO$sub 4$, BaWO$sub 4$
AIX-08:295364;EDB-77:056206; Dokl. Akad. Nauk SSSR (DANKA) 228:(3):613-616 (21 Jun 1976)

SUBJECT DESCRIPTORS: BARIUM COMPOUNDS: T7;BARIUM FLUORIDES: T1;BARIUM TUNGSTATES: T6;CHEMICAL REACTIONS;COMPLEXES;CONVERSION;DIFFERENTIAL THERMAL

<516> CONT.
ANALYSIS;MIXTURES;MOLYBDATES: T2;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10;POTASSIUM COMPOUNDS: T8;POTASSIUM FLUORIDES: T3;POTASSIUM TUNGSTATES: T9;SODIUM FLUORIDES: T4;SODIUM TUNGSTATES: T10;TUNGSTATES: T5;X-RAY SPECTROSCOPY

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<517>
Posypaiko, V.I.; Stratilatov, B.V.; Pervikova, V.N.

Calculated method of eutectics of multicomponent systems on base of algorithm and digital computers
AIX-07:277874;EDB-77:031093; Zh. Neorg. Khim. (ZNOKA) 21:(5):1298-1301 (May 1976)

SUBJECT DESCRIPTORS: ALGORITHMS;COMPUTER CALCULATIONS;CRYSTALLIZATION;DIGITAL COMPUTERS;EQUATIONS;EQUILIBRIUM;EUTECTICS;MIXTURES;PHASE TRANSFORMATIONS: Q1,Q2,Q3;POTASSIUM CHLORIDES: T1;POTASSIUM FLUORIDES: T2;POTASSIUM IODIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602;400201
INIS CATEGORY: B12

<518>
Posypaiko, V.I.; Trunin, A.S.; Kosmynin, A.S.; Shter, G.E. (Kujbyshevskii Politekhnicheskii Inst. (USSR); Kujbyshevskii Meditsinskii Inst. (USSR))

Projection-thermographic method for study of ternary and ternary mutual systems AIX-08:280681;EDB-77:031509; Dokl. Akad. Nauk SSSR (DANKA) 228:(4):911-913 (1 Jun 1976)

SUBJECT DESCRIPTORS: BARIUM CHLORIDES: T1;BARIUM FLUORIDES: T4;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;MEASURING METHODS;MIXTURES;PHASE DIAGRAMS;PHASE STUDIES: Q1,Q2,Q3,Q4;SODIUM CHLORIDES: T2;TUNGSTATES: T3

<518>

<519> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<519>
Posypaiko, V.I.; Trunin, A.S.; Miftakhov, T.T.; Gasanaliev, A.M.; Garkushin, I.K. (Kujbyshevskij Politekhnicheskij Inst. (USSR))

Thermal analysis of the system of NaF, CaF$sub 2$, Na$sub 2$MoO$suh 4$, CaMoO$sub 4$ AIX-08:289314;EDB-77:050884; (UKZHAUkr. Khim. Zh.) 42:(7):687-691 (Jul 1976)

SUBJECT DESCRIPTORS: CALCIUM COMPOUNDS: T4;CALCIUM FLUORIDES: T1;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;MELTING POINTS;MOLYBDATES: T2;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;SODIUM COMPOUNDS: T5;SODIUM FLUORIDES: T3;SOLID SOLUTIONS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<520>
Posypajko, V.I.; Trunin, A.S.; Khitrova, L.M. (Vsesoyuznii Zaochnii Politekhnicheskii Inst., Moscow (USSR); Kujbyshevskii Politekhnicheskii Inst. (USSR); Voronezhskii Meditsinskii Inst. (USSR))

KF-KCl-K$sub 2$MoO$sub 4$ system AIX-07:277873;EDB-77:031083; Zh. Neorg. Khim. (ZNOKA) 21:(2):547-550 (Feb 1976)

SUBJECT DESCRIPTORS: CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;MOLYBDATES: T1;PHASE DIAGRAMS: Q1,Q2,Q3;POTASSIUM CHLORIDES: T2;POTASSIUM FLUORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<521>
Poulain, M.; Chanthanasinh, M.; Lucas, J.

New fluoride glasses EDB-78:004622; Mater. Res. Bull. (MRBUA) 12:(2):151-156 (Feb 1977)

SUBJECT DESCRIPTORS: BARIUM FLUORIDES: T3;CHEMICAL COMPOSITION;CRYSTALLIZATION;GLASS: T4;MELTING POINTS;OPTICAL PROPERTIES: Q1,Q2,Q3,Q4;SYNTHESIS;THERMODYNAMIC PROPERTIES;THORIUM FLUORIDES: T2;ZIRCONIUM FLUORIDES: T1

ABSTRACT: New fluoride glasses have been obtained in the ZrF$sub 4$-ThF$sub 4$-BaF$sub 2$ systems. Large samples have been prepared in order to determine some physical properties. Optical transmission range lies from 0.22 to 7mu, the refractive index is about 1.53 and can be modulated by chemical composition. Glass temperature, crystallization and melting temperature have been measured.

EDB SUBJECT CATEGORY: EDB-360204

<522>
Poyarkov, A.M.; Lebedev, V.A.; Nichkov, I.F.; Rspopin, S.P.

Thermodynamic properties of liquid thorium-gallium alloys EDB-76:042177; Izv. Akad. Nauk SSSR, Met. (IZNMA) (3):87-88 (May 1975)

SUBJECT DESCRIPTORS: ELECTROMOTIVE FORCE;GALLIUM ALLOYS: T1;HIGH TEMPERATURE;INTERMETALLIC COMPOUNDS;LIQUID METALS;SOLID SOLUTIONS;THERMODYNAMIC PROPERTIES: Q1,Q2;THORIUM ALLOYS: T2

ABSTRACT: The emf (electromotive force) method was used to study the thermodynamic properties of liquid alloys of thorium with gallium and of an intermetallic compound existing in equilibrium with them. The solubility of thorium in gallium was also determined. The formation of the intermetallic compound is accompanied by the release of a considerable amount of heat, and by a decrease in entropy and in the free energy of the thorium. This change of thermodynamic functions suggests an energetic interaction of thorium with gallium in the fused state.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<523>

<523>
Predel, B.; Berka, H. (Max-Planck-Institut fuer Metallforschung, Stuttgart (F.R. Germany). Inst. fuer Werkstoffwissenschaften; Stuttgart Univ. (TH) (F.R. Germany). Inst. fuer Metallkunde)

Thermodynamic investigation of liquid alloys in the system Cd-In-TI AIX-07:275118;EDB-77:018629; Z. Metallkd. (ZEMTA) 67:(5):296-302 (May 1976)

SUBJECT DESCRIPTORS: CADMIUM;CADMIUM ALLOYS: T1;ENTROPY;FREE ENTHALPY;HIGH TEMPERATURE;INDIUM ALLOYS: T2;LIQUID METALS;MIXING HEAT;QUANTITY RATIO;TERNARY ALLOY SYSTEMS;THALLIUM ALLOYS: T3;THERMODYNAMIC ACTIVITY: Q1,Q2,Q3

ABSTRACT: The thermodynamic activities of Cd in liquid Cd-In-Tl alloys have been determined by the application of the isopiestic method. The entire field of concentrations has been covered at temperatures of 500, 550, 595, 650 and 700$sup 0$C. The positive deviations of the activity isctherms from Raoult's law are indicating a prevailing tendency for demixing throughout the system. Nevertheless, a more detailed consideration of the partial and integral free excess enthalpies, of the enthalpies of mixing and of the excess entropies, as resulting from the fundamental experimental values leads to the conclusion that - similar to the conditions in the bordering systems Cd-In and Cd-Tl - there are also individual bonding influences in the ternary case: In spite of the general demixing tendency due to the differences of the atomic volumes of the component species this tendency is considerably reduced in the concentration area of about 75 at.-% Cd.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<524>
Predel, B.; Berka, H. (Max-Planck-Institut fuer Metallforschung, Stuttgart (F.R. Germany). Inst. fuer Werkstoffwissenschaften; Stuttgart Univ. (TH) (F.R. Germany). Inst. fuer Metallkunde)

Contribution to the problem of the thermodynamic properties and the structure of liquid Cd-In alloys AIX-07:262718;EDB-77:018793; Z. Metallkd. (ZEMTA) 67:(3):198-204 (Mar 1976)

SUBJECT DESCRIPTORS: CADMIUM ALLOYS: T1;ENTROPY;HIGH TEMPERATURE;INDIUM ALLOYS: T2;LIQUID METALS;MIXING HEAT;THERMODYNAMIC PROPERTIES: Q1,Q2;VAPOR PRESSURE

ABSTRACT: In order to obtain a new set of thermodynamic data of liquid Cd-In alloys partial vapor pressure measurements by an isopiestic method have been carried out in the whole

<524> CONT.
concentration range at temperatures between 500 and 700$sup 0$C. An analysis of the concentration dependences of the enthalpies and entropies of mixing resulting from the experimental data shows that there is a tendency towards compound formation in the melt near 75 at.-% Cd, where an intermetallic compound is occurring in the solid state. The volume fraction of the parts of the melt, where this tendency is prevailing is about 0.3 at 500$sup 0$C and decreases to about 0.03 at 700$sup 0$C.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<525>
Protopapas, P.; Parlee, N.A.D.

Theory for the derivation of a single hard-sphere potential describing the overall molecular interactions in binary liquid metal alloys as a function of temperature and composition EDB-76:048728; High Temp. Sci. (HITSA) 7:(4):259-287 (Dec 1975)

SUBJECT DESCRIPTORS: BIBLIOGRAPHIES;BINARY ALLOY SYSTEMS: M1;LIQUID METALS;MATHEMATICAL MODELS;MOLECULAR STRUCTURE: Q1;REVIEWS;SIMULATION

ABSTRACT: The hard sphere potential provides the simplest mathematical formalism of a kinetic theory for liquids. Numerous attempts have been made to develop kinetic theories based on more complex potential models, but their mathematics become almost intractable, and the necessary approximations and assumptions introduce errors. Furthermore, the necessary input data are extensive, involved, and seldom available. The situation worsens in the case of binary liquid mixtures. One way of improving the hard-sphere results is the implementation of the mathematical formalism for hard-sphere potential with hard spheres shrinking at higher temperatures, i.e., the implementation of the kinetic theory for hard-sphere potential with ''effective'' soft spheres. In previous papers, a corresponding state principle were developed and numerically tested for the calculation of temperature-dependent hard spheres for liquid metals. It is shown how a binary liquid metal alloy can be simulated by a hypothetical single-component hard-sphere liquid, the overall molecular interactions of which are described by the ''effective'' soft-sphere potential for pure liquid metals. The simulation and potential are tested on the calculation of the structure factor of 71 binary alloys of different components, at different compositions and temperatures. The theoretical vehicle is the Percus--Yevick theory for the

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structure factor of pure liquids. Results are in excellent agreement with the Percus--Yevick theory for binary hard-sphere fluids and experimental data. 70 references. (DLC)

EDB SUBJECT CATEGORY: EDB-360104

<526>
Prusakov, V.N.; Ezhov, V.K.; Efremov, E.A.

Investigation of liquid-steam equilibrium in system with diluted solutions of metal fluorides in uranium hexafluoride
AIX-08:295482;EDB-77:056092; At. Energ. (USSR) (AENGA) 41:(2):98-101 (Aug 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400105
INIS CATEGORY: B13

<527>
Pugh, C.E.; Robinson, D.N., Oak Ridge National Lab., Tenn. (USA)

In Some trends in constitutive equation model development for high-temperature behavior of fast-reactor structural alloys
** ERA-03:000677;INS-77:017890;EDB-78:008226; (1977)
CONF-770807--27

SUBJECT DESCRIPTORS: CHROMIUM-MOLYBDENUM STEELS: T3;LMFBR TYPE REACTORS: T1;MATHEMATICAL MODELS;MECHANICAL PROPERTIES: Q2,Q3;REACTOR MATERIALS: M2,Q1

ABSTRACT: The paper addresses some important features of the inelastic behavior of 2$sup 1$/$sub 4$Cr--1Mo steel and indicates a mathematical framework that is capable of representing these types of response. While the constitutive model discussed embraces capabilities beyond those of equations presently used in design analyses: their implementation into practicable analysis methods (such as finite-element programs) is more demanding. For example, in the case of slow time-dependent deformations, the equations governing accumulation of the inelastic strain components and the evolution of the tensorial state variable $alpha$ are intimately coupled. A part of recommending any such model for use in design must be a quantitative assessment of the economic feasibility of implementation.

EDB SUBJECT CATEGORY: EDB-210500;360103
INIS CATEGORY: E35;B22

<528>
Pulham, R.J. (Nottingham Univ. (UK))

Recent developments in the chemistry of solutions of salts in liquid alkali metals AIX-08:312192;EDB-77:094032; Pure Appl. Chem. (PACHA) 49:(1):83-92 (1977)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS;BIBLIOGRAPHIES;CESIUM: T1;CHEMICAL REACTIONS;ELECTRIC CONDUCTIVITY;ENTHALPY;LIQUID METALS;LITHIUM: T2;NONMETALS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;POTASSIUM: T3;REVIEWS;RUBIDIUM: T4;SODIUM: T5;SOLUBILITY;SOLUTIONS

ABSTRACT: Essential features of phase equilibria between alkali metal-salt-non-metal are summarized and narrowed to detailed consideration of dilute solutions of salts in metals. The use of resistivity techniques is illustrated to determine non-metal solubilities and hence derive partial molar quantities and anion solvation enthalpies. Dissolved non-metals increase the resistivity of a specific metal by a characteristic amount and this property is exploited in the study of solute-solute interactions. Examples are given of solute association, dissociation and equilibrium in metallic solution and the reactions are correlated with the corresponding solid state reaction enthalpies.

EDB SUBJECT CATEGORY: EDB-360102;400201
INIS CATEGORY: B12

<529>
Pulham, R.J.; Adams, P.F.; Hubberstey, P.; Parry, G.; Thunder, A.E. ** Watson, J.S.; Wiffen, F.W.; Bishop, J.L.; Breeden, B.K., Oak Ridge National Lab., Tenn. (USA)

Reaction rates and electrical resistivities of the hydrogen isotopes with, and their solubilities in, liquid lithium In Radiation effects and tritium technology for fusion reactors. Vol. IV ** INS-76:021788;ERA-02:004615;EDB-76:095984; (Mar 1976) CONF-750989--P4

SUBJECT DESCRIPTORS: DEUTERIUM;ELECTRIC CONDUCTIVITY;ENTHALPY;HIGH TEMPERATURE;LIQUID METALS;LITHIUM;LITHIUM DEUTERIDES: T2;LITHIUM HYDRIDES: T1;LITHIUM TRITIDES: T3;PHASE DIAGRAMS: Q1,Q2,Q3;PRESSURE DEPENDENCE;SOLUBILITY;SOLVATION;TRITIUM

ABSTRACT: The rate of reaction, k, of hydrogen and of deuterium with liquid lithium have been determined up to pressures of 20kNm$sup -2$ and at temperatures between 230 and 270$sup 0$C. The reaction is first order with an apparent activation energy of 52.8 and 55.2 kJmol$sup -1$ for hydrogen and

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<529> CONT.
deuterium, respectively. The deuterium isotope effect, k/sub H/k/sub D/, decreases from 2.95 at 230 to 2.83 at 270$sup 0$C. Tritium is predicted to react even more slowly than deuterium. The freezing point of lithium is depressed by 0.082 and 0.075$sup 0$C, respectively, by dissolved hydride and deuteride giving eutectics at 0.016 mol percent H and 0.012 mol percent D in the metal-salt phase diagrams. The depression and eutectic concentration are expected to be less for tritium. The increase in the resistivity of liquid lithium caused by dissolved hydrogen isotopes is linear and relatively large, 5 x 10$sup -8$ $Omega$m (mol percent H or D)$sup -1$. The solubility of lithium hydride and deuteride was determined from the marked change in resistivity on saturation. The liquidus of the metal-salt phase diagram rises steeply from the eutectic point to meet the two-immiscible liquid region. Tritium is expected to be less soluble than deuterium. The partial molar enthalpies of solution are 44.2 and 55.0 kJmol$sup -1$ for hydrogen and deuterium, respectively. These values are used to calculate the solvation enthalpies of the isotope anions in the metal.

EDB SUBJECT CATEGORY: EDB-060100;400201
INIS CATEGORY: B31;B12

<530>
Pyrina, V.K.; Prostakov, M.E. (Ural'skij Gosudarstvennyj Univ., Sverdlovsk (USSR))

Interaction of potassium tetrafluoroborate with fluorides of potassium, lanthanum, neodymium in melt EDB-76:036686; Zh. Neorg. Khim. (ZNOKA) 20:(4):1140-1142 (Apr 1975)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS;FLUOROBORATES: T2;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;POTASSIUM COMPOUNDS: T1;THERMAL ANALYSIS;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<531>
Rakitskii, A.N. (AN Ukrainskoj SSR, Kiev. Inst. Metallofiziki)

Investigation on the resistance of high-refractory materials to chromium melt AIX-08:321154;EDB-77:113764; Ogneupory (OGNPA) (12):47-51 (Dec 1975)

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES: T8;ANNEALING;BERYLLIUM OXIDES: T2;CHEMICAL REACTIONS;CHROMIUM;CHROMIUM BASE

<531> CONT.
ALLOYS;CRUCIBLES: T9;MAGNESIUM OXIDES: T7;MELTING;METALLOGRAPHY;MOLYBDENUM COMPOUNDS;PLASTICITY;POROSITY;POWDERS;RARE EARTH ADDITIONS;REFRACTORIES: T1;SILICIDES;STABILITY: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;STRUCTURAL CHEMICAL ANALYSIS;TABLES;THERMAL TESTING;TITANIUM BORIDES: T3;TUNGSTEN COMPOUNDS;ZIRCONIUM BORIDES: T4;ZIRCONIUM CARBIDES: T5;ZIRCONIUM OXIDES: T6

ABSTRACT: An investigation was made of the stability of refractory crucibles used in melting ERKh-type chromium (electrolytically refined in hydrogen atmosphere) and its alloys with rare-earth metals. As refractory materials for the crucibles powdered oxides (Al$sub 2$O$sub 3$, ZrO$sub 2$, MgO, BeO), carbides (TiC, ZrC), borides (TiB$sub 2$,ZrB$sub 2$) and silicides (MoSi$sub 2$, W$sub 5$Si$sub 3$) were used. Crucibles having a capacity up to 1 kg of liquid chromium were made from powdered refractory materials by the sl8/ip casting method and pressing technique. The porosity of the crucibles after calcining at 1850-2000 deg C was 4-8%. The melting process was carried out in a laboratory induction furnace in purified argon atmosphere. The metal in liquid state was kept in the crucible for 5 min. The suitability of the examined refractory materials for making crucibles and ingot molds, used in contact with molten chromium and its alloys, was determined from the degree of interaction of chromium melt with the refractory materials and from the mechanical (first of all, plastic) properties of the cast metal most sensitive to the presence of impurities in Cr. The degree of interaction was established by x-ray structural analysis and petrographic measurements of the refractory materials, as well as by chemical and metallographic analyses of the surface layer of the casting. Crucibles made of BeO, ZrC, Al$sub 2$O$sub 3$ and ThO$sub 2$ were found to be most inert towards non-alloyed molten chromium. Minimum contamination of Cr-rare-earth elements melts was observed in the case of crucibles made of ZrC.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<532>
Rakovshchik, G.M.; Linchevskij, B.V.

Nitrogen solubility in liquid nickel--niobium alloys
EDB-76:048704; Tekhnol. Legk. Splavov (TLSPD) (8):61-65 (1974)

SUBJECT DESCRIPTORS: DEGASSING;ENTHALPY;ENTROPY;LIQUID METALS;NICKEL BASE ALLOYS: T1;NIOBIUM ALLOYS: T2;NITROGEN: T3;PRESSURE DEPENDENCE;QUANTITY RATIO;REACTION KINETICS;SOLUBILITY: Q3;SOLVENT PROPERTIES: Q1,Q2;TEMPERATURE

<532>

<532> CONT.
DEPENDENCE

ABSTRACT: None

EDE SUBJECT CATEGORY: EDB-360104;360603
INIS CATEGORY: B22

<533>
Rapp, R.A., Ohio State Univ., Columbus (USA)

In Fundamental studies of metal fluorination reactions.
Progress report, May 1, 1976--April 31, 1977 **
ERA-02:030370;EDB-77:062487; (Jan 1977) COO--2671-2

SUBJECT DESCRIPTORS: CALCIUM
FLUORIDES;COPPER;DIFFUSION;FLUORINATION: Q1,Q2;METALS:
T2;NICKEL: T1;RESEARCH PROGRAMS;SOLUBILITY

ABSTRACT: The present research is being undertaken to study some fundamental thermodynamic and transport properties and detailed mechanisms pertinent to metal fluorination reactions. The program consists of determining the following properties using solid-state, CaF$sub 2$-electrolyte galvanic cells: (A) solubility and diffusivity of fluorine in metals, specifically nickel, and (B) the nature of the point defects (type, concentration and mobility) in metal fluorides as a function of fluorine partial pressure, temperature and impurity concentration. The latter study encompasses the study of the electrical conductivity of metal fluorides under thermodynamically well-defined conditions. Another objective of the program is to design and construct a fluorine probe for the measure of fluorine chemical potentials in gaseous environments. The probe must be evaluated in oxygen-containing atmospheres which might limit its accuracy and lifetime. For several technical reasons, the specific experimentation has deviated somewhat from that originally proposed. For two reasons, a probable phase change in CaF$sub 2$ at a temperature around 1175$sup 0$C and a thermal expansion coefficient which differs greatly from solid nickel, CaF$sub 2$ single crystal electrolytes could not yet be interfaced perfectly to solid nickel for electrochemical studies. However, these problems were avoided by the successful substitution of copper for nickel in the studies of solubility and diffusivity. Some problems also arose in the study of the electrical conductivity of NiF$sub 2$, namely, only relatively impure NiF$sub 2$ was available, and NiF$sub 2$ exhibited poor mechanical stability as electrodes. Therefore, the proposed methods were used mostly for the study of B-PbF$sub 2$, for which previous studies also

<533> CONT.
provided values for comparison. With the experience gained from the work reported here, future experimentation with nickel metal and NiF$sub 2$ should be successful.

EDB SUBJECT CATEGORY: EDB-400201

<534>
Reeder, P.L.; Alquist, L.J.; Lin, J.; Wright, J.F. (Battelle Pacific Northwest Labs., Richland, Wash. (USA))

Separation of alkaline earth from alkali metal fission products in the SOLAR on-line mass spectrometer
AIX-07:257637;ERA-02:010661;EDB-77:007656; Nucl. Instrum. Methods (NUIMA) 133:(3):501-502 (15 Mar 1976)

SUBJECT DESCRIPTORS: BARIUM FLUORIDES;BARIUM ISOTOPES: T1;CESIUM ISOTOPES: T2;COUNTING RATES;EFFICIENCY;FISSION PRODUCTS;ISOTOPE PRODUCTION;MASS SPECTROMETERS;MASS SPECTROSCOPY: Q1,Q2,Q3,Q4;MOLECULAR IONS;MULTI-ELEMENT SEPARATION;ON-LINE MEASUREMENT SYSTEMS;RUBIDIUM ISOTOPES: T3;STRONTIUM FLUORIDES;STRONTIUM ISOTOPES: T4;SURFACE IONIZATION

ABSTRACT: Fission product nuclides of Sr and Ba have been separated from their Rb and Cs isobars in an on-line spectrometer by the use of molecular fluoride ions of Ba and Sr formed on a hot Re surface.

EDB SUBJECT CATEGORY: EDB-400703
INIS CATEGORY: D13

<535>
Reetz, T.

In Measurement of the cell voltage of ThO$sub 2$--Y$sub 2$O$sub 3$-solid electrolyte cells in the range of mixed conduction
** ERA-02:000825;EDB-76:080725; Z. Phys. Chem. (Leipzig) (ZPCLA) 250:(3/4):205-216 (1972) ANL-Trans--1060

SUBJECT DESCRIPTORS: ELECTROLYTIC CELLS: T1;ELECTROMOTIVE FORCE: Q1;OXYGEN;PRESSURE DEPENDENCE;THORIUM OXIDES;YTTRIUM OXIDES

ABSTRACT: The cell voltage drop of galvanic chains with oxygen ion-conducting solid electrolytes by electron transfer can be estimated with a knowledge of either the parameters for electron conduction of the transfer numbers applicable to different oxygen pressures. For a given electrode system, it is possible to determine an optimum reference system in terms of the mean transfer number. Approximation equations are derived for the relationship between the transfer number and

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<535> CONT.
mean transfer number of galvanic chains. The electrical conduction properties of the ThO$sub 2$--Y$sub 2$O$sub 3$ solid electrolyte are discussed on the basis of experimental results with the chains Pt/H$sub 2$,H$sub 2$O(20$sup 0$C/sub sat./)/ ThO$sub 2$ + 20 Mol- percent YO/sub 1,5/air/Pt (Chain 1) and Ni/Na,Na$sub 2$O (sat.)/ThO$sub 2$ + 20 Mol- percent YO/sub 1,5/O$sub 2$(p'o$sub 1$)/Ag/Ni (Chain 2) and literature data. The measured values of chain 2 at different oxygen pressures of the reference system furnished values for electron conduction parameters. 7 figures, 4 tables.

EDB SUBJECT CATEGORY: EDB-250902;400702

<536>
Reeves, F.; Chassay, R., National Aeronautics and Space Administration, Huntsville, Ala. (USA). George C. Marshall Space Flight Center

In Space Processing Applications Rocket project, SPAR 1. Final report ** INS-77:015213;ERA-02:057093;EDB-77:127846; (Dec 1976) N--77--16082

SUBJECT DESCRIPTORS: FABRICATION: Q2;SPACE

ABSTRACT: The experiment objectives, design/operational concepts, and final results of each of nine scientific experiments conducted during the first Space Processing Applications Rocket (SPAR) flight are summarized. The nine individual SPAR experiments, covering a wide and varied range of scientific materials processing objectives, were entitled: solidification of Pb-Sb eutectic, feasibility of producing closed-cell metal foams, characterization of rocket vibration environment by measurement of mixing of two liquids, uniform dispersions of crystallization processing, direct observation of solidification as a function of gravity levels, casting thoria dispersion-strengthened interfaces, contained polycrystalline solidification, and preparation of a special alloy for manufacturing of magnetic hard superconductor under zero-g environment.

EDB SUBJECT CATEGORY: EDB-360101;360201
INIS CATEGORY: B21;B23

<537>
Reil, K.C.; Cronenberg, A.W., Sandia Labs., Albuquerque, N.Mex. (USA); EG and G Idaho, Inc., Idaho Falls (USA)

In Effective equation-of-state measurements on uranium dioxide
** NTS-78:000279;ERA-03:006804;INS-78:000240;EDB-78:008749; (1977) SAND--77-1094C

SUBJECT DESCRIPTORS: EQUATIONS OF STATE;LMFBR TYPE REACTORS: T1;MELTDOWN: M2,Q1;THERMODYNAMICS: Q2;URANIUM DIOXIDE: T3;VAPOR PRESSURE: Q3

ABSTRACT: The safety analysis of Liquid Metal Fast Breeder Reactor (LMFBR) systems requires knowledge of the vapor pressure of reactor fuels up to 6000 K. A new technique was developed to obtain experimental vapor pressure data for reactor fuel materials at high temperatures and pressures. Fuel samples are pulse fission heated in the Annular Core Pulse Reactor (ACPR) at heating rates comparable to those anticipated during a severe LMFBR transient. Since the vapor of reactor fuels may contain several dissociated fuel species, volatile fission products, and/or fission gas, and the evolution of that pressure may be time or rate dependent, the terminology ''effective equation-of-state (EEOS) measurement'' was used to differentiate these results from the vapor pressure of pure materials. This technique can be easily applied to plutonium bearing and previously irradiated fuels. The EEOS technique was used to determine the vapor pressure of high purity uranium dioxide with an oxygen-to-metal ratio of 2.08. Energy depositions of up to 2720 J/g relative to room temperature were obtained, resulting in measured pressures in excess of 38 mpa.

EDB SUBJECT CATEGORY: EDB-220900;210500;360204
INIS CATEGORY: C52;E35;B23

<538>
Reisfeld, R. (Hebrew Univ., Jerusalem (Israel). Dept. of Inorganic and Analytical Chemistry) ** Dunitz, J.D. (ed.) (Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Organische Chemie); Hemmerich, P. (ed.) (Konstanz Univ. (F.R. Germany). Fachbereich Biologie); Holm, R.H. (ed.) (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Chemistry); Ibers, J.A. (ed.) (Northwestern Univ., Evanston, Ill. (USA). Dept. of Chemistry); Joergensen, C.K. (ed.) (Geneva Univ. (Switzerland). Dept. de Chimie Minerale et Analytique); Neilands, J.B. (ed.) (California Univ., Berkeley (USA). Dept. of Biochemistry); Reinen, D. (ed.) (Marburg Univ. (F.R. Germany). Fachbereich Chemie); Williams, R.J.P. (ed.) (Oxford Univ. (UK). Inorganic Chemistry Lab.)

Radiative and non-radiative transitions of rare-earth ions in

<538>

<538> CONT.
glasses In Rare Earths ** Structure and Bonding,
AIX-07:257202;EDB-77:007479; (1975) Springer

SUBJECT DESCRIPTORS: CATIONS;DATA;ELECTRIC MOMENTS;EMISSION SPECTRA;ENERGY LEVELS;ENERGY-LEVEL TRANSITIONS: Q1;FLUORESCENCE SPECTROSCOPY;GLASS;MAGNETIC MOMENTS;QUADRUPOLES;RARE EARTH COMPOUNDS;RARE EARTHS: T1;RELAXATION;REVIEWS;TEMPERATURE DEPENDENCE;VALENCE

ABSTRACT: Magnetic dipole and electric quadrupole transitions, forced electric dipole transitions, intensity parameters of trivalent rare earth ions in glasses, and nonradiative relaxations are treated.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<539>
Reisfeld, R.; Lieblich, N.; Boehm, L. (Hebrew Univ., Jerusalem (Israel)); Barnett, B. (Soreq Nuclear Research Center, Yavne, Israel)

Energy transfer between Bi$sup 3+$$YieldsEusup 3+$, Bi$sup 3+$$YieldsSmsup 3+$ and UO$sub 2$$sup 2+$$YieldsEusup 3+$ in oxide glasses AIX-07:253226;ERA-02:008296;EDB-77:004188; J. Lumin. (JLUMA) 12-13::749-753 (Mar 1976)

SUBJECT DESCRIPTORS: EFFICIENCY;ENERGY TRANSFER: Q1,Q2,Q3,Q4,Q5,Q6;EXCITATION;FLUORESCENCE;GLASS;LIFETIME;PROBILITY;SPECTRA

ABSTRACT: Probabilities and efficiencies of energy transfer from Bi$sup 3+$ to Eu$sup 3+$, Bi$sup 3+$ to Sm$sup 3+$ in borax and germanate glasses, and from UO$sub 2$$sup 2+$ to Eu$sup 3+$ in phosphate glass were measured. Enhancement of acceptor fluorescence by two orders of magnitude was achieved as a result of energy transfer. From the decrease of donor fluorescence lifetime the energy transfer from UO$sub 2$$sup 2+$ to Eu$sup 3+$ was found to be nonradiative.

EDB SUBJECT CATEGORY: EDB-640302
INIS CATEGORY: A12

<540>
Reshetnikova, L.P.; Shaimuradov, I.B.; Novoselova, A.V.
(Moskovskij Gosudarstvennyj Univ. (USSR))

Investigation into reaction of rubidium and holmium fluorides
AIX-08:320706;EDB-77:114204; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 12:(4):638-642 (Apr 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL REACTIONS: Q1,Q2;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;HIGH TEMPERATURE;HOLMIUM FLUORIDES: T1;MELTING;PHASE DIAGRAMS: Q1,Q2;RUBIDIUM FLUORIDES: T2;X-RAY DIFFRACTION

ABSTRACT: A study was made of the phase diagram of the system RbF-HoF$sub 3$. The investigation was carried out by differential thermal and X-ray diffraction analyses. The following double fluorides were formed in the system: Rb$sub 3$HoF$sub 6$, RbHo$sub 2$F$sub 7$ and compounds with assumed composition RbHoF$sub 4$, RbHo$sub 3$F$sub 10$, RbHo$sub 7$F$sub 22$. The compound RbHoF$sub 4$ was found only thermographically. There are two eutectic points: the eutectic between rubidium fluoride and R$sub 3$HoF$sub 6$ has the composition 7.5 mol.% HoF$sub 3$ and melts at 745 deg C; the entectic between Rb$sub 3$HoF$sub 6$ and RbHo$sub 2$F$sub 7$ contains 45% HoF$sub 3$ and melts at 850 deg C. Rubidium hexafluorohclmiate (Rb$sub 3$HoF$sub 6$) is the only compound of the system which melts in a congruent way (tsub(m)=1020 deg C).

EDB SUBJECT CATEGORY: EDB-400201:360603
INIS CATEGORY: B12

<541>
Rhoades, S.C., Bureau of Mines, Washington, D.C. (USA)

In K$sub 2$HfF$sub 6$--K$sub 2$ZrF$sub 6$--1.25 percent of HF system at 40$sup 0$C with other solubility curves from 25$sup 0$C to 70$sup 0$C ** INS-77:011944;EDB-77:120764; (1973) BM-RI--7785

SUBJECT DESCRIPTORS: DIAGRAMS;HAFNIUM FLUORIDES: T2;HYDROFLUORIC ACID: T4;MEDIUM TEMPERATURE;PHASE STUDIES: Q1,Q2,Q3,Q4;POTASSIUM FLUORIDES: T1;RECRYSTALLIZATION;SOLUBILITY: Q1,Q2,Q3;SOLVENT PROPERTIES: Q4;ZIRCONIUM FLUORIDES: T3

ABSTRACT: The Bureau of Mines investigated the complete ternary system K$sub 2$HfF$sub 6$--K$sub 2$ZrF$sub 6$--1.25 weight-percent HF at 40$sup 0$C. In addition, solubility curves have been established at 25$sup 0$, 30$sup 0$, 50$sup 0$, 60$sup 0$, and 70$sup 0$C. These solubility data implemented a study of hafnium enrichment in feed solutions

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for liquid-liquid extraction processes. Selected K$sub 2$HfF$sub 6$--K$sub 2$ZrF$sub 6$--1.25 weight-percent HF mixtures were equilibrated in a constant temperature bath. Compositions of the equilibrated solutions and wet residues were established from combined hafnium and zirconium oxide and total fluorine analyses. All solubility curves were essentially parallel on triangular coordinates. At 40$sup 0$C, the solid phase of the K$sub 2$HfF$sub 6$--K$sub 2$ZrF$sub 6$--1.25 percent HF system is a series of solid solution hydrates with K$sub 2$HfF$sub 6$. H$sub 2$O and K$sub 2$ZrF$sub 6$. 3H$sub 2$O segments existing at the respective extremes. Since this system contains K$sub 2$HfF$sub 6$. H$sub 2$O and K$sub 2$ZrF$sub 6$. 3H$sub 2$O segments, it is not ideal for simple separation of high-purity K$sub 2$HfF$sub 6$ from K$sub 2$HfF$sub 6$--K$sub 2$ZrF$sub 6$ mixtures by recrystallization. However, it would be useful for producing hafnium-enriched feed solutions from zircon concentrates for liquid-liquid extraction of hafnium from zirconium.

EDB SUBJECT CATEGORY: EDB-400201;400105
INIS CATEGORY: B12;B11

<542>
Rosa, C.J., Cincinnati Univ., Ohio (USA). Dept. of Materials Science and Metallurgical Engineering

In Basic mechanisms providing oxidation resistance in structural metals at high temperatures. II. The defect structure of nonstoichiometric rutile (TiO$sub 2$) and nonstoichiometric rutile containing 1 to 10 mole % Cb$sub 2$O$sub 6$. Final report 21 Dec 1973-20 Dec 1974 **
ERA-02:010462;EDB-77:007113; (Aug 1975) AD-A024540

SUBJECT DESCRIPTORS: ELECTROLYTES;ELECTROLYTIC CELLS;NIOBIUM OXIDES: T3;OXIDATION: Q1;RUTILE: T2;THERMODYNAMIC PROPERTIES: Q2,Q3;THORIUM OXIDES;TITANIUM BASE ALLOYS: T1;VERY HIGH TEMPERATURE;YTTRIUM OXIDES

ABSTRACT: The overall research program in which this investigation is a part is a study of oxidation of titanium and titanium alloys in hopes of yielding information concerning possible alloy additions which may improve the oxidation resistance of titanium structural materials at temperatures in the range 800 to 1200C. Previous investigations have shown marked improvement in the oxidation resistance of titanium by additions of several metals, of which columbium is one. Because the thermodynamic stability limits for nonstoichiometric rutile is in the range of oxygen chemical potentials which can be conveniently measured by electrochemical techniques, an EMF (electromotive force) cell

<542> CONT.
using yttria doped thoria as a solid electrolyte was designed to determine the thermodynamic properties of nonstoichiometric rutile and rutile containing columbia. (GRA)

EDB SUBJECT CATEGORY: EDB-360105;360204

<543>
Roy, S.K. (Ranchi Univ. (India). Dept. of Chemistry)

Heats of formation of solid solutions of CsCl with CsBr
AIX-08:331987;EDB-78:022284; Indian J. Chem., Sect. A (IJCAD) 14:(12):1008-1009 (Dec 1976)

SUBJECT DESCRIPTORS: CESIUM BROMIDES: T1;CESIUM CHLORIDES: T2;CRYSTAL DEFECTS;FORMATION HEAT: Q1,Q2;SOLID SOLUTIONS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<544>
Rustamov, P.G.; Seidova, N.A.; Shakhbazov, M.G.
(Azerbajdzhanskij Gosudarstvennyj Pedagogicheskij Inst., Baku (USSR); AN Azerbajdzhanskoj SSR, Baku. Inst. Neorganicheskoj i Fizicheskoj Khimii)

Ga-Bi-Te system AIX-08:329911;EDB-78:009649; Zh. Neorg. Khim. (ZNOKA) 21:(3):764-768 (Mar 1976)

SUBJECT DESCRIPTORS: BISMUTH: T3;BISMUTH ALLOYS;BISMUTH TELLURIDES: T1;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;GALLIUM: T4;GALLIUM ALLOYS;GALLIUM TELLURIDES: T2;MICROHARDNESS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4

ABSTRACT: To elucidate the nature of interaction in the system Ga-Bi-Te, a study has been made of sections GaTe-Bi$sub 2$Te$sub 3$, Ga$sub 2$Te$sub 3$-Bi, GaTe-Bi and Bi$sub 2$Te$sub 3$-Ga. The alloys have been prepared by direct melting of the components or their alloys with subsequent homogenizin.o annealing at 400 deg C. The study has been made by the methods of differential thermal, microstructural analysis and by microhardness measurements. On the basis of literature data and data obtained a projection of the liquidus surface of the phase diagram for the system Ga-Bi-Te has been constructed. In the ternary system there are 17 curves of monovariant equilibrium dividing the liquidus into 10 fields of primary crystallization of phases, 9 points of

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<544> CONT.
non-variant equilibrium of which 4 points are triple eutectics and 5 points are triple peritectics.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<545>
Rustamov, P.G.; Seidova, N.A.; Shakhbazov, M.G. (Arzamasskij Gosudarstvennyj Pedagogicheskij Inst. (USSR); AN Azerbajdzhanskoj SSR, Baku. Inst. Neorganicheskoj i Fizicheskoj Khimii)

GaTe-Bi$sub 2$Te$sub 3$ system AIX-08:329912;EDB-78:009650; Zh. Neorg. Khim. (ZNOKA) 21:(3):860-862 (Mar 1976)

SUBJECT DESCRIPTORS: BISMUTH ALLOYS;BISMUTH TELLURIDES: T1;EUTECTICS;GALLIUM ALLOYS;GALLIUM TELLURIDES: T2;MICROHARDNESS;MICROSTRUCTURE;PHASE DIAGRAMS: Q1,Q2;SOLID SOLUTIONS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<546>
Ruzinova, E.A.; Kozhemyakin, V.A.; Korshunov, B.G.; Pirkovskaya, N.V. ** Poletaev, I.F.; Rubajlova, K.M. (eds.), Gosudarstvennyj Nauchno-Issledovatel'skij i Proektnyj Inst. Redkometallicheskoj Promyshlennosti, Moscow (USSR)

Practice of experiment planning in studying limited regions of multicomponent system In Rare earth metals **
AIX-08:292458;EDB-77:074877; (1976) INIS-mf--3315

SUBJECT DESCRIPTORS: ALUMINIUM CHLORIDES: T1;EQUATIONS;EXPERIMENT PLANNING: T;IRON CHLORIDES: T2;MAGNESIUM CHLORIDES: T3;MELTING;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6;POTASSIUM CHLORIDES: T4;SODIUM CHLORIDES: T5;VAPOR PRESSURE;ZIRCONIUM CHLORIDES: T6

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<547>
Ryabov, E.N.; Sandler, R.A.; Nguen Ngok Kuan; Klyuchnikova, E.F.; Kozhina, I.I. (Leningradskij Gornyj Inst. (USSR))

MoCl$sub 2$-NaCl and MoCl$sub 2$-KCl binary systems
EDB-76:048907; Zh. Neorg. Khim. (ZNOKA) 20:(3):765-768 (Mar 1975)

SUBJECT DESCRIPTORS: BINARY MIXTURES;DIFFERENTIAL THERMAL ANALYSIS;MOLYBDENUM CHLORIDES: T3;PHASE DIAGRAMS: Q1,Q2,Q3;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<548>
Ryabov, Eh.N.; Aleksandrovskii, S.V.; Sandler, R.A.; Zakharevich, A.A.; Naumchik, A.N.

ZrCl$sub 4$-TiCl$sub 3$-NaCl ternary system
AIX-08:283015;EDB-77:044276; Zh. Prikl. Khim. (ZPKHA) 49:(6):1378-1379 (Jun 1976)

SUBJECT DESCRIPTORS: EUTECTICS;MELTING POINTS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3;SODIUM CHLORIDES: T1;TITANIUM CHLORIDES: T2;ZIRCONIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<549>
Rykhal, R.M.; Zarechnyuk, O.S. (L'vovskij Gosudarstvennyj Univ. (Ukrainian SSR)) ** Ministerstvo Vysshego i Srednego Spetsial'nogo Obrazovaniya SSSR, Moscow; L'vovskij Gosudarstvennyj Univ. (Ukrainian SSR)

New representatives of CeMn$sub 4$Al$sub 8$ structural type In 2. all-union conference on crystallochemistry of intermetallic compounds ** AIX-07:275122;EDB-77:050192; (1974) INIS-mf--3191

SUBJECT DESCRIPTORS: ALUMINIUM BASE ALLOYS: T2;DIFFRACTION METHODS;INTERMETALLIC COMPOUNDS;LATTICE PARAMETERS: Q1,Q2,Q3;RARE EARTH ALLOYS: T1;RHENIUM ALLOYS: T3;TETRAGONAL LATTICES

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<549> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<550>
Saboungi, M.; Rahman, A.

Application of molecular dynamics computations to the conformal ionic solution theory: Thermodynamics of binary molten salt mixtures INS-76:019963;ERA-02:001161;EDB-76:081827; J. Chem. Phys. (JCPSA) 65:(6):2393-2399 (15 Sep 1976)

SUBJECT DESCRIPTORS: BINARY MIXTURES;FREE ENERGY;MIXING;MOLTEN SALTS: T1;STATISTICAL MECHANICS;THERMODYNAMIC PROPERTIES: Q1

ABSTRACT: An evaluation of the coefficient a (T,V) as defined in the equation for the excess Helmholtz free energy of mixing of binary solutions, $delta$A/sub m//sub E/=a (T,V)(lambda/sub i/-lambda/sub j/)$sup 2$X/sub i/X/sub j/ +..., derived from the conformal ionic solution theory is presented. This coefficient is shown to be negative and proportional to a fluctuation energy. The sign agrees with experimental calorimetric data of binary molten salt mixtures. A molecular dynamics computation of a (T,V) was made to compare theory and experiments. The calculated values are strongly dependent on the form of the repulsive contribution to the pair potentials (Tosi and Fumi model and Michielsen, Woerlee, Graaf, and Ketelaar model). Criteria for testing the repulsive part of proposed pair potentials are suggested as a result of this investigation. (AIP)

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<551>
Saboungi, M.I.; Blander, M.

Electromotive force measurements in molten lithium--magnesium alloys ERA-01:023780;EDB-76:065775; J. Electrochem. Soc. (JESOA) 122:(12):1631-1634 (Dec 1975)

SUBJECT DESCRIPTORS: ELECTROMOTIVE FORCE: Q1,Q2;LIQUID METALS;LITHIUM ALLOYS: T1;MAGNESIUM ALLOYS: T2;PHASE STUDIES;THERMODYNAMIC PROPERTIES

ABSTRACT: Electromotive force measurements of molten lithium-magnesium alloys are presented. Results of the

<551> CONT.
measurements may be combined with data from the measured Li-Mg phase diagram to calculate the thermodynamic properties of solid Li-Mg alloys at the solidus. (MCG)

EDB SUBJECT CATEGORY: EDB-360104;400400

<552>
Saboungi, M.L.; Blander, M., Argonne National Lab., Ill. (USA)

In Theoretical concepts useful in the calculation or storage of phase diagrams of ionic systems **
ERA-02:041863;EDB-77:094490; (Jan 1977) CONF-770116--1

SUBJECT DESCRIPTORS: COMPUTER CALCULATIONS: Q2;MOLTEN SALTS: T1;PHASE DIAGRAMS: Q1,T2

ABSTRACT: Equations for the a priori calculation or for the storage of phase diagrams and thermodynamic properties of molten ternary ionic systems were derived from the conformal ionic solution theory, which rigorously takes into account the ionic nature of the melts. Thermodynamic functions for ternary ionic systems were derived for cases in which all the cations have the same charge and all the anions have the same charge. Equations for the excess free energy of mixing, $delta$G/ sup E/, are obtained for reciprocal systems, e.g., A$sup +$, B$sup +$/X$sup -$, Y$sup -$, defined by the three components AY, BX, and BY, and for additive systems, e.g., A$sup +$, B$sup +$, C$sup +$/X$sup -$. From these equations and classical thermodynamic relations, one can calculate phase diagrams of the two classes of ternary systems a priori from data on the lower order systems. Comparisons of such calculations with experimental data were made for liquidus phase diagrams and miscibility gaps in a number of ternary systems; the agreement was generally very good. An empirical extension of the theory to a broader range of systems, in which a pair of cations or anions have different charges, led to a good representation of the phase diagrams. The success of these calculations indicates their usefulness in evaluating the self-consistency of measurements and in the extrapolation of data into unmeasured regions. The equations should also prove useful for the storage of phase diagrams. The accuracy of such stored information can be improved by treating the coefficients as somewhat adjustable parameters and by adding more terms.

EDB SUBJECT CATEGORY: EDB-360602

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<553>
Safonov, V.V .; Pes'kova, Zh.K.; Grigor'eva, N.M.; Ksenzenko, V.I. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

BiCl$sub 3$-GeCl$sub 4$-TeCl$sub 4$ system
AIX-07:277889;EDB-77:031085; Zh. Neorg. Khim. (ZNOKA) 21:(2):588-589 (Feb 1976)

SUBJECT DESCRIPTORS: BISMUTH CHLORIDES: T1;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;GERMANIUM CHLORIDES: T2;MELTING POINTS;PHASE DIAGRAMS: Q1,Q2,Q3;TELLURIUM CHLORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<554>
Safonov, V.V.; Burshina, V.V.; Ivnitskaya, R.B. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

FeCl$sub 3$-MoCl$sub 5$-NbCl$sub 5$-WCl$sub 6$ system
AIX-08:329913;EDB-78:010015; Zh. Neorg. Khim. (ZNOKA) 21:(3):863-865 (Mar 1976)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;IRON CHLORIDES: T1;MOLYBDENUM CHLORIDES: T2;NIOBIUM CHLORIDES: T3;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;TUNGSTEN CHLORIDES: T4

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<555>
Safonov, V.V.; Burshina, V.V.; Ivnitskaya, R.B.; Osipov, N.V.; Korshunov, B.G. (Institut Tonkoj Khimicheskoj Tekhnologii, Moscow (USSR); Moskovskij Inst. Stali i Splavov (USSR))

Thermographic study of iron, molybdenum, tantalum and tungsten high chlorides interaction AIX-08:339969;EDB-78:017378; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (1):77-79 (Jan 1976)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS: Q1,Q2,Q3,Q4;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;IRON CHLORIDES: T1;MELTING POINTS;MOLYBDENUM CHLORIDES: T2;PHASE DIAGRAMS;PHASE STUDIES;SOLID SOLUTIONS;TANTALUM CHLORIDES: T3;TUNGSTEN CHLORIDES: T4

<555> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<556>
Safonov, V.V.; Kuzina, T.V.; Titov, L.G.; Korshunov, B.G. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR))

Investigation into reactions of hexabromotellurates of potassium, cesium and thallium(1) in melt
AIX-07:277890;EDB-77:031086; Zh. Neorg. Khim. (ZNOKA) 21:(2):586-587 (Feb 1976)

SUBJECT DESCRIPTORS: BROMINE COMPOUNDS: T1;CESIUM COMPOUNDS: T2;CHEMICAL REACTIONS;DIFFERENTIAL THERMAL ANALYSIS;MOLTEN SALTS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;POTASSIUM COMPOUNDS: T3;SOLID SOLUTIONS;TELLURATES: T5;THALLIUM COMPOUNDS: T4;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<557>
Saito, Shinroku (Tokyo Inst. of Tech. (Japan). Research Lab. of Engineering Materials) ** Saito, Shinroku; Somiya, Shigeyuki (Tokyo Inst. of Tech. (Japan). Research Lab. of Engineering Materials); Kotera, Yoshihide; Pask, J.A.; Batha, H.D. (eds.)

Recent development of ceramic basic science in Japan In Equilibria and kinetics in modern ceramic processing **
EDB-76:053947; (1972) Tokyo Inst. of Tech.

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES;BERYLLIUM OXIDES: T1;CERAMICS;CHEMICAL PREPARATION;DOPED MATERIALS;INERT ATMOSPHERE;MAGNESIUM OXIDES;POWDER METALLURGY: Q1,Q2,Q3;PRESSURE DEPENDENCE;REVIEWS;SINTERING;SOL-GEL PROCESS;URANIUM DIOXIDE: T2;ZIRCONIUM OXIDES: T3

ABSTRACT: Topics on the basic science on ceramics are discussed, limiting to the recent works carried out in Japan on densification and its concerns. The significant factors contributing to densification are considered to be: 1) effect of preparation of starting materials, 2) influence of atmosphere, 3) special treatment of powder, and 4) sintering mechanism under vacuum, atmosphere and high pressure. On the preparation of specially modified starting powder materials for the purpose of densification, there are two ways; one is

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<557> CONT.
the hysteresis of preparation from mother salt, and the other is the effect of minor additions. The studies on the easily sinterable powder of UO$sub 2$ prepared by sol-gel process, the effects of Cl$sup -$ and F$sup -$ on MgO, very fast shrinkage at the initial stage of sintering of Al$sub 2$O$sub 3$, ZrO$sub 2$, and BeO derived from sulfates, the densification effect of Li$sub 2$O and B$sub 2$O$sub 3$, the effect of valency of metallic ions using NiO as a sintering sample, and others are described. The study on the effect of vapor pressure on the sintering of MgO is reviewed. Finding were applied to the work of activation hot pressing of MgO. On the special treatment of powder, two reports are introduced. One was done with explosive, and the other is powder treatment by electro-discharge. Studies on sintering mechanism, and models for sintering under atmospheric pressure are reviewed.

EDB SUBJECT CATEGORY: EDB-360201
INIS CATEGORY: B23

<558>
Sakurai, T.; Takahashi, A. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment)

Behavior of ruthenium in flucride-volatility process. II. Fluorination of RuO$sub 2$ by F$sub 2$
AIX-08:312303;ERA-02:042677;EDB-77:098250; J. Inorg. Nucl. Chem. (JINCA) 39:(3):427-429 (1977)

SUBJECT DESCRIPTORS: FLUORIDE VOLATILITY PROCESS: T;FLUORINATION: Q1;FLUORINE;HIGH TEMPERATURE;INFRARED SPECTRA;MOLECULAR STRUCTURE;OXYFLUORIDES;RUTHENIUM OXIDES: T1;SPENT FUELS;TEMPERATURE DEPENDENCE

ABSTRACT: RuO$sub 2$ was fluorinated by F$sub 2$ in the temperature range 250 to 500$sup 0$C. Mass spectrometry confirmed that the reaction product was RuOF$sub 4$. Small amount of RuO$sub 4$ was produced as a by-product in the fluorination. Temperatures higher than 400$sup 0$C were necessary to convert RuO$sub 2$ smoothly into RuOF$sub 4$. IR absorption spectrum of RuOF$sub 4$ was obtained. The product is an unstable material and tends to decompose into RuF$sub 4$, releasing oxygen. Discrepancies with earlier published literature were discussed.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<559>
Sanchez, J.P.; Friedt, J.M.; Shenoy, G.K.; Percheron, A.; Achard, J.C., Strasbourg-1 Univ., 67 (France). Centre de Recherches Nucleaires

In Electronic and magnetic properties of rare earth-Sn$sub 3$ compounds from $sup 119$Sn Moessbauer spectroscopy ** AIX-07:246634;EDB-77:018704; (1975) CRN-CNPA--75-27

SUBJECT DESCRIPTORS: HYPERFINE STRUCTURE;ISOMER SHIFT;MAGNETIC FIELDS;MAGNETIC PROPERTIES: Q2,Q3;MOESSBAUER EFFECT: Q1;ORIENTATION;QUADRUPOLES;RARE EARTH ALLOYS: M2;TIN 119: M1;TIN ALLOYS: M3

ABSTRACT: The electronic and magnetic properties of RESn$sub 3$ compounds (RE=La, Ce, Pr, Nd, Sm, Eu, Gd, Yb) have been investigated using the 23.8keV Moessbauer resonance of $sup 119$Sn. The isomer shifts and quadrupole interactions are nearly the same in all compounds. The transferred magnetic fields and their orientation with respect to the principal electric field gradient axis at various Sn sites in the magnetically ordered state of RESn$sub 3$ (RE=Pr, Nd, Sm, Eu, Gd) have been utilized to get information about the magnetic structure. An evaluation of the transferred fields in PrSn$sub 3$ and NdSn$sub 3$ shows that the spin density at the Sn nucleus is nearly the same in both compounds.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<560>
Sandenshaw, T.A. (Los Alamos Scientific Lab., N.Mex. (USA)) ** Blank, H.; Lindner, R. (eds.)

Anomalous thermal property behaviour of uranium at low temperatures In Plutonium 1975 and other actinides ** AIX-08:309909;ERA-02:041793;EDB-77:094098; (1976) North-Holland

SUBJECT DESCRIPTORS: BRILLOUIN ZONES;CRYSTAL-PHASE TRANSFORMATIONS;DISLOCATIONS;ENTHALPY;ENTROPY;FERMI LEVEL;GRAIN SIZE;HARDNESS;IMPURITIES;LOW TEMPERATURE;POLYCRYSTALS;SPECIFIC HEAT: Q1,Q2;STACKING FAULTS;TEMPERATURE DEPENDENCE;THERMAL CONDUCTIVITY: Q2;URANIUM;URANIUM 235: T1;URANIUM 238: T2;VERY LOW TEMPERATURE

ABSTRACT: Low temperature heat capacity curves are presented for polycrystalline $sup 235$U and $sup 238$U metals in different microstructural states and of different purities. Thermal conductivity versus temperature curves are shown for polycrystalline $sup 238$U metal after undergoing varied

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<560> CONT.
fabrication procedures such as casting, swaging, $gamma$-phase extrusion and $alpha$-phase rolling. Purity and the microstructure existing at the time of thermal property measurements appear to determine whether $alpha$-phase uranium is modified reversibly or irreversibly, if at all, on cooling below 250-270 K. It is suggested that the cooling rate through the $beta$$Yields$$alpha$ phase transformation temperature of uranium has a considerable influence on observed low temperature properties because of the resulting defect (dislocation and stacking fault) structure. It is speculated that the reproducible heat capacity behaviour observed between 36 K and 250 K in a specimen of $sup 238$U is due to a type of defect ordering which is compatible with a martensitic transformation.

EDB SUBJECT CATEGORY: EDB-360103
INIS CATEGORY: B22

<561>
Schaefer, H.; Giegling, D. (Muenster Univ. (F.R. Germany). Anorganisch-Chemisches Inst.)

Chemistry of elements niobium and tantalum. 87. Studies on the thermal formation and decomposition of the complexes [Nb$sub 6$Cl$sub 12$]$sup 2+$, [Nb$sub 6$I$sub 8$]$sup 3+$, and [Ta$sub 6$X$sub 12$]sup(n+) (X=Cl,Br,I)
AIX-07:262572;EDB-77:019361; Z. Anorg. Allg. Chem. (ZAACA) 420:(1):1-24 (1976)

SUBJECT DESCRIPTORS: CHEMICAL REACTION KINETICS;CRYSTAL STRUCTURE;DEBYE-SCHERRER METHOD;MASS SPECTROSCOPY;NIOBIUM BROMIDES: T1;NIOBIUM CHLORIDES: T2;NIOBIUM COMPLEXES: T3;NIOBIUM IODIDES: T4;PYROLYSIS: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8;SOLVENT EXTRACTION;STABILITY;TANTALUM BROMIDES: T5;TANTALUM CHLORIDES: T6;TANTALUM COMPLEXES: T7;TANTALUM IODIDES: T8;THERMAL GRAVIMETRIC ANALYSIS;X-RAY DIFFRACTION

ABSTRACT: Thermal decompositions of the compounds Nb$sub 3$Cl$sub 8$, Nb$sub 3$Br$sub 8$, Nb$sub 3$I$sub 8$, [Nb$sub 6$Cl$sub 12$]Cl$sub 2$, [Nb$sub 6$I$sub 8$]I$sub 3$, TaCl$sub 3$, TaBr$sub 3$, [Ta$sub 6$Cl$sub 12$]Cl$sub 3$, [Ta$sub 6$Br$sub 12$]Br$sub 3$, [Ta$sub 6$Br$sub 12$]Br$sub 2$ and [Ta$sub 6$I$sub 12$]I$sub 2$ have been investigated by means of the thermobalance. These observations have been completed by chemical analysis of the solid phases, X-ray photographs, extractions of the solid with ethanol and mass spectra. The formation of the crystal lattices containing Me$sub 6$-complexes during the thermal decomposition of MeX$sub 3$ or Me$sub 3$X$sub 8$ is kinetically difficult. The decomposition in the vacuum requires much higher temperatures

<561> CONT.
as expected from thermodynamics. During the decomposition of TaCl$sub 3$ occurs an X-ray amorphes phase, from which Ta$sub 6$-complexes can be extracted. The retardation in respect to the formation of the corresponding crystal lattice is explained by the assumption that the complexes within the amorphous phase have different oxidation numbers. This requires a redox mechanism connected with diffusion. The decomposition reaction leading from [Ta$sub 6$Br$sub 12$]Br$sub 3$ to [Ta$sub 6$Br$sub 12$]Br$sub 2$ proceeds in such a way, that a small part of the complexes is decomposed and acts as reducing agent for the remaining undestroyed complexes.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<562>
Schenk, H.J.; Bohres, E.W.; Schwochau, K. (Kernforschungsanlage Juelich G.m.b.H. (F.R. Germany). Inst. fuer Nuklearchemie)

Diffuse reflectance spectra of protactinium(IV), uranium(IV) and neptunium(IV) tetrachlorides and tetraformates
AIX-07:236211;EDB-76:092884; J. Inorg. Nucl. Chem. (JINCA) 37:(12):2491-2495 (Dec 1975)

SUBJECT DESCRIPTORS: CHLORIDES;COORDINATION NUMBER: T7;CRYSTAL FIELD;ELECTRON TRANSFER;ELECTRONIC STRUCTURE;ENERGY-LEVEL TRANSITIONS;EXCITED STATES;FORMATES;LIGANDS;NEPTUNIUM CHLORIDES: T4;NEPTUNIUM COMPLEXES: T1;PROTACTINIUM CHLORIDES: T6;PROTACTINIUM COMPLEXES: T2;REFLECTION: Q1,Q2,Q3,Q4,Q5,Q6,Q7;SPECTRA;URANIUM CHLORIDES: T5;URANIUM COMPLEXES: T3

ABSTRACT: Diffuse reflectance spectra of 8-coordinate AnCl$sub 4$ and An(HCOO)$sub 4$(An:Pa,U,Np) have been measured in the range 18,000 to 2200 A at room temperature. The observed excited levels arise from 5fsup(q), 5fsup(q-1)6d$sup 1$ and 5fsup(q+1)$pi$$sup -1$ electron configurations. The 5fsup(q) spectra of corresponding chlorides and formates are quite similar, shifted towards higher wave numbers in the latter case. Owing to the actinide contraction the crystal-field splitting of the 5fsup(q) levels decreases with increasing atomic number. The energy variation of the 5fsup(q)$Yields$5fsup(q-1)6d$sup 1$ transitions as a function of q is more pronounced in the predominantly ionic tetraformates than in the more covalent tetrachlorides. The cubic splitting parameter of the 6d shell is evaluated to be $delta$sub(6d) = 9kK and $delta$sub(6d) = 15 kK in PaCl$sub 4$ and Pa(HCOO)$sub 4$, respectively. The electron transfer spectra indicate the optical electronegativities Xsub(opt) =

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<562> CONT.
1.42 for protactinium(IV) and Xsub(opt) = 3.13 for the formate ion.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<563>
Schenke, M.; Broers, G.H.J.; Ketallaar, J.A.A.

Solubility of oxygen in molten carbonates EDB-76:086741; J. Electrochem. Soc. (JESOA) 113:(4):404 (Apr 1966)

SUBJECT DESCRIPTORS: CARBONATES;ELECTROLYTES: Q3;HIGH-TEMPERATURE FUEL CELLS: T3;MOLTEN SALTS: T1;OXYGEN: T2;SOLUBILITY: Q2;SOLUTION HEAT;SOLVENT PROPERTIES: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-300505

<564>
Schirmacher, W., Freie Univ. Berlin (Germany, F.R.). Fachbereich Physik

In Nuclear quadrupole relaxation and viscosity in liquid metals ** AIX-07:264025;EDB-77:040109; (1976) AED-Conf--76-087-010

SUBJECT DESCRIPTORS: BESSEL FUNCTIONS;EQUATIONS;HYDRODYNAMICS;INELASTIC SCATTERING;INTEGRALS;LIQUID METALS: T1;NEUTRON DIFFRACTION;NUCLEAR MAGNETIC RESONANCE;NUCLEAR QUADRUPOLE RESONANCE: Q1,T2;RELAXATION: Q2;SELF-DIFFUSION;TEMPERATURE DEPENDENCE;VISCOSITY

ABSTRACT: It is shown that the nuclear quadrupole relaxation rate due to the molecular motions in liquid metals is related to the shear and bulk viscosity and hence to the absorption coefficient of ultrasound. Application of the 'extended liquid phonon' model of Ortoleva and Nelkin - which is the third of a series of continued-fraction-approximations for the van Hove neutron scattering function - gives a relation to the self diffusion constant. The predictions of the theory concerning the temperature dependence are compared with quadrupole relaxation measurements of Riegel et al. and

<565> CONT.
Kerlin et al. in liquid gallium. Agreement is found only with the data of Riegel et al.

EDB SUBJECT CATEGORY: EDB-656000
INIS CATEGORY: A13

<565>
Schmitz, F. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France))

Oxygen potential and vacancy structure of the mixed oxide (UPu)O/sub 2-x/ AIX-07:239904;EDB-77:013204; J. Nucl. Mater. (JNUMA) 58:(3):357-360 (Dec 1975)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;IMPURITIES;OXYGEN;PLUTONIUM OXIDES: T1;QUANTITY RATIO;REDOX POTENTIAL: Q1,Q2;URANIUM OXIDES: T2;VACANCIES: Q1,Q2

ABSTRACT: The authors have analyzed reported $delta$G/sub O2/ = f(O/M) values. For concentrations of oxygen vacancies, V/sub O/ = x and (PuO$sub 2$) = y-2x, log x/(y-2x) = $alpha$log P/sub O2/ + log k. The value x/(y-2x), rather than the oxygen to metal ratio (O/M), determines the variation of the mixed oxide as a function of deviation from stoichiometry up to the level or near approach to stoichiometry or phase limits; the impurities determine the extrinsic value of the property considered. The hypostoichiometric domain of the mixed oxide (U/sub 1-y/ Pu/sub y/) O/sub 2-x/ is characterized by a defect complex, V/sub O/ + 2Pu atoms. The energy of formation of the complex is about 2.25 eV.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B24

<566>
Schoenfeld, I.; Ungarish, M. ** Israel Atomic Energy Commission, Tel Aviv

Spectrochemical method for determination of zirconium in molten salts In Research laboratories annual report 1975 ** AIX-08:320548;EDB-77:114116; (Jun 1976) IA--1321

SUBJECT DESCRIPTORS: ABSORPTION SPECTROSCOPY: Q1;CHEMICAL ANALYSIS: Q2;EMISSION SPECTROSCOPY: Q1;MOLTEN SALTS: T2;QUANTITATIVE CHEMICAL ANALYSIS;ZIRCONIUM: T1;ZIRCONIUM SILICATES

<566>

<566> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400104
INIS CATEGORY: B11

<567>
Schommers, W. ** Pintschovius, L., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Angewandte Kernphysik

Frequency spectrum and scattering law for liquid copper. A molecular dynamics investigation In Progress report of the Teilinstitut Nukleare Festkoerperphysik. (1.6.1974--31.5.1975) ** AIX-07:253507;EDB-77:007047; (Nov 1975) KFK--2183

SUBJECT DESCRIPTORS: COPPER: T1;CORRELATION FUNCTIONS;LIQUID METALS;MATHEMATICAL MODELS;MOLECULAR STRUCTURE: Q1;SCATTERING

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<568>
Schouler, E.; Hammou, A.; Kleitz, M.

Complex impedance of electrochemical cells based on yttria doped thoria INS-77:006416;EDB-77:055745; Mater. Res. Bull. (MRBUA) 11:(9):1137-1146 (Sep 1976)

SUBJECT DESCRIPTORS: AGING;CHEMICAL COMPOSITION;ELECTRIC CONDUCTIVITY;ELECTRIC IMPEDANCE;ELECTRICAL PROPERTIES: Q1,Q2,Q3;ELECTROCHEMICAL CELLS: T1;IONIC CONDUCTIVITY;QUANTITY RATIO;TEMPERATURE DEPENDENCE;THORIUM OXIDES: T2;YTTRIUM OXIDES: T3

ABSTRACT: In the frequency range 10$sup -2$ to 5.10$sup 5$ Hz and the temperature interval 400 to 1200$sup 0$C, the impedance diagram of a symmetrical cell based on yttria-doped thoria is composed of three semicircles. The influence of the geometrical factor of the thoria samples indicates that the two low-frequency semicircles characterize interface processes. The electrical resistance of the electrolyte is determined by the low frequency intercept of the high frequency semicircle with the real axis. The electronic conductivity of thoria based solid solutions deduced from the variation of this point obeys the law sigma/sub +/ = kP/sub O$sub 2$/1/4. Ionic conductivity measured as a function of the oxide vacancy concentration and the relevant activation

<568> CONT.
energies are also reported. An aging process was observed on this material. 7 figures.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<569>
Seddon, J.W.

In Nuclear reactor containments **
AIX-08:296900;ERA-02:034217;EDB-77:073461; (15 Sep 1976)

SUBJECT DESCRIPTORS: CLOSURES;COMPOSITE MATERIALS;CONTAINMENT SHELLS: M2,Q1;DESIGN: Q2;LMFBR TYPE REACTORS: M1;PRESSURE VESSELS;PRESTRESSED CONCRETE;STEELS;THERMAL EXPANSION

ABSTRACT: The containment comprises a cavity-defining prestressed concrete structure and a composite concrete and steel top closure which slides horizontally relative to the structure. The closure has a recess complementary to the cavity to form a chamber for housing a primary vessel containing a nuclear reactor core and ancillary equipment. The chamber bounded by a metal membrane lining the concrete, and wherein the concrete is relieved to form a peripheral groove adjacent to the lining, the width of the groove extending across the junction of the closure with the structure.

EDB SUBJECT CATEGORY: EDB-210500
INIS CATEGORY: E35

<570>
Seleznev, B.L.; Vlasov, Yu.G. (Leningradskij Gosudarstvennyj Univ. (USSR))

Thermodynamics of solid solutions CsCl-RbCl and CsBr-RbBr at 25$sup 0$C AIX-08:298343;EDB-77:069082; Zh. Fiz. Khim. (ZFKHA) 50:(6):1605-1606 (Jun 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<571>

<571>
Seppelt, K. (Heidelberg Univ. (F.R. Germany). Inst. fuer Anorganische Chemie)

Covalent compounds of uranium of the type F/sub x/ U(OTeF$sub 5$)/sub 6-x/ AIX-07:272453;EDB-77:026655; Chem. Ber. (CHBEA) 109:(3):1046-1052 (1976)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION: Q1,Q2;COVALENCE;MASS SPECTRA;NUCLEAR MAGNETIC RESONANCE;TELLURIUM COMPOUNDS: T2;TELLURIUM FLUORIDES;URANIUM COMPOUNDS: T1;URANIUM FLUORIDES;URANIUM OXIDES;VOLATILITY

ABSTRACT: Pure U(OTeF$sub 5$)$sub 6$ is prepared. It is volatile in spite of the molecular weight of 1,669 mass units and seems to be the inorganic nonpolymeric molecule with the highest molecular weight known. All compounds Fsub(x)U(OTeF$sub 5$)sub(6-x) have been detected by the n.m.r. method.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B12

<572>
Shajmuradov, I.B.; Reshetnikova, L.P.; Novoselova, A.V. (Moskovskij Gosudarstvennyj Univ. (USSR))

CsF-HoF$sub 3$ system EDB-76:048910; Zh. Neorg. Khim. (ŽNOKA) 20:(4):1077-1080 (Apr 1975)

SUBJECT DESCRIPTORS: CESIUM FLUORIDES: T1;CHEMICAL REACTIONS;DIFFERENTIAL THERMAL ANALYSIS;HOLMIUM FLUORIDES: T2;PHASE DIAGRAMS: Q1,Q2;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<573>
Shaner, J.W., California Univ., Livermore (USA). Lawrence Livermore Lab.

In Thermal expansion of metals over the entire liquid range ** INS-77:019140;NTS-78:000095;ERA-03:007095;EDB-78:004477; (25 Aug 1977) UCRL--80007

SUBJECT DESCRIPTORS: DENSITY;HIGH TEMPERATURE;LIQUID METALS: T1;MEASURING METHODS: Q2;REVIEWS;THERMAL EXPANSION: Q1,T2;VERY HIGH TEMPERATURE

<573> CONT.

ABSTRACT: This paper reviews the current state of the art for measuring liquid metal densities. Conventional high precision techniques for use below 2000K as well as new techniques for more extreme temperatures are addressed. Pertinent data, which have appeared since the last critical reviews, for elemental metals are discussed.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<574>

Shaner, J.W.; Gathers, G.R.; Minichino, C., California Univ., Livermore (USA). Lawrence Livermore Lab.

In New apparatus for thermophysical measurements above 2500 K **
INS-04:016966;ERA-01:023767;EDB-76:065458; (Mar 1976)
UCRL--77929

SUBJECT DESCRIPTORS: ENTHALPY;FUSION HEAT;LIQUID METALS;MEASURING INSTRUMENTS;MELTING;MELTING POINTS;MOLYBDENUM: M2;NIOBIUM: M1;PHYSICAL PROPERTIES: Q1,Q2,Q3,Q4;PRESSURE DEPENDENCE;TANTALUM: M3;TUNGSTEN: M4;VERY HIGH TEMPERATURE

ABSTRACT: An apparatus was developed to make simultaneous measurements of enthalpy, temperature, volume, and electrical resistivity on metals in the temperature range from 2500 to 8000$sup 0$K and at pressures up to 1 GPa. Cylindrical samples are resistively heated by a 10-50 mus current pulse in a constant pressure inert gas environment. Data for the refractory transition metals Nb, Mo, Ta, and W are presented.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<575>

Shatinskii, V.F.; Goikhman, M.S.; Mendel'son, D.A.; Garlinskii, R.N. (AN Ukrainskoj SSR, Lvov. Fiziko-Mekhanicheskij Inst.)

Friction in metal melts AIX-08:295560;EDB-77:055396; Fiz.-Khim. Mekh. Mater. (FKMMA) 12:(4):91-96 (Jul 1976)

SUBJECT DESCRIPTORS: ADHESION;EUTECTICS;FRICTION: Q1,Q2,Q3,Q4;HIGH TEMPERATURE;IRON: T1;LEAD ALLOYS: T2;LIQUID METALS: T3;PRESSURE DEPENDENCE;TEMPERATURE DEPENDENCE;TIN ALLOYS: T4

<575>

<575> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360103
INIS CATEGORY: B15

<576>
Shejko, I.N.; Grechina, T.N.; Sidorenko, I.A. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Viscosity of melts of KCl-KF-K$sub 2$ZrF$sub 6$ ternary system
EDB-76:042421; Ukr. Khim. Zh. (UKZHA) 41:(2):206-208 (Feb 1975)

SUBJECT DESCRIPTORS: MOLTEN SALTS;POTASSIUM CHLORIDES: T1;POTASSIUM FLUORIDES: T2;VISCOSITY: Q1,Q2,Q3;ZIRCONIUM FLUORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602;400201
INIS CATEGORY: B12

<577>
Sheth, A.; Leibowitz, L., Argonne National Lab., Ill. (USA)

In Equation of state and transport properties of uranium and plutonium carbides in the liquid region **
INS-77:003552;ERA-02:017804;EDB-77:026214; (Sep 1975)
ANL-AFP--11

SUBJECT DESCRIPTORS: DATA COMPILATION;DENSITY;EMISSIVITY;ENTHALPY;EQUATIONS OF STATE;PLUTONIUM CARBIDES: T2;SPECIFIC HEAT;THERMAL CONDUCTIVITY;THERMODYNAMIC PROPERTIES: Q1,Q2;URANIUM CARBIDES: T1;VAPOR PRESSURE;VISCOSITY

ABSTRACT: By the use of available low-temperature data for various thermophysical and transport properties for uranium and plutonium carbides, values above the melting point were estimated. Sets of recommended values have been prepared for the compounds UC, PuC, and (U,Pu)C. The properties that have been evaluated are density, heat capacity, enthalpy, vapor pressure, thermal conductivity, viscosity, and emissivity.

EDB SUBJECT CATEGORY: EDB-360204;050700
INIS CATEGORY: B23

<578>
Sheth, A.; Leibowitz, L., Argonne National Lab., Ill. (USA)

In Equation of state and transport properties of uranium and plutonium nitrides in the liquid region **
INS-77:002299;ERA-02:017805;EDB-77:026215; (Oct 1976)
ANL-AFP--12

SUBJECT DESCRIPTORS: DENSITY;ENTHALPY;EQUATIONS OF STATE: Q1,Q2;PLUTONIUM NITRIDES: T2;SPECIFIC HEAT;THERMAL CONDUCTIVITY;THERMODYNAMIC PROPERTIES: Q1,Q2;URANIUM NITRIDES: T1;VAPOR PRESSURE;VISCOSITY

ABSTRACT: By the use of available low-temperature data for various thermophysical and transport properties for uranium and plutonium nitrides, values above the melting point of density, heat capacity, enthalpy, vapor pressure, thermal conductivity, and viscosity were estimated. Sets of recommended values have been prepared for the compounds UN, PuN, and (U$sub 0$.$sub 8$Pu$sub 0$.$sub 2$)N.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<579>
Sheth, A.; Leibowitz, L.; Winslow, G.

Densities of liquid carbides and nitrides of uranium and plutonium ERA-02:002460;INS-76:020668;EDB-76:090325; Trans. Am. Nucl. Soc. (TANSA) 23::130-131 (Jun 1976)

SUBJECT DESCRIPTORS: DENSITY: Q1,Q2,Q3,Q4;LIQUIDS;NUCLEAR FUELS;PLUTONIUM CARBIDES: T3;PLUTONIUM NITRIDES: T4;THERMAL EXPANSION;THERMODYNAMIC PROPERTIES;URANIUM CARBIDES: T1;URANIUM NITRIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-050700;360204
INIS CATEGORY: B23

<580>
Shimizu, S.; Kase, K.; Midoriyama, S.; Murakami, T. (Kawasaki Heavy Industries Ltd., Kobe (Japan))

Properties of structural materials for sodium-cooled fast breeder reactor AIX-08:315087;EDB-77:120379; FAPIG (Tokyo) (FPIGA) (81):19-31 (May 1976)

SUBJECT DESCRIPTORS: CARBURIZATION;CHROMIUM-MOLYBDENUM STEELS: T1;CORROSION: Q1,Q2,Q3,Q4,Q5,Q6;CORROSIVE EFFECTS:

<580>

<580> CONT.
Q7,Q8;CRACKS;CREEP;DECARBONIZATION;FATIGUE;FRACTURE PROPERTIES;INCOLOY 800: T6;LIQUID METALS;LMFBR TYPE REACTORS;SODIUM: T7;SODIUM COOLED REACTORS;STAINLESS STEEL-304: T2;STAINLESS STEEL-316: T3;STAINLESS STEEL-321: T4;STAINLESS STEEL-347: T5;STEAM;TENSILE PROPERTIES;WATER: T8

ABSTRACT: For the selection of the structural materials for superheaters and reheaters of sodium-cooled fast breeder reactors, it is important to grasp the change of strength due to the complex change of material properties, such as the combination of surface corrosion, the decarbonization of 2-1/4 Cr-1Mo steel, the carburization of austenitic stainless steel, the structural change due to heating history, etc. in sodium environment. The stress corrosion cracking of austenitic materials in water must be studied also. The materials taken up in this paper are austenitic stainless steels such as SUS 304, SUS 316, SUS 321, and SUS 347, iron-based superalloy Incoloy 800, and ferritic alloy steel 2-1/4Cr-1Mo steel. The data on the above described properties of the materials are given. Also the tensile strength, creep rupture and fatigue characteristics of the parent materials in the amount of corrosion in sodium. The strength of ferritic alloy steel is lowered owing to the decarbonization in sodium, but the change of strength due to carburization was not observed. There is some possibility that the unstabilized steels such as SUS 304 and SUS 316 become sensitive to stress corrosion cracking, and the stabilized steels such as SUS 321 and SUS 347 become sensitive to it in long hour heating. The tensile strength of welded joints is almost same as that of parent materials, but the elongation decreases by about 10%.

EDB SUBJECT CATEGORY: EDB-360105;210500
INIS CATEGORY: B22

<581>
Shohoji, N.; Katsura, M.; Sano, T. (Osaka Univ. (Japan))

Decomposition of the UN-CeN solid solution
AIX-07:254866;EDB-76:097712; J. Nucl. Mater. (JNUMA) 60:(1):52-58 (Apr 1976)

SUBJECT DESCRIPTORS: CERIUM NITRIDES: T1;DECOMPOSITION;EQUATIONS;FORMATION FREE ENERGY;LOW PRESSURE;MEDIUM VACUUM;PHASE TRANSFORMATIONS: Q1,Q2;SOLID SOLUTIONS;THERMAL ANALYSIS;URANIUM NITRIDES: T2;VERY HIGH TEMPERATURE

ABSTRACT: The decomposition temperature of CeN, Usub(0.5)Cesub(0.5)N and Usub(0.75)Cesub(0.25)N has been measured as a function of nitrogen pressure. Thermodynamic

<581> CONT.
analysis based on the reaction, in which the solid solution, Usub(1-x)Cesub(x)N, decomposes into Usub(1-x)Cesub(x)(1) and 1/2 N$sub 2$(g), results in a very simple relation. The influence of solubility of nitrogen in Usub(1-x)Cesub(x)(1) has been also taken into consideration. The present experimental data are in good agreement with the equation derived from the present thermodynamic analysis.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<582>
Shulakov, A.S.; Zimkina, T.M.; Fomichev, V.A.; Neshpor, V.S.

X-ray spectral study of the carbides and nitrides of group IV and V metals EDB-77:050532; Fiz. Tverd. Tela (FTVTA) 18:(3):793-796 (Mar 1976)

SUBJECT DESCRIPTORS: CARBIDES: T2;HAFNIUM;NIOBIUM;NIOBIUM CARBIDES;NIOBIUM NITRIDES;NITRIDES: T3;TANTALUM;TITANIUM;TRANSITION ELEMENT COMPOUNDS: T1;VALENCE;VANADIUM;X-RAY SPECTRA: Q1,Q2,Q3;ZIRCONIUM

ABSTRACT: The very long-wave x-ray emission bands of Group IV and V transition metals reflecting the distribution of the d valence state were studied in the corresponding carbides and nitrides and the results were compared with those obtained for the pure metals (Ti, V, Nb, Hf, Ta, and Zr). For each group the structure of the d-type bands of the metals in monotypic compounds was very similar and depended mainly on the electron concentration. Special attention was paid to the cases of NbC and NbN, and the groups of electron states associated with various spatial bonds were distinguished. Analysis of the band shapes showed that in Nb and Zr some of the metal d electrons came under the influence of the lighter elements (C or N).

EDB SUBJECT CATEGORY: EDB-360204

<583>
Shurmovskaya, N.A.; Egorova, E.M.; Kornacheva, G.M. (AN SSSR, Moscow. Inst. Ehlektrokhimii)

Work function of gallium AIX-08:317782;EDB-77:120280; Elektrokhimiya (ELKKA) 12:(4):590-591 (Apr 1976)

SUBJECT DESCRIPTORS: ELECTRODES;ELECTROMOTIVE FORCE;GALLIUM: T1;LIQUID METALS;STAINLESS STEELS;TANTALUM;VACUUM SYSTEMS;WORK FUNCTIONS: Q1

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<583> CONT.
ABSTRACT: None

EDE SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B12

<584>
Silbert, M. (East Anglia Univ. (UK). School of Mathematics and Physics) ** Evans, R.; Greenwood, D.A. (eds.)

Pressure and entropy calculations for liquid Na, K and Rb along the melting line In Liquid metals, 1976 **
AIX-08:319612;EDB-77:113423; (1977) Institute of Physics

SUBJECT DESCRIPTORS: ENTROPY;EQUATIONS OF STATE: Q1,Q2,Q3;FREE ENERGY;LIQUID METALS;MELTING POINTS;POTASSIUM: T3;PRESSURE DEPENDENCE;RUBIDIUM: T2;SODIUM: T1;VARIATIONAL METHODS

ABSTRACT: The Gibbs-Bogoliubov variational principle is used to derive an equation of state for liquid metals, following a procedure indicated by Watabe et al (J.Phys.F:Metal Phys.;4L:29(1974)). Results for liquid Na, K and Rb along the melting curve are presented. It is found that for liquid Na there is overall agreement with experimental results up to 80 kbar, but for liquid K and Rb only up to 25 to 30 kbar.

EDE SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<585>
Silverman, M.D.; Huntley, W.R.; Robertson, H.E., Oak Ridge National Lab., Tenn. (USA)

In Heat transfer measurements in a forced convection loop with two molten-fluoride salts: LiF--BeF$sub 2$--ThF$sub 2$--UF$sub 4$ and eutectic NaBF$sub 4$--NaF **
INS-77:000119;ERA-02:009794;EDB-77:006325; (Oct 1976)
ORNL/TM--5335

SUBJECT DESCRIPTORS: BERYLLIUM FLUORIDES;COOLANTS: Q1;HEAT TRANSFER;LITHIUM FLUORIDES;MOLTEN SALT FUELS: T3;MOLTEN SALT REACTORS: T1;MOLTEN SALTS: T2;REACTOR COOLING SYSTEMS;SODIUM FLUORIDES;THERMODYNAMIC PROPERTIES: Q2,Q3;THORIUM FLUORIDES;URANIUM FLUORIDES

ABSTRACT: Heat transfer coefficients were determined experimentally for two molten-fluoride salts [LiF-BeF$sub 2$-ThF$sub 2$-UF$sub 4$ (72-16-12-0.3 mole %) and NaBF$sub 4$-NaF (92-8 mole %] proposed as the fuel salt and coolant salt, respectively, for molten-salt breeder reactors. Information was obtained over a wide range of variables, with

<585> CONT.
salt flowing through 12.7-mm-OD (0.5-in.) Hastelloy N tubing in a forced convection loop (FCL-2b). Satisfactory agreement with the empirical Sieder-Tate correlation was obtained in the fully developed turbulent region at Reynolds moduli above 15,000 and with a modified Hausen equation in the extended transition region (Re approx.2100-15,000). Insufficient data were obtained in the laminar region to allow any conclusions to be drawn. These results indicate that the proposed salts behave as normal heat transfer fluids with an extended transition region.

EDB SUBJECT CATEGORY: EDB-210500;360204
INIS CATEGORY: E35;B23

<586>
Silvester, L.F.; Pitzer, K.S.

Thermodynamics of electrolytes. 8. High-temperature properties, including enthalpy and heat capacity, with application to sodium chloride
INS-78:000307;ERA-03:008849;EDB-78:009960; J. Phys. Chem. (JPCHA) 81:(19):1822-1828 (22 Sep 1977)

SUBJECT DESCRIPTORS: ELECTROLYTES;ENTHALPY: Q1;HIGH TEMPERATURE;MEDIUM TEMPERATURE;REACTION KINETICS;SODIUM CHLORIDES: T1;SPECIFIC HEAT: Q1;THERMODYNAMIC ACTIVITY: Q1;THERMODYNAMICS

ABSTRACT: The ion-interaction type of equation which has proven so successful for activity and osmotic coefficents of both pure and mixed electrolytes near room temperature is extended for wide temperature ranges and for the enthalpy and heat capacity. An improved equation is obtained for the dielectric constant of water over a wide range of temperature and density; it is used to calculate the Debye-Hueckel parameters to 350$sup 0$C for enthalpy and heat capacity as well as for osmotic and activity coefficients. These equations are applied to the extensive array of thermodynamic data for aqueous sodium chloride from 0 to 300$sup 0$C. Good agreement is obtained and the equations thus provide a convenient analytical representation of the thermodynamic properties of NaCl(aq). Also the results indicate that at 300$sup 0$C sodium chloride is still a strong electrolyte with little tendency toward the formation of ion pairs.

EDB SUBJECT CATEGORY: EDB-400201;400400
INIS CATEGORY: B12

<587>

<587>
Sinha, V.K. (Indian Inst. of Tech., Kanpur)

Terminal solid solubility of hydrogen in the zirconium-2.5 weight % niobium alloy AIX-07:270433;EDB-77:030672; J. Chem. Soc. (London), Faraday Trans., I (JCFTA) 72:(pt.1):134-142 (1976)

SUBJECT DESCRIPTORS: HIGH TEMPERATURE;HYDRIDATION;HYDROGEN: T3;NIOBIUM ALLOYS: T1;PHASE STUDIES;SOLID SOLUTIONS;SOLUBILITY: Q3;SOLVENT PROPERTIES: Q1,Q2;VERY HIGH TEMPERATURE;ZIRCONIUM;ZIRCONIUM BASE ALLOYS: T2;ZIRCONIUM HYDRIDES

ABSTRACT: The terminal solid solubility (TSS) of hydrogen in the Zr-2.5 wt.% Nb alloy has been determined by measuring the decomposition pressures of several Zr-2.5 wt.% Nb alloys containing hydrogen in the temperature range 425 to 900$sup 0$C. The TSS boundaries $alpha$/($alpha$ + delta) and $alpha$/($alpha$ + $beta$) were determined from the points of inflection of the van't Hoff decomposition pressure against temperature plots. The TSS of hydrogen in Zr-2.5 wt.% Nb alloy is about 1 to 2.5 atom % more than that in unalloyed zirconium (the maximum difference being at the eutectoid temperature of the Zr/H$sub 2$ system). The decomposition pressure against temperature relation in the $alpha$ and ($alpha$ + delta) phase regions and the temperature against concentration relation along the TSS boundary have also been derived. The mean relative partial molar enthalpy of hydrogen in the $alpha$-phase and the mean enthalpy of formation of the delta-hydride from the saturated $alpha$-phase in the alloy are - 24.6 kcal(mol H$sub 2$)$sup -1$ and - 40.9 kcal(mol H$sub 2$)$sup -1$ respectively.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<588>
Skrinichenko, T.M.; Klibanov, E.L.; Kashin, V.I.

Investigation into outgassing from molybdenum during melting EDB-76:036209; Fiz. Khim. Obrab. Mater. (FKOMA) (1):40-43 (Jan 1975)

SUBJECT DESCRIPTORS: DEGASSING: Q1;DESORPTION;DIFFUSION;DROPLETS;ELECTRIC ARCS;EQUATIONS;FILMS;HYDRODYNAMICS;HYDROGEN;LIQUID METALS;MASS TRANSFER;MOLYBDENUM: T1;OXYGEN;REFINING;REYNOLDS NUMBER;VACUUM MELTING

<588> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360101
INIS CATEGORY: B21

<589>
Skripko, G.A.; Makhanek, A.G.; Gintoft, R.I.

Structure of 4f$sup 6$ and 4f$sup 8$ levels and Eu$sup 3+$ and Tb$sup 3+$ configurations in short-range ultra-violet
AIX-C8:280690;EDB-77:031506; Zh. Prikl. Spektrosk. (ZPSBA) 24:(6):968-971 (Jun 1976)

SUBJECT DESCRIPTORS: CALCIUM FLUORIDES;COMPARATIVE EVALUATIONS;CRYSTALS;ELECTRONIC STRUCTURE: Q1,Q2;ENERGY LEVELS;EUROPIUM COMPOUNDS: T1;LASERS;LUMINESCENCE;SPECTRA;TERBIUM COMPOUNDS: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<590>
Slcan, S.A. ** Cooper, M.H. (ed.), American Nuclear Society, Hinsdale, Ill.; American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inc., New York; Energy Research and Development Administration, Washington, D.C. (USA); American Nuclear Society, Pittsburgh, Pa. Pittsburgh Section

Reaction of potassium superoxide in excess potassium In Proceedings of the international conference on liquid technology in energy production **
INS-77:016019;ERA-02:059704;EDB-77:139579; (Nov 1976)
CONF-760503--P2

SUBJECT DESCRIPTORS: CHEMICAL REACTION KINETICS: Q3;COOLANTS;EUTECTICS;EXPLOSIONS: Q1,Q2;LIQUID METALS;LMFBR TYPE REACTORS: T1;POTASSIUM ALLOYS: T2;POTASSIUM OXIDES: T3;SIMULATION;SODIUM ALLOYS;TEMPERATURE DEPENDENCE

ABSTRACT: Experiments are described in which liquid potassium and potassium superoxide are brought into contact at different temperatures. There is no obvious reaction below 390 K, a controlled reaction between 390 K and 450 K, and an explosive reaction occurs when the reactants are mixed at higher temperatures. If the reactants are mixed at a low temperature and heated at 100 K min$sup -1$, an explosion occurs. When heated at 3 K min$sup -1$, the potassium quietly ingests the superoxide. The results are discussed in terms of

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a thermal explosion model. The explosions occur in the absence of organic contaminants. The system is not critically sensitive to shock or agitation.

EDB SUBJECT CATEGORY: EDB-220900;210500;400201
INIS CATEGORY: C52;E35;B12

<591>
Smith, D.F.; Miller, W.C.; Taylor, A.R. Jr., Bureau of Mines, Tuscaloosa, Ala. (USA)

In High-temperature heat contents and entropies of zirconium fluoride and zirconium sulfate ** EDB-77:101119; (May 1961) BM-RI--5964

SUBJECT DESCRIPTORS: ENTHALPY;ENTROPY;HIGH TEMPERATURE;MEDIUM TEMPERATURE;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1,Q2;VERY HIGH TEMPERATURE;ZIRCONIUM FLUORIDES: M1;ZIRCONIUM SULFATES: M2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201

<592>
Smotrakov, V.G.; Popovskaya, N.P.; Protsenko, P.I. (Rostovskij-na-Donu Gosudarstvennyj Univ. (USSR))

Viscosity of binary of nitrate systems melts AIX-08:334371;EDB-77:140978; Zh. Fiz. Khim. (ZFKHA) 50:(12):3087-3090 (Dec 1976)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS;BINARY MIXTURES;CADMIUM NITRATES: T1;CADMIUM NITRATES: T4;CALCIUM NITRATES: T2;MOLTEN SALTS;NITRATES;QUANTITY RATIO;SILVER NITRATES: T5;THALLIUM NITRATES: T3;VISCOSITY: Q1,Q2,Q3,Q4,Q5

ABSTRACT: The systematic studies results of the physical and chemical properties of the binary mixtures melts of univalent metals nitrates with calcium and cadmium nitrates have been generalized. It has been noted that the concentration dependence in such compounds becomes more complicated, which is manifested by an increase in the deviation from additivity with the increasing difference in the energy characteristics of cations. The somewhat greater deviations from additivity observed in the sequence of cadmium systems may be explained by the more significant structural changes taking place in melts which contain the cadmium ions. The relationship

<592> CONT.
between the deviation of viscosity from additivity and the values the accessive modal volume is discussed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<593>
Sobolev, B.P.; Sejranyan, K.B. (AN SSSR, Moscow. Inst. Kristallografii; Erevanskii Gosudarstvennyi Univ. (USSR))

Phases of variable composition with LaF$sub 3$ structure in MF$sub 2$-(Y,Ln)F$sub 3$ systems. 1. SrF$sub 2$-(Y,Ln)F$sub 3$ systems (thermal characteristics, formation of berthollides) AIX-07:265104;EDB-77:013488; Kristallografiya (KRISA) 20:(4):763-768 (Jul 1975)

SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS;PHASE DIAGRAMS;PHASE STUDIES: Q1,Q2,Q3;PHASE TRANSFORMATIONS;RARE EARTH COMPOUNDS: T3;SOLID SOLUTIONS;STRONTIUM FLUORIDES: T1;X-RAY DIFFRACTION;YTTRIUM FLUORIDES: T2

ABSTRACT: Using thermal and X-ray diffraction analysis, portions of the phase diagrams have been studied of 13 systems of SrF$sub 2$-(Y,Ln)F$sub 3$ in the region containing 60-100 mol.%(Y,Ln)F$sub 3$. In all the systems the solid solutions Ln/sub 1-x/Sr/sub x/F/sub 3-x/ are formed of the LaF$sub 3$-type structure. As a result of a morphotropic transition in the LnF$sub 3$-series these phases get isolated acquiring all characteristic features of berthollides. The observed relation of the berthollide phase with solid solutions based on actually existing tisonite modifications (LaF$sub 3$-type) of rare earth trifluorides uniquely determines the relationship of berthollides to the type of solid solutions on the base of ''imaginary'' modifications of components. The berthollide phases studied refer to a new variety characterized by a congruent melting which is stipulated by the stabilization of the LaF$sub 3$-type structure with heterovalent isomorphic substitutions. The coordinates of the maxima have been given in the phase diagrams of the tisonite phases. In the systems of trifluorides of yttrium and rare earths (erbium through ytterbium) solid solutions have been discovered based on high-temperature modifications $alpha$-LnF$sub 3$ (structural type $alpha$-UO$sub 3$).

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

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<594>
Sommers, J.A.; Westrum, E.F. Jr. (Michigan Univ., Ann Arbor (USA). Dept. of Chemistry)

Thermodynamics of the lanthanide halides. II. Heat capacities and Schottky anomalies of SmCl$sub 3$, EuCl$sub 3$ and GdCl$sub 3$ from 50 to 350 K AIX-08:305623;EDB-77:107385; J. Chem. Thermodyn. (JCTDA) 9:(1):1-26 (Jan 1977)

SUBJECT DESCRIPTORS: CALORIMETRY;ENTROPY;EUROPIUM CHLORIDES: T1;GADOLINIUM CHLORIDES: T2;LOW TEMPERATURE;MEDIUM TEMPERATURE;SAMARIUM CHLORIDES: T3;SPECIFIC HEAT: Q1,Q2,Q3;TEMPERATURE DEPENDENCE;ULTRALOW TEMPERATURE;VERY LOW TEMPERATURE

ABSTRACT: The heat capacities of SmCl$sub 3$, EuCl$sub 3$, and GdCl$sub 3$ have been measured from 5 to 350 K by adiabatic calorimetry. For SmCl$sub 3$ and EuCl$sub 3$, the calculated Schottky heat capacities may be compared with the difference in heat capacity between LaCl$sub 3$ and the paramagnetic members, as before. For GdCl$sub 3$ which lacks a Schottky contribution, the difference between the heat capacity of LaCl$sub 3$ and GdCl$sub 3$ may be discussed in terms of spectroscopic data on lattice vibration. Comparison between the measured entropies and the results of estimation schemes is presented. The values of (S$sup 0$(298.15 K) - S$sup 0$(0)) for SmCl$sub 3$, EuCl$sub 3$, and GdCl$sub 3$ are 35.88, 34.43 and 36.19 calsub(th) K$sup -1$ mol$sup -1$, respectively.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<595>
Sproule, R.T.

Zirconia and yttria--thoria ceramics find new uses as solid electrolytes EDB-77:043916; Mater. Eng. (MAENB) 79:(1):48-49 (1974)

SUBJECT DESCRIPTORS: CERAMICS;ELECTRIC CONDUCTIVITY;ELECTRICAL PROPERTIES;ELECTROLYTES: Q4;HIGH TEMPERATURE;HIGH-TEMPERATURE FUEL CELLS: T4;MASS TRANSFER;OXYGEN IONS;THORIUM OXIDES: T3;USES: Q1,Q2,Q3;YTTRIUM OXIDES: T2;ZIRCONIUM OXIDES: T1

ABSTRACT: Zirconia and yttria-thoria are electrical insulators at low temperatures, but become electrical conductors at elevated temperatures. Their high-temperature conductivity can be controlled by varying the type and amount of stabilizer such as calcia, yttria, or magnesia. O ions will pass through the zirconia lattice: it is impervious to all

<595> CONT.
other gases. This property is used in devices for determining O in gases, liquids, and metals. It also makes it useful in fuel cells.

EDB SUBJECT CATEGORY: EDB-360204;300503

<596>
Steffens, F.; Reinen, D. (Marburg Univ. (F.R. Germany). Fachbereich Chemie)

Preparation and structure cf transition metal fluorides UEsup(II)Msup(IV)F$sub 6$[UEsup(II) : Cr-Zn; Msup(IV) : Hf,Zr] AIX-07:274884;EDB-77:031503; Z. Naturforsch., b (ZENBA) 31:(6):894-896 (Jun 1976)

SUBJECT DESCRIPTORS: CHEMICAL BONDS;CHEMICAL PREPARATION;COMPARATIVE EVALUATIONS;CRYSTAL STRUCTURE: Q1,Q2;HAFNIUM FLUORIDES: T1;JAHN-TELLER EFFECT;LATTICE PARAMETERS;TRANSITION ELEMENT COMPOUNDS;X-RAY DIFFRACTION;ZIRCONIUM FLUORIDES: T2

ABSTRACT: Compounds UEsup(II)Msup(IV)F$sub 6$[UE : Mn-Ni,Zn] crystallize in the LiSbF$sub 6$- or in the ordered ReO$sub 3$-structure. The influence of the Jahn-Teller ions Cr$sup 2+$ and Cu$sup 2+$ on these structure types is studied.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<597>
Steiger, R.P.; Cater, E.D.

Mass spectrometric determination of dissociation energies of high-temperature molecules: ScS, YS, LaS, ZrS, UO INS-76:014749;ERA-01:020217;EDB-76:054358; High Temp. Sci. (HITSA) 7:(4):288-300 (Dec 1975)

SUBJECT DESCRIPTORS: DISSOCIATION ENERGY:

Q1,Q2,Q3,Q4,Q5;GASES;LANTHANUM SULFIDES: T3;MASS SPECTROSCOPY;MOLECULES;SCANDIUM SULFIDES: T1;URANIUM OXIDES: T5;YTTRIUM SULFIDES: T2;ZIRCONIUM SULFIDES: T4

ABSTRACT: Gaseous isomolecular equilibria of types MS + N = NS + M and MO + N = NO + M, where M and N are variously the elements Sc, Y, La, Zr, and U, were studied mass spectrometrically, cver appropriate mixed solid phases heated in a tungsten Knudsen cell. Dissociation energies were derived, using as reference values D$sub 0$$sup 0$(US) = 124.0 +- 2.3, D$sub 0$$sup 0$(YS) = 125.4 +- 2.5, and D$sub 0$$sup 0$(YO) = 170.0 +- 3.0 kcal/mole. ''Preferred values''

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<597> CONT.
obtained by considering the results of the present study and literature values are ScS, 113.4 +- 3.0; YS, 125.4 +- 2.5; LaS, 136.0 +- 3.0; ZrS, 136.6 +- 4.0; and UO, 181.0 +- 4.0 kcal/mole. Determination of ground state degeneracies of US and UO by calculating the electronic entropies of the molecules was attempted. 4 tables, 33 references.

EDB SUBJECT CATEGORY: EDB-400201;400702;360204
INIS CATEGORY: B12;B13;B23

<598>
Steiner, P.; Hoechst, H.; Huefner, S. (Universitaet des Saarlandes, Saarbruecken (Germany, F.R.))

XPS valence bands of La, Ce and Gd and their aluminium alloys AIX-08:319619;EDB-77:113442; J. Phys., F (London) (JPFMA) 7:(5):L145-L149 (May 1977)

SUBJECT DESCRIPTORS: ALUMINIUM ALLOYS: T1;BAND THEORY;CERIUM;CERIUM ALLOYS: T2;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4;FERMI LEVEL;GADOLINIUM;GADOLINIUM ALLOYS: T3;LANTHANUM;LANTHANUM ALLOYS: T4;PHOTOELECTRON SPECTROSCOPY;SPECTRA;VALENCE;X RADIATION

ABSTRACT: The XPS valence band spectra of La, Ce and Gd metal and of their aluminium alloys show the 5d band in La metal at 0.8 eV below the Fermi energy with a width of about 1.5 eV; in Ce the 4f band and 5d band are at 0.5 eV and 1.7 eV below the Fermi energy with widths of 0.7 eV and 1.5 eV respectively. The Gd 5d band is very similar to the La 5d band, while the 4f level is well localized at 8.0 eV below the Fermi energy.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<599>
Stepanov, V.G.; Kozhevnikov, V.F. (Moskovskij Aviatsionnyj Inst. (USSR))

Density and enthalpy of liquid alkaline metals at pressures up to 1500 bar AIX-09:349543;EDB-78:027597; Inzh.-Fiz. Zh. (INFZA) 30:(5):855-862 (May 1976)

SUBJECT DESCRIPTORS: CESIUM;DENSITY: Q1;ENTHALPY;FREE ENERGY;HIGH PRESSURE;HIGH TEMPERATURE;LIQUID METALS: T1;LITHIUM;MEDIUM TEMPERATURE;POTASSIUM;PRESSURE DEPENDENCE;RUBIDIUM;SODIUM;TEMPERATURE DEPENDENCE;VERY HIGH PRESSURE

<599> CONT.

ABSTRACT: On the basis of the similarity principle justified thecretically for liquid alkali metals, generalized expressions for thermophysical characteristics have been derived. Frcm data for rubidium density and enthalpy of liquid lithium, scdium, pctassium are calculated at pressures up to 1500 bars and those of liquid cesium up to 1000 bars.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<600>

Stephens, F.B.; Gutmacher, R.G.; Ernst, K.; Harrar, J.E., California Univ., Livermore (USA). Lawrence Livermore Lab.

In Methods for the accountability of uranium dioxide **
INS-76:014263;ERA-01:018796;EDB-76:057861; (Jun 1975)
PB--241763

SUBJECT DESCRIPTORS: ACCOUNTING;CHEMICAL ANALYSIS;DISSOLUTION;IMPURITIES;MASS SPECTROSCOPY;NUCLEAR MATEBIALS MANAGEMENT: Q1;SAMPLING;URANIUM DIOXIDE: T1

ABSTRACT: This report deals with methods for the analysis of uranium dicxide and contains sections describing: (1) sampling and sample handling, (2) dissolution of samples, (3) the determination of impurities in the matrix material, (4) isotcpic analysis by surface ionization mass spectrometry, (5) chemical analysis, and (6) error analysis. Each section deals in sufficient detail with the subject matter to allow an experienced analyst to implement the procedures in a reasonably well-equipped analytical laboratory. (GRA)

EDB SUBJECT CATEGORY: EDB-055001
INIS CATEGORY: F42

<601>

Stievenart, M.; Bouffioux, P.; Egleme, M.; Fabry, J.P.; Lamotte, H. (Societe Belge pour l'Industrie Nucleaire, Brussels) ** Jaeger, T.A. (comp.)

Analysis of LMFBR explosion model experiments by means of the SUBBOUM-II code In Structural mechanics in reactor technolcgy. Vol. 2 **
AIX-08:287060;ERA-02:024800;EDB-77:049734; (1975)
North-Holland

SUBJECT DESCRIPTORS: BOUNDARY CONDITIONS;COMPUTER CALCULATIONS;DEFORMATION;INCOMPRESSIBLE FLOW;REACTOR CORE DISRUPTION: T2,Q1;S CODES;SIMULATION: Q2;SNR-1 REACTOR: T1;TWO-DIMENSIONAL CALCULATIONS

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<601> CONT.

ABSTRACT: Experiments have been carried out to simulate in small scale vessels the occurrence of an Hypothetical Core Disruptive Accident (HCDA) for the SNR-300 reactor. In parallel with the experimental programme, the (2D) computer code SURBOUM-II has been developed. The code computes the two-dimensional fluid flow within the system in case of a core explosion. The fluid is assumed incompressible and the deformations of the concrete shell(s) and vessel(s) are calculated by means of the thin shell theory. Perforated dip plates which are included in the model are treated as a particular type of boundary conditions involving empirical pressure drop versus flow relationships. The first part of the interpretation work was the determination of the pressure-volume relationship of the slow burning charge used to simulate the HCDA. This has been achieved by an original trial and error method built in the code which fits best the experimental impulse time records obtained in bare charge experiments fired in overstrong vessels. Other experiments carried out in overstrong vessels and involving a perforated dip plate above the core to damp out the fluid impact on the roof were calculated and the comparison of the theoretical and experimental impulse time curves was satisfactory. Further experiments, with and without the perforated dip plate, carried out in yielding vessels were also interpreted. For those experiments the scope of the work was the comparison of calculated and measured deformation of the vessel. The agreement obtained is satisfactory, through the code seems to overestimate slightly the final deformation.

EDB SUBJECT CATEGORY: EDB-220900;210500
INIS CATEGORY: C52

<602>

Storonkin, A.V.; Vasil'kova, I.V.; Efimov, A.I.; Baruzdina, V.A.

Thermographic investigation of the PbCl$sub 2$-PbBr$sub 2$-PbI$sub 2$ and PbCl$sub 2$-PbBr$sub 2$PbF$sub 2$ systems
AIX-08:317792;EDB-77:133394; Vestn. Leningr. Univ., Fiz., Khim. (VLUFB) (16):137-139 (Aug 1975)

SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;LEAD BROMIDES: T1;LEAD CHLORIDES: T2;LEAD FLUORIDES: T4;LEAD IODIDES: T3;PHASE DIAGRAMS: Q1,Q2,Q3,Q4;SOLID SOLUTIONS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<603>
Storozhenko, T.P.; Khanaev, E.I.; Afanas'ev, Yu.A. (Kubanskij Gosudarstvennyj Univ., Krasnodar (USSR))

Formation enthalpy of gadolinium, terbium and dysprosium trifluorides AIX-08:292491;EDB-77:069064; Zh. Fiz. Khim. (ZFKHA) 50:(4):1060 (Apr 1976)

SUBJECT DESCRIPTORS: CALORIMETRY;DYSPROSIUM FLUORIDES: T1;FORMATION HEAT: Q1,Q2,Q3;GADOLINIUM FLUORIDES: T2;TERBIUM FLUORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<604>
Streicher, M.A.

Effect of composition and structure on crevice, intergranular, and stress corrosion of some wrought Ni--Cr--Mo alloys INS-76:016231;EDB-76:053892; Corrosion (CORRA) 32:(3):79-93 (Mar 1976)

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CORROSIVE EFFECTS: Q2,Q3;HASTELLOYS: T1;INORGANIC ACIDS: T2;INTERGRANULAR CORROSION: Q1;INTERMETALLIC COMPOUNDS;MAGNESIUM CHLORIDES: T3;MICROSTRUCTURE;PRECIPITATION HARDENING;STRESS CORROSION: Q1;VERY HIGH TEMPERATURE

ABSTRACT: The relationship of composition and microstructure to the occurrence of localized corrosion in Hastelloy alloys C, C-276, and C-4 was investigated. One hour exposures of these alloys in the range of 1200 to 2200$sup 0$F may result in the formation of a molybdenum-rich intermetallic compound and, in alloys with more than about 0.004 percent C, a molybdenum-rich carbide. The boiling ferric sulfate-50 percent H$sub 2$SO$sub 4$ test readily detects the presence of both of these precipitates which cause rapid intergranular attack in this solution. The molybdenum-rich M$sub 6$C carbide precipitate impairs resistance to intergranular, crevice, and stress corrosion. In contrast, the molybdenum-rich intermetallic compound, Mu-phase, impairs resistance only to intergranular attack, primarily in oxidizing acids. When the carbon content is progressively increased above 0.004 percent, formation of the molybdenum-rich carbide precipitate at grain boundaries by one hour heat treatments results first in loss of resistance to stress corrosion cracking (SCC) in the boiling 45 percent MgCl$sub 2$ test. Further increases in carbon content (0.05 percent) result in loss of resistance to intergranular attack

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<604> CONT.
in acids, to crevice corrosion in 10 percent ferric chloride at 50$sup 0$C and also to SCC in this solution. All SCC is of the intergranular type. Formation of the molybdenum-rich carbide precipitate is prevented in alloy C-4 by keeping the carbon content low and by addition of titanium. Formation of the intermetallic compound is minimized by adjustment of the alloy content. In the heat investigated, titanium stabilization was effective in preventing intergranular attack in reducing acids and SCC in the MgCl$sub 2$ test. However, metallographic examination and intergranular attack in the ferric sulfate test on material heated 1 hour at 1600$sup 0$F indicated that a compound was still being formed at grain boundaries.

EDB SUBJECT CATEGORY: EDB-360105
INIS CATEGORY: B15

<605>
Stremousov, V.I.; Rubtsov, A.S.

Thermophysical properties of the ternary liquid-metal system tin--lead-- cadmium ERA-02:001027;EDB-76:081560; High Temp. (USSR) (Engl. Transl.) (HITEA) 13:(6):1201-1203 (Nov 1975)

SUBJECT DESCRIPTORS: CADMIUM ALLOYS: T1;COMPRESSIBILITY: Q1,Q2,Q3;EUTECTICS;LEAD ALLOYS: T3;MEDIUM TEMPERATURE;SPECIFIC HEAT: Q1,Q2,Q3;TIN ALLOYS: T2;ULTRASONIC WAVES

ABSTRACT: Data on the velocity of ultrasound and adiabatic compressibility are used to calculate specific heats and isothermal compressibility of Pb-Sn-Cd alloys. (AIP) (AIP)

EDB SUBJECT CATEGORY: EDB-360104

<606>
Stremousov, V.I.; Rubtsov, A.S. (Volgogradskij Pedagogicheskij Inst. (USSR))

Thermodynamic properties of the ternary Sn-Pb-Cd liquid metal system AIX-08:324282;EDB-77:132712; Teplofiz. Vys. Temp. (TVYTA) 13:(6):1298-1300 (Nov 1975)

SUBJECT DESCRIPTORS: CADMIUM ALLOYS: T1;CHEMICAL COMPOSITION;COMPRESSIBILITY;EQUATIONS;LEAD ALLOYS: T2;LIQUID METALS;MEASURING METHODS;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;TERNARY ALLOY SYSTEMS;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;TIN ALLOYS: T3;ULTRASONIC WAVES

<606> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<607>
Stuve, J.M., Bureau of Mines, Reno, Nev. (USA). Reno Metallurgy Research Center

In Heat of formation of europium sesquioxide and europium trichloride ** EDB-77:107188; (Oct 1964) BM-RI--6640

SUBJECT DESCRIPTORS: CALORIMETRY;EUROPIUM CHLORIDES: T2;EUROPIUM OXIDES: T1;FORMATION HEAT: Q1,Q2;MEDIUM TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360204

<608>
Stuve, J.M., Bureau of Mines, Reno, Nev. (USA). Reno Metallurgy Research Center

In Heats of formation of holmium and terbium trichlorides ** EDB-77:120761; (Nov 1967) BM-RI--7046

SUBJECT DESCRIPTORS: FORMATION HEAT: Q1,Q2;HOLMIUM CHLORIDES: T1;SOLUTION HEAT;TERBIUM CHLORIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201

<609>
Suzuki, K. (Tohoku Univ., Sendai (Japan). Research Inst. for Iron, Steel and Other Metals)

Structural study of liquids with strong short-range correlation in the atomic distribution AIX-08:333464;EDB-78:022010; Ber. Bunsenges. Phys. Chem. (BBPCA) 80:(8):689-694 (Aug 1976)

SUBJECT DESCRIPTORS: AMORPHOUS STATE;ATOMIC MODELS;BOND LENGTHS;CARBON SULFIDES: T3;COMPARATIVE EVALUATIONS;CORRELATIONS;CRYSTAL STRUCTURE;DISTRIBUTION;INTERACTION RANGE;LIQUID METALS;MOLECULAR STRUCTURE;NEUTRON DIFFRACTION: Q1,Q2,Q3;PALLADIUM SILICIDES: T2;SELENIUM: T1;SOLIDS;SPECTRA;STRUCTURAL MODELS;TIME-OF-FLIGHT METHOD

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<609> CONT.

ABSTRACT: Structure factors of liquids and amorphous solids having a relatively high degree of ordering in their short-range structures have been measured over a wide range of scattering vector by means of the T-O-F neutron diffraction using epithermal pulsed neutrons generated by a linear electron accelerator. It has been shown in the case of CS$sub 2$ liquid that the size and shape of a molecule existing in the liquid are determined from the behaviour of the structure factor in the range of high scattering vector, and that the structure factor at low scattering vectors then informs on inter-molecular orientational and center-center correlations in the liquid state. Moreover, based on highly-resolved radial distribution functions, a free rotating chain model has been discussed for chain molecules contained in liquid Se and a splitting of the nearest neighbour Pd-Pd and Pd-Si correlation has been clearly found in amorphous Pdsub(0.8)-Sisub(0.2) alloy.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: A13

<610>

Svechnikov, V.N.; Kobzenko, G.F.; Ivanchenko, V.G. (AN Ukrainskoj SSR, Kiev. Inst. Metallofiziki)

Gd, Tb, Dy, Ho, Er solubility in chromium

AIX-09:349545;EDB-78:027614; Metallofizika (MFIZA) (59):77-83 (1975)

SUBJECT DESCRIPTORS: CHROMIUM: T1;DOPED MATERIALS;INTERSTITIALS;MICROHARDNESS;MICROSTRUCTURE;PHASE TRANSFORMATIONS;RARE EARTHS: T2;SOLID SOLUTIONS;SOLUBILITY: Q1,Q2;TRANSITION TEMPERATURE;VERY HIGH TEMPERATURE

ABSTRACT: Using metallographic, differential, thermal and X-ray crystal analysis and microhardness methods, the authors determined the limiting solubility in chromium of five rare-earth metals of the yttrium sub-group at the temperatures of monotectic transformation and at 1700deg, 1600deg, 1400deg and 900degC. The influence of the quantity of alloying additive on the microhardness of the chrome-based solid solution and on the microstructure and hardness of the alloys was investigated. The temperatures of monotectic and eutectic transformation were determined. The changes in the physical properties of the solid solution as a function of

<611> CONT.
composition are explained on the basis of notions of phase equilibria in multi-component systems.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<611>
Tagawa, H. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment)

Nonstoichiometry in cubic uranium sesquinitride In U.S.-Japan joint seminar on defects and diffusion in solids **
AIX-08:320731;EDB-77:114344; (1976) Japan Society for Promotion of Science

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CRYSTAL DEFECTS: C1;CRYSTAL-PHASE TRANSFORMATIONS;CUBIC LATTICES;DENSITY;HIGH TEMPERATURE;LATTICE PARAMETERS;NEUTRON DIFFRACTION;PHASE DIAGRAMS;PRESSURE DEPENDENCE;THERMODYNAMIC PROPERTIES;URANIUM NITRIDES: T1;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: Of four phases in the U-N system, the cubic sesquinitride $alpha$-U$sub 2$N$sub 3$ exhibits a wide nonstoichiometric range of composition at high temperatures. The defect characteristic of $alpha$-U$sub 2$N$sub 3$ has been examined from the standpoint of crystal structure and thermodynamic properties. Two separate linear relationships between lattice parameter and nitrogen content are obtained: one is characteristic of U$sub 2$N$sub 3$ and the other of UN$sub 2$. Using the density data, it is deduced that the nonstoichiometry in the U$sub 2$N$sub 3$ region is caused by the interstitial nitrogen atoms, and the nonstoichiometry in UN$sub 2$ is due to the nitrogen vacancies. X-ray and neutron diffraction analyses also show that the excess nitrogen atoms fill the vacant interstitial positions without the structure change. Thermodynamic data suggest that the excess nitrogen is dissolved in U$sub 2$N$sub 3$ with the wide homogeneous range of composition; the results are consistent with those obtained from the measurements for lattice parameter and density, and from the structure analysis.

EDB SUBJECT CATEGORY: EDB-400702;360202
INIS CATEGORY: B12

<612>

<612>
Tagawa, H.; Fujino, T.; Tateno, J., Japan Atomic Energy Research Inst., Tokyo

In Phase relations, crystal structures and physical properties of nuclear fuels **
AIX-08:281013;ERA-02:032849;EDB-77:074802; (Jul 1975)
JAERI-M--6180

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE;ELECTRICAL PROPERTIES;MAGNETIC PROPERTIES;MELTING POINTS;PHASE DIAGRAMS;PHYSICAL PROPERTIES: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15;PLUTONIUM CARBIDES: M1;PLUTONIUM NITRIDES: M2;PLUTONIUM OXIDES: M3;PLUTONIUM PHOSPHIDES: M4;PLUTONIUM SULFIDES: M5;REVIEWS;SELF-DIFFUSION;THERMAL EXPANSION;THORIUM CARBIDES: M6;THORIUM NITRIDES: M7;THORIUM OXIDES: M8;THORIUM PHOSPHIDES: M9;THORIUM SULFIDES: M10;URANIUM CARBIDES: M11;URANIUM NITRIDES: M12;URANIUM OXIDES: M13;URANIUM PHOSPHIDES: M14;URANIUM SULFIDES: M15

ABSTRACT: Phase relations, crystal structures and physical properties of the compounds for nuclear fuels are presented, including melting point, thermal expansion, diffusion and magnetic and electric properties. Emphasis is on oxides, carbides and nitrides of thorium, uranium and plutonium.

EDB SUBJECT CATEGORY: EDB-360204;360202;220300
INIS CATEGORY: B23

<613>
Takahashi, Yoichi; Kamimoto, Masayuki (Tokyo Univ. (Japan). Faculty of Engineering)

Thermal properties of nuclear fuel ceramics EDB-76:054019; Seramikkusu (SERAA) 10:(5):304-310 (May 1975)

SUBJECT DESCRIPTORS: CERAMICS;NUCLEAR FUELS;PLUTONIUM OXIDES: T1;SOLID SOLUTIONS;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;THERMAL CONDUCTIVITY;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3,Q4;THORIUM OXIDES: T2;URANIUM CARBIDES: T3;URANIUM OXIDES: T4

ABSTRACT: The contribution of electronic structure to thermal properties was studied by examining the heat capacity and heat conductivity of ceramics as nuclear fuel material. The heat capacity of NaCl type uranium compounds at low temperature and the relationship between state density and the coefficient of electronic heat capacity are illustrated. Further, the heat capacity of UC, U$sub 2$C$sub 3$ and PuC at high temperature is shown. The deviation of the heat capacity of UC and U$sub 2$C$sub 3$ from the ordinary temperature

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dependence of heat capacity has been explained as dependent on the formation of lattice defects in crystals, whereas the deviation of that of PuC has to be examined still further. The heat conductivity of UO$sub 2$ is small. The heat conductivity of NaCl type uranium compounds is in an intermediate range between metallic uranium and UO$sub 2$. It is markedly low at low temperature, but increases with temperature rise, and shows large value as compared with UO$sub 2$ at high temperature. Therfore, the NaCl type uranium compounds are promising as nuclear fuel ceramics for future. The heat conductivity of UO$sub 2$ is reviewed on the basis of phonon concept. Attention is paid to the localized 5 f electrons of UP and US. As a result, the behavior of the heat conductivity at transition point differs considerably from that of UN. The research on solid solutions such as (U,Pu)O$sub 2$ and U(P,S) are reviewed. Finally, the method of measuring thermal property by laser flash is briefly described.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B23

<614>

Talbot, J.B.; Smith, F.J.; Land, J.F.; Barton, P. (Oak Ridge National Lab., Tenn. (USA))

Tritium sorption in lithium--bismuth and lithium--aluminum alloys AIX-08:295850;ERA-02:027007;EDB-77:055610; J. Less-Common Met. (JCOMA) 50:(1):23-28 (Nov 1976)

ABSTRACT: The sorption of tritium by molten lithium-bismuth, Li-Bi (15 at.% lithium), and solid equiatomic lithium-aluminum, Li-Al, was investigated to evaluate the potential application of both materials in controlled thermonuclear reactors. The solubility of tritium in molten Li-Bi is less than 0.1 ppb at 500 - 700 $sup 0$C and tritium partial pressures of 10$sup -1$ - 10$sup -3$ Torr. Therefore, extraction of tritium from molten Li$sub 2$BeF$sub 4$ salt with Li-Bi is not practical. The solubility of hydrogen in solid Li-Al (50 - 50 at.%) at 500 $sup 0$C follows Sieverts' Law; the Sieverts' constant was measured to be 1.9 (+-0.1) X 10$sup 4$ Torrsup(1/2)/atomic fraction. Tritium sorption in Li-Al ranged from 0.01 to 7 ppm at 400 - 600 $sup 0$C at respective tritium partial pressures of 0.14 - 0.52 Torr.

EDB SUBJECT CATEGORY: EDB-360105;700209
INIS CATEGORY: B22

<615>

<615>
Tamaki, S. (Niigata Univ. (Japan). Dept. of Physics)

Application of the hard-sphere model to thermodynamic properties of liquid 3d transition metals AIX-07:251112;EDB-76:097500; J. Phys., F (London) (JPFMA) 6:(4):L89-L92 (Apr 1976)

SUBJECT DESCRIPTORS: ANALYTICAL SOLUTION;HARD-SPHERE MODEL;LIQUID METALS;PERCUS-YEVICK EQUATION;SPECIFIC HEAT;THERMODYNAMIC PROPERTIES: Q1;TRANSITION ELEMENTS: T1;VANADIUM;VAPORIZATION HEAT

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<616>
Tamura, S.; Yokokawa, T. (Hokkaido Univ., Sapporo (Japan). Faculty of Science)

Enthalpy of vitreous beryllium fluoride AIX-08:280698;EDB-77:094784; Bull. Chem. Soc. Jpn. (BCSJA) 48:(9):2542-2547 (Sep 1975)

SUBJECT DESCRIPTORS: BERYLLIUM FLUORIDES: M1;CALORIMETRY;ENTHALPY;GLASS;HIGH TEMPERATURE;LIQUIDS;PHASE TRANSFORMATIONS;SPECIFIC HEAT;TEMPERATURE DEPENDENCE;THERMODYNAMIC PROPERTIES: Q1;VISCOSITY

ABSTRACT: The enthalpy increments of beryllium fluoride were measured by the drop method in the glassy and liquid states from 450 to 914 K. The other thermodynamic functions were also calculated. The estimated configurational entropy of the supercooled liquid showed its temperature dependence to be small compared with those of nearly all other glass-forming liquids. The theory of Adam and Gibbs was applied to explain both the present enthalpy data and the Arrhenius viscosity behaviour over an unusually wide temperature range. The similarity between beryllium fluoride and silicon dioxide was also shown with respect to the heat capacities of the glassy and supercooled liquid states.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<617>
Taylor, A.R. Jr.; Gardner, T.E., Bureau of Mines, Tuscaloosa, Ala. (USA). Tuscaloosa Metallurgy Research Lab.

In Some thermal properties of beryllium fluoride from 8$sup 0$ to 1,200$sup 0$ K ** EDB-77:101124; (Dec 1964) BM-RI--6664

SUBJECT DESCRIPTORS: BERYLLIUM FLUORIDES: T1;GLASS;HIGH TEMPERATURE;LOW TEMPERATURE;MEDIUM TEMPERATURE;SPECIFIC HEAT: Q1;ULTRALOW TEMPERATURE;VERY HIGH TEMPERATURE;VERY LOW TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201

<618>
Tetenbaum, M.

Total pressures of uranium- and plutonium-bearing species above the U--Pu--O system
ERA-02:002461;INS-76:020669;EDB-76:090326; Trans. Am. Nucl. Soc. (TANSA) 23::131-132 (Jun 1976)

SUBJECT DESCRIPTORS: NUCLEAR FUELS;PLUTONIUM DIOXIDE: T2;PRESSURE DEPENDENCE;SUBLIMATION;URANIUM DIOXIDE: T1;VAPOR PRESSURE: Q1,Q2;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-050700;360204
INIS CATEGORY: B23

<619>
Thayer, W.L.; Robbins, J.L. (California Univ., Livermore (USA). Lawrence Livermore Lab.) ** Blank, H.; Lindner, R. (eds.)

Enthalpy and heat capacity of liquid plutonium and uranium In Plutonium 1975 and other actinides **
AIX-08:309932;ERA-02:041806;EDB-77:094171; (1976)
North-Holland

SUBJECT DESCRIPTORS: ENTHALPY: Q1,Q2;FILMS;FISSION;HIGH TEMPERATURE;LIQUID METALS;NEUTRON REACTIONS;PLUTONIUM: T1;RADIATION HEATING;RADIOMETRIC ANALYSIS;SPECIFIC HEAT: Q1,Q2;SUPER KUKLA REACTOR;TEMPERATURE MEASUREMENT;URANIUM: T2

ABSTRACT: The enthalpy and effective heat capacity of delta-plutonium and oralloy have been measured at temperatures high in the liquid region. The Super Kukla prompt-burst reactor was used to heat thin wafers of these

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metals by neutron-induced fission. The temperature increase in the samples was measured with thermocouples and the number of fissions in the sample determined radiochemically. From these data, heat capacity and enthalpy were calculated. The heat capacity of oralloy was calculated as 159 J/kg.$sup 0$C up to 2200$sup 0$C. A constant value of 180 J/Kg.$sup 0$C was computed for the effective heat capacity of liquid delta-plutonium up to 2200$sup 0$C. Because molten plutonium and uranium would chemically attack even the most refractory crucible materials, it would be very difficult to obtain such data by conventional laboratory calorimetry; it is believed that the use of neutron heating in these investigations is unique.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<620>
Thayer, W.L.; Robbins, J.L. (California Univ., Livermore (USA). Lawrence Livermore Lab.) ** Commission of the European Communities, Karlsruhe (Germany, F.R.). European Inst. for Transuranium Elements

Enthalpy and heat capacity of liquid plutonium and uranium In 5th international conference on plutonium and other actinides. Book of abstracts **
AIX-07:233077;EDB-76:087038; (1975) AED-Conf--417-007

SUBJECT DESCRIPTORS: ENTHALPY: Q1,Q2;FISSION RATIO;LIQUID METALS;PLUTONIUM-DELTA: T1;SPECIFIC HEAT: Q1,Q2;URANIUM: T2;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<621>
Thirriot, C.; Lacas, L. (Toulouse-3 Univ., 31 (France)); Amoros, D. (Centre National de la Recherche Scientifique, 31 - Toulouse (France))

Experimental study of the temperature dependence on energy exchanges in liquid metals In Comptes rendus du 95 **
AIX-07:279004;EDB-77:026115; (1975) Bibliotheque Nationale

SUBJECT DESCRIPTORS: ENERGY TRANSFER: Q1;LIQUID METALS: T1;TEMPERATURE DEPENDENCE;VISCOSITY

ABSTRACT: Because of their simple structure, liquid metals are

<621> CONT.
ideal for fundamental research on the liquid state. The very wide temperature region between the adjacent solid-vapour states is a great advantage in studying the influence of temperature on parameters characteristics of energy transfer. Following a bibliographical survey aimed at establishing the possibilities of theoretical prediction the results of experiments carried out at the Toulouse Institute of Fluid Mechanics, concerning measurements of the viscosity, specific heat and diffusivity parameters for several liquid metals and an alloy, are presented in detail. The experimental results are compared with theoretical predictions. By using the law of the corresponding states it is possible to give graphs relating dimensionless parameters.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: E11

<622>
Tippelskirch, H. v., Karlsruhe Univ. (TH) (Germany, F.R.). Inst. fuer Physikalische Chemie und Elektrochemie

In Viscosities of cesium vapor to 1,620 K and of liquid gallium to 1,800 K ** AIX-07:268015;EDB-77:036624; (1976) AED-CONF--76-087-008

SUBJECT DESCRIPTORS: CESIUM: T2;GALLIUM: T1;LIQUID METALS;TEMPERATURE DEPENDENCE;VAPORS;VERY HIGH TEMPERATURE;VISCOSITY: Q1,Q2

ABSTRACT: The viscosity of cesium at 1,620 K and 40 bar has been determined to 41 x 10$sup -6$(Pa x s) by the oscillating cup method. The saturated vapor density at 1,580 K could be derived from the viscosity measurements. The viscosity of liquid gallium has been determined from 370 K to 1,800 K. The experimental results have been compared with calculations based on the Enskog hard-sphere transport theory for dense fluids.

EDB SUBJECT CATEGORY: EDB-360103
INIS CATEGORY: B22

<623>
Tiptsova-Yakovleva, V.G.; Kopnina, O.I.; Lopatina, E.A. (Moskovskij Inst. Stali i Splavov (USSR))

Spectrophotometric determination of rare earths and yttrium in gallium base alloys AIX-08:342659;EDB-78:017233; Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. (IVUKA) 20:(3):465 (1977)

SUBJECT DESCRIPTORS: CHEMICAL ANALYSIS: Q1;GALLIUM BASE ALLOYS:

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<623> CONT.
T1;QUANTITATIVE CHEMICAL ANALYSIS;RARE EARTHS:
T2;SPECTROPHOTOMETRY: Q2,Q3;YTTRIUM: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400104
INIS CATEGORY: B11

<624>
Tishura, T.A.; Budarina, A.N. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Degree of thermal dissociation of MCaCl$sub 3$(M-K,Rb,Cs) complexes during melting AIX-08:286199;EDB-77:094806; Ukr. Khim. Zh. (UKZHA) 42:(3):280-282 (Mar 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<625>
Toft Soerensen, O., Danish Atomic Energy Commission, Risoe. Research Establishment; Lund Univ. (Sweden)

In Rare earth and actinide oxides. Thermodynamic and electron microscopy studies ** AIX-07:272766;EDB-77:055674; (Oct 1975) RISO--331

ABSTRACT: Partial molar thermodynamic quantities for oxygen in substoichiometric cerium oxides (CeO/sub 2-x/), plutonium oxides (PuO/sub 2-x/) and mixed uranium--plutonium oxides ((U, Pu)O/sub 2-x/) were determined by thermogravimetric analysis in atmospheres of controlled oxygen pressures (CO$sub 2$/CO mixtures) in the temperature range 900 to 1450 deg C. Detailed analysis of the data obtained showed that the nonstoichiometric phase ranges for the three oxide-systems can be divided into several subregions each consisting of an apparent nonstoichiometric single phase. The finer details of the thermodynamic data, however, suggest that some of these subregions can be further split into ordered intermediate phases with compositions following the series M/sub n/O/sub 2n-2/. Supplementary high-temperature X-ray diffraction studies were made on CeO$sub 2$ at temperatures up to 855 deg C. Between 790 and 855 deg C, a new phase of low symmetry was obtained. Indexing the powder pattern for this phase showed it to be isostructural with Pr$sub 6$O$sub 11$ and with a monoclinic unit cell with a=6.781 +- 0.006 A, b=11.893 +- 0.009 A, c=15.823 +- 0.015 A and $beta$=125.04 +- 0.04 deg. The Ce$sub 6$O$sub 11$ phase observed in the X-ray studies

<625> CONT.
corresponds to one of the intermediate phases inferred from the thermodynamic data. Supplementary high-resolution electron microscopy studies were also conducted on reduced single crystals of CeO$sub 2$. On some particles reduced by beam heating, a lamellae structure was observed and a model involving crystallographic shearing is proposed to explain this observation. In other beam-heated particles diffraction patterns were observed corresponding to the monoclinic superstructure found in the high-temperature X-ray studies. Finaly patterns on particles reduced by a heat treatment in vacuum under well defined conditions showed that twinning can also take place in this oxide system.

EDB SUBJECT CATEGORY: EDB-360202;360204
INIS CATEGORY: B23

<626>
Toft Soerensen, O. (Danish Atomic Energy Commission, Risoe. Research Establishment)

Studies of non-stoichiometric oxides by thermoanalytical methods
AIX-07:247911;EDB-76:081891; Thermochim. Acta (THACA) 15:(2):227-237 (May 1976)

SUBJECT DESCRIPTORS: CERIUM OXIDES: T1;CHEMICAL COMPOSITION;CONTROLLED ATMOSPHERES;CRYSTAL LATTICES;HIGH TEMPERATURE;OXYGEN;PHASE STUDIES;PLUTONIUM OXIDES: T2;STOICHIOMETRY: Q1,Q2,Q3;TEMPERATURE DEPENDENCE;THERMAL GRAVIMETRIC ANALYSIS;THERMODYNAMIC PROPERTIES;URANIUM OXIDES: T3;VACANCIES;VAPOR PRESSURE;VERY HIGH TEMPERATURE

ABSTRACT: Non-stoichiometric oxides can be divided into metal-deficient and oxygen-deficient oxides, and a few examples of each type are given in order to show the materials of interest in this field. After a short review of the methods used in the study of these oxides, an account is given of the methods used in and the results obtained from a recent thermogravimetric investigation in atmospheres of controlled oxygen pressure on cerium oxides, plutonium oxides and mixed uranium/plutonium oxides, which are all of special interest in research on fuels for nuclear power reactors.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B11

<627>

<627>
Tominaga, T.; Sakai, T.; Mimura, T. (Tokyo Univ. (Japan). Faculty of Science)

A Moessbauer spectroscopic study of intercalation compounds of graphite with ferric chloride and aluminum chloride
EDB-76:036719; Chem. Lett. (Tokyo) (CMLTA) (8):853-858 (Aug 1974)

SUBJECT DESCRIPTORS: ALUMINIUM CHLORIDES: T1;CLATHRATES;GRAPHITE: T2;IRON CHLORIDES: T3;ISOMER SHIFT;MOESSBAUER EFFECT;QUADRUPOLES;SPIN;STRUCTURAL CHEMICAL ANALYSIS: Q1,Q2,Q3

ABSTRACT: The Mossbauer spectra of graphite-FeCl$sub 3$ and graphite-FeCl$sub 3$-AlCl$sub 3$ compounds with varying FeCl$sub 3$/AlCl$sub 3$ ratio were measured at 80$sup 0$K and 298$sup 0$K. In the spectra of the latter compounds with FeCl$sub 3$/AlCl$sub 3$ ratio of approximately one and less were observed two quadrupole doublets indicating the presence of high-spin Fe(II). (auth)

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: A13

<628>
Toropov, A.N.; Sokhovich, E.V.; Rubinshtein, O.V.; Ermakova, T.M. (Leningradskij Tekhnologicheskij Inst. (USSR))

Refractory materials resistance to molten barium alloy
AIX-08:340277;EDB-78:016989; Ogneupory (OGNPA) (7):64-68 (Jul 1975)

SUBJECT DESCRIPTORS: ARGON;BARIUM ALLOYS: T1;BARIUM COMPOUNDS;CALCIUM COMPOUNDS: T2;CHEMICAL REACTIONS;CORROSION: Q2,Q3,Q4,Q5;CORROSIVE EFFECTS: Q1;CORUNDUM: T3;LIQUID METALS;MATERIALS TESTING;MICROHARDNESS;MICROSTRUCTURE;PHASE STUDIES;SPINELS: T4;TEMPERATURE DEPENDENCE;ZIRCONATES: T5

ABSTRACT: An investigation was made of the resistance to barium fusion of dense sintered refractors materials - corundum, magnesium clay spinel, magnesium oxide, and calcium and barium zirconates. The tests were made by the crucible method at 1,600$sup 0$C in an argon atmosphere. The refractory materials resist well to barium fusion. The presence of barium oxide reduces the resistance of corundum and spinel as a result of the formation of barium monoaluminate in equilibrium with the eutectic that fuses at 1,480$sup 0$C. Calcium zirconate in the presence of BaO becomes barium zirconate, which causes cracking of the samples. The most promising materials resistant to the fusion of barium and its

<628> CONT.
oxide are the solid refractories of pure magnesium oxide and barium zirconate.

EDB SUBJECT CATEGORY: EDB-360205
INIS CATEGORY: B23

<629>
Tovmas'yan, I.K.; Krasnova, O.M.; Bukhalova, G.A. (Rostovskij-na-Donu Pedagogicheskij Inst. (USSR))

Quarter mutual system of chlorides, bromides, iodides of sodium and rubidium EDB-76:036671; Zh. Neorg. Khim. (ZNOKA) 20:(1):254-256 (Jan 1975)

SUBJECT DESCRIPTORS: CHEMICAL REACTIONS;MELTING POINTS;MIXTURES;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6;SOLID SOLUTIONS;THERMAL ANALYSIS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<630>
Tovmas'yan, I.K.; Krasnova, O.M. (Rostovskij-na-Donu Pedagogicheskij Inst. (USSR))

Quaternary mutual system of chlorides, bromides, iodides of potassium and cesium EDB-76:048911; Zh. Neorg. Khim. (ZNOKA) 20:(4):1103-1105 (Apr 1975)

SUBJECT DESCRIPTORS: CESIUM BROMIDES: T2;CESIUM CHLORIDES: T1;CESIUM IODIDES: T3;CRYSTAL STRUCTURE;DIFFERENTIAL THERMAL ANALYSIS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6;POTASSIUM BROMIDES: T5;POTASSIUM CHLORIDES: T4;POTASSIUM IODIDES: T6

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<631>

<631>
Tovmas'yan, I.K.; Tsushba, T.M.

Sections of quaternary mutual system consisting of sodium, potassium and cesium chlorides and bromides EDB-76:036681; Zh. Neorg. Khim. (ZNOKA) 20:(2):513-515 (Feb 1975)

SUBJECT DESCRIPTORS: ALKALI METAL COMPOUNDS: T1;CESIUM BROMIDES;CESIUM CHLORIDES;CROSS SECTIONS;CRYSTALLIZATION;HALIDES: T2;PHASE DIAGRAMS: Q1,Q2;POTASSIUM BROMIDES;POTASSIUM CHLORIDES;SODIUM BROMIDES;SODIUM CHLORIDES;SOLID SOLUTIONS

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<632>
Trebeljahr, S. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)) ** Muenze, R. (ed.), Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)

Spectrophotometric determination of uranium in spent fuels of WWER-2 reactors In Annual report, 1975 ** AIX-07:272349;EDB-77:054177; (Aug 1975) ZfK--294

SUBJECT DESCRIPTORS: BURNUP;QUANTITATIVE CHEMICAL ANALYSIS: Q2;SPECTROPHOTOMETRY: T;SPENT FUEL ELEMENTS: T2,Q1;SPENT FUELS;URANIUM;URANIUM COMPLEXES;WWER-2 REACTOR: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-210200;440105;400104
INIS CATEGORY: B11

<633>
Tret'yakova, K.V.; Tyurin, V.I.; Nisel'son, L.A.

Systems of NbCl$sub 5$-GaCl$sub 3$ and TaCl$sub 5$-GaCl$sub 3$ AIX-07:277929;EDB-77:031094; Zh. Neorg. Khim. (ZNOKA) 21:(5):1310-1314 (May 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602;400201
INIS CATEGORY: B12

<634>
Tretyakov, Yu.D.; Kaul, A.R.; Makukhin, N.V.

Electrochemical study of high-temperature stability of compounds between the rare earths and copper oxide
INS-76:013209;EDB-76:042345; J. Solid State Chem. (JSSCB) 17:(1-2):183-189 (Feb 1976)

SUBJECT DESCRIPTORS: COPPER OXIDES: T1;CRYSTAL STRUCTURE: Q1,Q2,Q3;ELECTROCHEMISTRY;ELECTROLYTES;FORMATION FREE ENERGY;OXIDES: T3;RARE EARTH COMPOUNDS: T2;THERMODYNAMIC PROPERTIES;VERY HIGH TEMPERATURE;X-RAY DIFFRACTION

ABSTRACT: Equilibrium conditions for formation of the compounds CuLn$sub 2$O$sub 4$ (Ln = La, Nd, Sm, Eu, Gd) and Cu$sub 2$R$sub 2$O$sub 5$ (R = Tb, Dy, Er, Yb, Y, In) were studied in galvanic cells with solid electrolyte ZrO$sub 2$ (Y$sub 2$O$sub 3$) in the temperature range 950 to 1150$sup 0$C. The results, together with results of a study of the equilibrium CuO--Cu$sub 2$O, were used to calculate the $delta$G$sup 0$ of formation of the double oxides from CuO and the Ln$sub 2$O$sub 3$ (In$sub 2$O$sub 3$, Y$sub 2$O$sub 3$) as listed above. A decrease was found in the stability of the compounds CuLn$sub 2$O$sub 4$ relative to the initial oxides in the sequence La--Gd and an increase in the stability of Cu$sub 2$Ln$sub 2$O$sub 5$ in the sequence Tb--Yb. The results are discussed on the basis of special features of the crystalline structure of the compounds examined.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<635>
Troyanov, S.I.; Marek, G.S.; Tsirel'nikov, V.I. (Moskovskij Gosudarstvennyj Univ. (USSR))

Thermographic determination of formation heats of lower zirconium chlorides and bromides EDB-76:036718; Izv. Sib. Otd. Akad. Nauk SSSR, Ser. Khim. Nauk (IZSKA) (9):111-114 (Jul 1974)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION;DIFFERENTIAL THERMAL ANALYSIS;FORMATION HEAT: Q1,Q2;ZIRCONIUM BROMIDES: T1;ZIRCONIUM CHLORIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360603
INIS CATEGORY: B12

<636>

<636>
Trunin, A.S.; Bukhalova, G.A.; Petrova, D.G.; Garkushin, I.K.
(Kujbyshevskij Politekhnicheskij Inst. (USSR))

Thermal analysis of NaF, NaCl, NaMoO$sub 4$ system
AIX-08:298365;EDB-77:069128; Zh. Neorg. Khim. (ZNOKA)
21:(9):2506-2510 (Sep 1976)

SUBJECT DESCRIPTORS: CHEMICAL
COMPOSITION;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS:
Q1,Q2,Q3;EUTECTICS;MELTING POINTS;MIXTURES;MOLTEN
SALTS;MOLYBDATES: T1;PHASE DIAGRAMS;SODIUM CHLORIDES:
T2;SODIUM FLUORIDES: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<637>
Trunin, A.S.; Garkushin, I.K.; Vasil'chenko, L.M.

System Na$sub 2$WO$sub 4$-NaCl-CaWO$sub 4$-CaCl$sub 2$
AIX-08:337037;EDB-77:140954; Zh. Neorg. Khim. (ZNOKA)
22:(2):495-498 (Feb 1977)

SUBJECT DESCRIPTORS: CALCIUM CHLORIDES: T1;CALCIUM TUNGSTATES:
T2;CRYSTALLIZATION: Q1,Q2,Q3,Q4;EUTECTICS;MELTING
POINTS;PHASE DIAGRAMS;SODIUM CHLORIDES: T3;SODIUM TUNGSTATES:
T4

ABSTRACT: Using the methods of thermal analysis (DTA, VPM), the authors have investigated the liquidus of the triple mutual system Na, Ca long Cl, WO$sub 4$. The crystallization fields of the components and the compounds of congruent melting of composition NaClxNa$sub 2$WO$sub 4$ have been separated. The system Na, Ca long Cl, WO$sub 4$ is singular and is characterized by the presence of three triple eutectics: E$sub 1$=494$sup 0$C (degenerated eutectic), E$sub 2$=656$sup 0$C, E$sub 3$=627$sup 0$C.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<638>
Trunin, A.S.; Shter, G.E.; Kosmynin, A.S. (Kujbyshevskij Sel'skohozyajstvennyj Inst. (USSR); Kujbyshevskij Meditsinskij Inst. (USSR))

NaMoO$sub 4$--BaMoO$sub 4$--NaF--BaF system EDB-76:042600; Zh. Neorg. Khim. (ZNOKA) 20:(6):1647-1651 (Jun 1975)

SUBJECT DESCRIPTORS: BARIUM COMPOUNDS: T5;BARIUM FLUORIDES: T1;CHEMICAL COMPOSITION;CHEMICAL REACTIONS;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;MELTING;MOLYBDATES: T2;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;SODIUM COMPOUNDS: T4;SODIUM FLUORIDES: T3;SOLID SOLUTIONS;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<639>
Trunov, V.K. (Moskovskii Gosudarstvennyi Univ. (USSR))

Double potassium rare earth tungstates AIX-07:265110;EDB-77:013490; Zh. Neorg. Khim. (ZNOKA) 20:(7):1974-1978 (Jul 1975)

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;DIFFERENTIAL THERMAL ANALYSIS;ERBIUM COMPOUNDS: T5;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5;POTASSIUM TUNGSTATES: T1;PROMETHIUM COMPOUNDS: T3;RARE EARTH COMPOUNDS;TERBIUM COMPOUNDS: T4;TUNGSTATES: T2;X-RAY DIFFRACTION

ABSTRACT: By roentgenophase and differential-thermal analysis phase diagrams of the potassium tungstates-tungstates r.e.e. (for Pm, Tb, Er) system was studied. On the basis of published and this study data the question of changing properties of double potassium tungstate in the rare earth elements series is discussed.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<640>

<640>
Tsushba, T.M.; Tovmas'yan, I.B.; Krasnova, O.M.
(Rostovskij-na-Donu Pedagogicheskij Inst. (USSR))

Quaternary mutual system of chlorides, bromides, iodides of rubidium and cesium EDB-76:048912; Zh. Neorg. Khim. (ZNOKA) 20:(5):1376-1377 (May 1975)

SUBJECT DESCRIPTORS: CESIUM BROMIDES: T1;CESIUM CHLORIDES: T2;CESIUM IODIDES: T3;DIFFERENTIAL THERMAL ANALYSIS;PHASE DIAGRAMS: Q1,Q2,Q3,Q4,Q5,Q6;RUBIDIUM BROMIDES: T6;RUBIDIUM CHLORIDES: T4;RUBIDIUM IODIDES: T5;SOLID SOLUTIONS;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<641>
Tsvigunov, A.; Polunina, G.P.; Kovba, L.M.; Impolitova, I.A. **
AN SSSR, Sverdlovsk. Inst. Khimii; Vostochnyj Nauchno-Issledovatel'skij i Proektnyj Inst. Ogneupornoj Promyshlennosti, Sverdlovsk (USSR); Ural'skij Nauchno-Issledovatel'skij Khimicheskij Inst., Sverdlovsk (USSR)

Phases of high pressure in UO$sub 2$-UO$sub 3$-PbO system In Summaries of reports of the all-union meeting on solid body chemistry. 3--5 June 1975. III. Synthesis, phase equilibrium and use of solid oxide compounds **
AIX-08:289418;EDB-77:074781; (1975) INIS-mf--3246

SUBJECT DESCRIPTORS: ALLOY SYSTEMS;CRYSTAL STRUCTURE;HIGH PRESSURE;HIGH TEMPERATURE;LATTICE PARAMETERS;LEAD OXIDES: T1;PHASE STUDIES: Q1,Q2,Q3;PHASE TRANSFORMATIONS;URANIUM DIOXIDE: T3;URANIUM TRIOXIDE: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B13

<642>
Twidwell, L.G.

Thermodynamic properties of sulphur in liquid antimony
EDB-77:107253; Inst. Min. Metall., Trans., Sect. C (TMEMA) 85::C52-C54 (Mar 1976)

SUBJECT DESCRIPTORS: ANTIMONY: T3;HIGH TEMPERATURE;LIQUID METALS;PHASE STUDIES;SOLVENT PROPERTIES: Q3;SULFUR: T1;THERMODYNAMIC PROPERTIES: Q1

ABSTRACT: The thermodynamic activity of sulphur in liquid antimony was determined over the temperature range 640--750$sup 0$C. This study is a part of a series of investigations to determine the thermodynamic properties of sulphur in liquid metallic solutions.

EDB SUBJECT CATEGORY: EDB-360603

<643>
Tyagunov, G.V.; Baum, B.A.; Kushnir, M.N.; Khasin, G.A.; Ermanovich, N.A.

Influenence of the technology of the alloy fabrication on its properties in a liquid state EDB-76:036326; Fiz. Khim. Obrab. Mater. (FKOMA) (1):48-50 (Jan 1975)

SUBJECT DESCRIPTORS: CORRELATIONS;CRYSTALLIZATION;ELECTRIC CONDUCTIVITY;ELONGATION;HYSTERESIS;LIQUID METALS;MECHANICAL PROPERTIES: Q1;MELTING POINTS;PHYSICAL PROPERTIES: Q1;PLASTICITY;SMELTING;STEELS: T1;TEMPERATURE DEPENDENCE;THERMAL CONDUCTIVITY;VACUUM MELTING;VISCOSITY;YIELD STRENGTH

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360103;360104
INIS CATEGORY: B21

<644>
Ugajin, M.

Thermodynamic activity of carbon in molybdenum-containing uranium carbide EDB-77:005578; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 12:(6):381-384 (Jun 1975)

SUBJECT DESCRIPTORS: CARBON;COMPATIBILITY: Q1,Q2,Q3,Q4;FAST REACTORS;FREE ENTHALPY;FUEL-CLADDING INTERACTIONS;MOLYBDENUM: T3;PHASE DIAGRAMS;PHASE STUDIES;PLUTONIUM CARBIDES: T2;STAINLESS STEELS: T4;THERMODYNAMIC PROPERTIES;URANIUM CARBIDES: T1

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<644> CONT.

ABSTRACT: The carbides UC and (U, Pu)C are promising fuel materials for fast reactors. The problem involved in their utilization is that the stainless steel used in the cladding tends to pick up carbon from the fuel, and this carburization of the steel may eventually undermine the intrinsic utility of these compounds. Calculations predict that molybdenum-stabilized carbide fuel is thermodynamically compatible with austenitic stainless steel cladding. 8 refs.

EDB SUBJECT CATEGORY: EDB-050700;360105

<645>

Ugajin, M., Japan Atomic Energy Research Inst., Tokyo

In Phase equilibrium study on system uranium-plutonium-tungsten-carbon **
AIX-08:315114;EDB-77:113695; (Nov 1976) JAERI-M--6804

SUBJECT DESCRIPTORS: FORMATION FREE ENERGY;METALLURGICAL EFFECTS: Q3;PHASE DIAGRAMS;PHASE STUDIES;PHASE TRANSFORMATIONS: Q1,Q2;PLUTONIUM CARBIDES: T2;QUATERNARY ALLOY SYSTEMS;SEGREGATION;SOLUTION HEAT;TERNARY ALLOY SYSTEMS;THERMAL EQUILIBRIUM;TUNGSTEN: T3;TUNGSTEN ADDITIONS;URANIUM CARBIDES: T1

ABSTRACT: Metallurgical properties of the U-Pu-W-C system have been studied with emphasis on phases and reactions. Free energy of compound formation, carbon activity and U/Pu segregation in the W-doped carbide fuel are estimated using phase diagram data. The results indicate that tungsten metal is useful as a thermochemical stabilizer of the carbide fuel. Tungsten has high temperature stability in contact with uranium carbide and mixed uranium-plutonium carbide.

EDB SUBJECT CATEGORY: EDB-360202;050700
INIS CATEGORY: B23

<646>

Ugajin, M.; Abe, J.; Kurihara, M.

Phase behavior and thermodynamics of U--Mo--C system
EDB-77:013203; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 12:(9):560-566 (Sep 1975)

SUBJECT DESCRIPTORS: CARBIDES: M5;CARBON;CARBON COMPOUNDS: M3;CHEMICAL REACTION KINETICS;CHEMICAL REACTIONS;CRYSTAL STRUCTURE;EQUATIONS;EQUILIBRIUM;FORMATION FREE ENERGY: Q4,Q5;MOLYBDENUM;MOLYBDENUM ALLOYS: M1;PHASE DIAGRAMS;PHASE STUDIES: Q1,Q2,Q3;PHASE TRANSFORMATIONS;THERMODYNAMIC PROPERTIES: Q4,Q5;THERMODYNAMICS;URANIUM;URANIUM ALLOYS:

<646> CONT.
M2;URANIUM CARBIDES: M4

ABSTRACT: The U-Mo-C system has been studied to supplement the hitherto available phase-diagram data and to deduje therefrom the thermodynamic property of UMoC$sub 1$ $sub 7$ and UMoC$sub 2$. It is shown that a peritectic four-phase in equilibrium reaction takes place : UC+Mo $Yields$ UMoC$sub 1$ $sub 7$ + liquid, at 1,830 +- 30$sup 0$C. The phase relations between orthorhombic UMoC$sub 2$ and monoclinic UMoC$sub 1$ $sub 7$ may be defined by the in equilibrium reaction UMoC$sub 1$ $sub 7$UMoC$sub 2$ + liquid, which will occur at some temperature between 2,200$sup 0$ and 2,350$sup 0$C, the reported melting point of UMoC$sub 2$. Liquidus projection for the U-Mo-C system is presented on the basis of these results and from data found in literature. 26 refs.

EDB SUBJECT CATEGORY: EDB-360202;050700

<647>
Ugajin, M.; Abe, J.; Kurihara, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment)

Phase behavior and thermodynamics of U--Mo--C system
AIX-07:262737;EDB-77:018944; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 12:(9):560-566 (Sep 1975)

SUBJECT DESCRIPTORS: ENTROPY;FORMATION FREE ENERGY;MOLYBDENUM CARBIDES: T1;ORTHORHOMBIC LATTICES;PHASE DIAGRAMS;PHASE STUDIES: Q1,Q2;THERMODYNAMICS;URANIUM CARBIDES: T2;VERY HIGH TEMPERATURE

ABSTRACT: The U-Mo-C system has been studied to supplement the hitherto available phase-diagram data and to deduce therefrom the thermodynamic property of UMoCsub(1.7) and UMoC$sub 2$. It is shown that a peritectic four-phase reaction takes place: UC+Mo reversible UMoCsub(1.7)+liquid, at 1,830$sup 0$+-30$sup 0$C. The phase relations between orthorhombic UMoC$sub 2$ and monoclinic UMoCsub(1.7) may be defined by UMoCsub(1.7) reversible UMoC$sub 2$+liquid, which will occur at some temperature between 2,200$sup 0$ and 2,350$sup 0$C, the reported melting point of UMoC$sub 2$. Liquidus projection for the U-Mo-C system is presented on the basis of these results and from data found in literature. The free energy equations for the formation of UMoCsub(1.7) and UMoC$sub 2$ are respectively estimated to be $delta$Gsub(f)$sup 0$(UMoCsub(1.7))=-40,350-0.69T cal/mol and

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<648> CONT.
$delta$Gsub(f)$sup 0$(UMoC$sub 2$)=-46,360-0.69T cal/mol, both in the temperature range 298--2,100 K.

EDB SUBJECT CATEGORY: EDB-360202;360204
INIS CATEGORY: B23

<648>
Ugajin, M.; Abe, J.; Suzuki, Y.; Takahashi, I.; Kurihara, M. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment)

Phase equilibria in system U--Pu--W--C
AIX-08:289684;ERA-02:025072;EDB-77:055683; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 13:(1):36-39 (Jan 1976)

SUBJECT DESCRIPTORS: COMPATIBILITY;EQUILIBRIUM;PHASE DIAGRAMS: Q1,Q2,Q3;PHASE STUDIES;PLUTONIUM CARBIDES: T1;QUATERNARY ALLOY SYSTEMS;TUNGSTEN CARBIDES: T2;URANIUM CARBIDES: T3;VERY HIGH TEMPERATURE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202;050700
INIS CATEGORY: B23

<649>
Ugajin, M.; Takahashi, I.

In Process for preparing uranium carbonitride **
AIX-07:259850;ERA-02:012466;EDB-77:016966; (5 Sep 1969)

SUBJECT DESCRIPTORS:
CONTAINERS;EMBRITTLEMENT;GRAPHITE;MOLYBDENUM;NITROGEN;NUCLEAR FUELS;PHASE DIAGRAMS;PRODUCTION: Q1,Q2;SOLID SOLUTIONS;TUNGSTEN;URANIUM;URANIUM CARBIDES: M1;URANIUM COMPOUNDS;URANIUM NITRIDES: M2

ABSTRACT: In the conventional production of uranium carbonitride UCsub(x)Nsub(y) (x+y=1, x not equal 0, y not equal 0) as a reactor fuel, the partial pressure of N$sub 2$ must be strictly controlled in order to prevent the formation of UC$sub 2$ which carburizes the stainless steel-made container to make it fragile. Herein provided is a new process for preparing UCsub(x)Nsub(y) in which the partial pressure of N$sub 2$ may be arbitrary. The process comprises fusing uranium carbide or a mixture of metallic uranium and graphite (the atomic ratio U:C=1:0.76 to 0.94) in the presence of metallic W or Mo and N$sub 2$ gas (0.02 to 1.2 atm). The W or Mo reacts with the formed UC$sub 2$ to convert it to harmless UWC$sub 2$ or UMoC$sub 2$. The minimum quantity of W or Mo to

<649> CONT.
be added can be predicted by referring to a U-C-W (or Mo)-N quaternary phase diagram (given in the specification), so far as the quantities of U and C and the partial pressure of N$sub 2$ are known. In one example, metallic uranium (1 mole), graphite (0.89 mole) and metallic W (0.07) were fused in an atmosphere of N$sub 2$+Ar (total pressure 0.7 atm, N$sub 2$ 0.45 atm) in a vacuum arc furnace (15 to 20 V, 90 to 250A) for about 2 minutes. This was repeated 7 times to yield 93.4% by mole of UCsub(0.82)Nsub(0.18) together with 6.6% by mole of UWC$sub 2$.

EDB SUBJECT CATEGORY: EDB-050700;360201
INIS CATEGORY: B23

<650>
Ugajin, Mitsuhiro (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment)

Thermodynamic activity of carbon in molybdenum-containing uranium carbide AIX-07:267905;EDB-77:007636; J. Nucl. Sci. Technol. (Tokyo) (JNSTA) 12:(6):381-384 (Jun 1975)

SUBJECT DESCRIPTORS: CARBON: T1;CHEMICAL REACTION KINETICS: Q1,Q2;COMPATIBILITY;CRYSTAL-PHASE TRANSFORMATIONS;FREE ENERGY;FUEL-CLADDING INTERACTIONS;MOLYBDENUM CARBIDES;STAINLESS STEELS;TERNARY ALLOY SYSTEMS;URANIUM CARBIDES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B16

<651>
Ukanwa, A.O.

In Diffusion in liquid metal systems. Final report ** ERA-02:010434;INS-77:001229;EDB-77:013073; (Jun 1975) N--76-10302

SUBJECT DESCRIPTORS: DATA COMPILATION;DENSITY;DIFFUSION: Q2,Q3;ELECTRIC CONDUCTIVITY;GALLIUM ALLOYS: A3;HEAT TRANSFER;INDIUM ALLOYS: A2;LIQUID METALS: A1;PHYSICAL PROPERTIES;REVIEWS: Q1;SAFETY;SPECIFIC HEAT;TABLES;THERMAL CONDUCTIVITY

ABSTRACT: Physical properties of twenty liquid metals are reported; some of the data on such liquid metal properties as density, electrical resistivity, thermal conductivity, and heat capacity are summarized in graphical form. Data on

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<651> CONT.
laboratory handling and safety procedure are summarized for each metal; heat-transfer-correlations for liquid metals under various conditions of laminar and turbulent flow are included. Where sufficient data were available, temperature equations of properties were obtained by the method of least-squares fit. All values of properties given are valid in the given liquid phase ranges only. Additional tabular data on some 40 metals are reported in the appendix. Included is a brief description of experiments that were performed to investigate diffusion in liquid indium-gallium systems. (Author) (GRA)

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<652>
Ullmann, H.; Lang, H.J.; Nebelung, C. (Zentralinstitut fuer Kernforschung, Rossendorf bei Dresden (German Democratic Republic)) ** Muenze, R. (ed.)

Investigations on chemical properties of thorium oxide solid electrolyte ceramics In Annual report, 1976 **
AIX-08:324308;EDB-78:009583; (Jul 1976) ZfK--312

SUBJECT DESCRIPTORS: CERAMICS;CHEMICAL PROPERTIES: Q1;ELECTROCHEMICAL CORROSION;ELECTROLYTES;ELECTROLYTIC CELLS;ELECTROMOTIVE FORCE;IMPURITIES;SODIUM;THORIUM OXIDES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360204;400201
INIS CATEGORY: B23

<653>
Uzuki, K., Tohoku Univ., Sendai (Japan). Research Inst. for Iron, Steel and Other Metals

In Structural study of liquids with strong short-range correlation in the atomic distribution **
AIX-07:264041;EDB-77:040110; (1976) AED-Conf--76-087-011

SUBJECT DESCRIPTORS: AMORPHOUS STATE: T1;ATOMIC MODELS;BOND LENGTHS;COMPARATIVE EVALUATIONS;CORRELATIONS;CRYSTAL STRUCTURE: Q1,Q2;DIAGRAMS;DISTRIBUTION;INTERACTION RANGE;LIQUID METALS;LIQUIDS: T2;MOLECULAR STRUCTURE;NEUTRON DIFFRACTION;PALLADIUM ALLOYS;QUANTITY RATIO;SELENIUM;SILICON ALLOYS;TIME-OF-FLIGHT METHOD;X-RAY DIFFRACTION

ABSTRACT: Structure factors of liquids and amorphous solids having a relatively high degree of ordering in their

<653> CONT.
short-range structures have been measured over a wide range of scattering vectors by means of the T-O-F neutron diffraction using epithermal pulsed neutrons generated by an electron linear accelerator. It has been shown in the case of liquid CS$sub 2$ that the size and shape of a molecule existing in the liquid phase are determined from the behaviour of the structure factor in the range of high scattering vectors, and that the structure factor in the region of low scattering vectors informs on inter-molecular orientational and center-center correlations in the liquid state. Moreover, based on highly resoluted radial distribution functions, a free rotating chain model has been discussed for chain molecules contained in liquid Se, and a splitting of the nearest neighbour Pd-Pd and Pd-Si correlation has been clearly found in the amorphous Pdsub(0.8) - Sisub(0.2) alloy.

EDB SUBJECT CATEGORY: EDB-656000
INIS CATEGORY: A13

<654>
Vahed, A.; Kay, D.A.R.

Deoxidation thermodynamics of cerium and lanthanum in liquid iron EDB-76:087291; Metall. Trans., B (MTTBC) 6B:(1):285-287 (Mar 1975)

SUBJECT DESCRIPTORS: CERIUM OXIDES: T2;FREE ENERGY;IRON ALLOYS;LANTHANUM OXIDES: T1;LIQUID METALS;PHASE DIAGRAMS;REDUCTION: Q1,Q2;THERMODYNAMICS;VERY HIGH TEMPERATURE

ABSTRACT: The deoxidation thermodynamics of the Fe-Ce-O and Fe-La-O systems are estimated by combining the free energies of solution of cerium and lanthanum in iron, obtained from the respective phase diagrams, with the standard free energies of formation of cerium and lanthanum oxides given in the literature. Values for the deoxidation constants (w/o Ce)$sup 2$. (w/o O)$sup 3$ and (w/o La)$sup 2$. (w/o O)$sup 3$ of about 1 x 10$sup -20$ are predicted at steelmaking temperatures. These predicted values are much lower than those obtained experimentally. It is suggested that refractory interactions, and sampling and analytical difficulties, in both laboratory and industrial determinations of these deoxidation constants, lead to erroneously high results.

EDB SUBJECT CATEGORY: EDB-360202;360105

<655>

<655>
Vaidya, V.N.; Prasad, R.; Venugopal, V.; Iyer, P.N.; Sood, D.D.; Ramaniah, M.V., Bhabha Atomic Research Centre, Bombay (India)

In Molten salt chemistry : Part IV - Solubility behaviour of PuF$sub 3$ in fluoride salts of interest in molten salt reactor technology ** AIX-08:289419;EDB-77:075232; (1976) BARC--854

ABSTRACT: Solubility of PuF$sub 3$ in eight ternary mixtures containing LiF, BeF$sub 2$ and ThF$sub 4$ and in four binary mixtures containing LiF and ThF$sub 4$ has been studied in the temperature range 510-787 deg C. From the observed solubility data, an attempt has been made to correlate the solubility of PuF$sub 3$ at a particular temperature as a function of composition of salt melts. Activity coefficients of PuF$sub 3$ in various fluoride mixtures using liquid PuF$sub 3$ as standard state, partial molal heat of mixing and excess partial molal entropy of mixing liquid PuF$sub 3$ have also been calculated from the solubility data. These thermodynamic data indicate that PuF$sub 3$ interacts with the melts, the interaction being higher for less ordered melts. It is concluded that PuF$sub 3$ is sufficiently soluble and stable in fluoride melts of interest, making it a suitable fuel for molten salt reactors of breeder or converter type.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<656>
Van Uitert, L.G.; Guggenheim, H.J.; O'Bryan, H.M.; Warner, A.W. Jr.; Brownlow, D.; Bernstein, J.L.; Pasteur, G.A.; Johnson, L.F.

Physical properties of thorium fluoride
INS-76:023005;EDB-76:097986; Mater. Res. Bull. (MRBUA) 11:(6):669-671 (Jun 1976)

SUBJECT DESCRIPTORS: CRYSTAL STRUCTURE;DIELECTRIC PROPERTIES;HARDNESS;MONOCRYSTALS;OPTICAL PROPERTIES;PHYSICAL PROPERTIES: Q1;THERMAL EXPANSION;THORIUM FLUORIDES: T1

ABSTRACT: Thorium fluoride has many properties that make it of interest for infrared windows. It is transparent to about eleven microns, is unaffected by moisture, has a moderate hardness, and suffers little dimensional change upon heating.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<657>
Varfolomeev, M.B.; Sotnikova, M.N.; Chibirova, F.Kh.; Shpinel, V.S. (Moskovskij Inst. Tonkoj Khimicheskoj Tekhnologii (USSR)

Some structure differences of double oxides of indium and gallium with antimony(5) EDB-76:048832; Zh. Neorg. Khim. (ZNOKA) 20:(5):1163-1166 (May 1975)

SUBJECT DESCRIPTORS: ANTIMONY OXIDES: T1;CRYSTAL STRUCTURE: Q1,Q2,Q3;CRYSTAL-PHASE TRANSFORMATIONS;MOESSBAUER EFFECT;SPECTRA;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B12

<658>
Vasil'eva, I.A.; Sukhushina, I.S.; Granovskaya, Zh.V.; Balabaeva, R.F.; Maicrova, A.F. (Moskovskij Gosudarstvennyj Univ. (USSR))

Thermodynamic properties of NbO, Fesub(0,95)O, CoO, NiO, Cu$sub 2$O and CuO oxides as comparative electrodes in electromotive forces method AIX-08:317802;EDB-77:120476; Zh. Fiz. Khim. (ZFKHA) 49:(9):2169-2174 (Sep 1975)

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;ELECTRODES;ELECTROLYTES;ELECTROMOTIVE FORCE;NIOBIUM;NIOBIUM OXIDES: T1;THERMODYNAMIC PROPERTIES: Q1;THORIUM OXIDES;VERY HIGH TEMPERATURE

ABSTRACT: On the basis of critical analysis and statistical treatment of literature data on thermodynamic properties of oxides FeO, NiO and CoO, the values of $delta$Hsub(O$sub 2$)sup(0), $delta$Ssub(O$sub 2$)sup(0) and the dependences $delta$Gsub(O$sub 2$)sup(0)(T) with corresponding errors have been calculated in the range 1000-1400 K. For oxides NbO, Cu$sub 2$O and CuO, for which the literature data are not reliable enough, the above thermodynamic functions are determined experimentally by the solid electrolyte e.m.f. method. A mixture Nb+NbO has been used as a reference electrode with a thorium dioxide base solid electrolyte to determine the thermodynamic properties of NbO. A convenient method of combination of the dependences $delta$Gsub(O$sub 2$)sup(0)(T)+-sigma(T) for different electrodes is proposed

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<659> CONT.
which can be used in the course of treatment of experimental data obtained by the e.m.f. method.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B12

<659>
Vasil'kova, I.V.; Efimov, A.I.; Ryazantseva, L.V.

Interaction in AgCl-CsCl, CsCl-KCl systems and liquidus surface of AgCl-CsCl-KCl ternary system AIX-08:295418;EDB-77:056191; Vestn. Leningr. Univ., Fiz., Khim. (VLUFB) 10:(2):144-147 (May 1976)

SUBJECT DESCRIPTORS: CESIUM CHLORIDES: T1;CHEMICAL COMPOSITION;CRYSTALLIZATION;DIFFERENTIAL THERMAL ANALYSIS;EUTECTICS;MELTING POINTS;MOLTEN SALTS;PHASE DIAGRAMS;PHASE STUDIES: Q1,Q2,Q3;POTASSIUM CHLORIDES: T2;SILVER CHLORIDES: T3;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<660>
Vasudeva Rao, P.R.; Patil, S.K., Bhabha Atomic Research Centre, Bombay (India)

In Spectrophotometric method for the determination of neptunium and plutonium in process solutions **
AIX-07:274807;ERA-02:027122;EDB-77:056017; (1976) BARC--842

SUBJECT DESCRIPTORS:
ARSENAZO;BIBLIOGRAPHIES;CALIBRATION;NEPTUNIUM: T1;NEPTUNIUM COMPLEXES;PLUTONIUM: T2;PLUTONIUM COMPLEXES;SOLUTIONS;SOLVENT EXTRACTION;SPECTROPHOTOMETRY: Q1,Q2;TTA;ZIRCONIUM

ABSTRACT: A method is described for the determination of neptunium and plutonium in process solutions. This involves the separation of these elements followed by their spectrophotometric determinations as Arsenazo III complexes. Neptunium(IV) and plutonium(IV) are separated using TTA extraction method, and the separated Np(IV) and Pu(IV) are then determined as their Arsenzo III complexes in 5 M HNO$sub 3$. A few solutions from the reprocessing plant at Trombay are analyzed for plutonium using this method and the results were compared with those obtained by the radiometric method.

<660> CONT.
An attempt was made to use Arsenazo III to determine uranium in the plant solutions.

EDB SUBJECT CATEGORY: EDB-400104;050800
INIS CATEGORY: B11

<661>
Vatolin, N.A.; Ukhov, V.F.; Pastukhov, Eh.A.; Gel'chinskij, B.R.; Esin, O.A.

Investigation of particles interaction in liquid metals and alloys EDB-76:036470; Izv. Akad. Nauk SSSR, Met. (IZNMA) (1):45-49 (Jan 1975)

SUBJECT DESCRIPTORS: BOLTZMANN EQUATION;CORRELATION FUNCTIONS;DISTRIBUTION FUNCTIONS;INTERATOMIC DISTANCES;IRON ALLOYS: T1;LIQUID METALS;NICKEL ALLOYS: T2;PARTICLE INTERACTIONS;PERCUS-YEVICK EQUATION;SILICON ALLOYS: T3;STRUCTURAL CHEMICAL ANALYSIS;THERMODYNAMIC MODEL;THERMODYNAMIC PROPERTIES: Q1,Q2,Q3;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<662>
Veal, B.W.; Lam, D.J.; Hoekstra, H.R.; Diamond, H.; Carnall, W.T., Argonne National Lab., Ill. (USA)

In XPS studies of actinide materials **
ERA-02:030285;INS-77:008094;EDB-77:068590; ([nd])
CONF-760956--4

SUBJECT DESCRIPTORS: ACTINIDES: M14;AMERICIUM OXIDES: M11;BAND THEORY;BERKELIUM OXIDES: M13;CALIFORNIUM OXIDES: M8;CRYSTAL FIELD;CURIUM OXIDES: M12;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14;EMISSION SPECTRA;ENERGY LEVELS;NEPTUNIUM OXIDES: M5;PHOTOEMISSION;PLUTONIUM OXIDES: M10;REVIEWS;THORIUM: M2;THORIUM OXIDES: M1;TRANSURANIUM ELEMENTS: M4;URANIUM: M6;URANIUM COMPOUNDS: M7;URANIUM OXIDES: M9;URANIUM-ALPHA: M3;X-RAY SPECTRA

ABSTRACT: Applications of x-ray photoemission spectroscopy (XPS) to the study of actinide materials are reviewed. Examples discussed here include the band structures of thorium and uranium metal, the multiplet structure associated with the 5f electron states in oxides of the transuranium elements, the test for temporal configurations in NpO$sub 2$, crystal field

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<662> CONT.
splitting of the U 6p/sub $sup 3$/$sub 2$/ level in a series of uranyl compounds, mixed oxidation states in Cf$sub 7$O$sub 12$, and a test for the participation of 5f electrons in bonding in a series of uranium compounds.

EDB SUBJECT CATEGORY: EDB-360106;360206
INIS CATEGORY: B25

<663>
Veleckis, E.; Maroni, V.A. ** Watson, J.S.; Wiffen, F.W.; Bishop, J.L.; Breeden, B.K. (eds.), Oak Ridge National Lab., Tenn. (USA)

Thermodynamic properties of solutions of hydrogen isotopes in metals and alloys of interest to fusion reactor technology In Radiation effects and tritium technology for fusion reactors ** ERA-02:022938;INS-77:005755;EDB-77:043997; (Mar 1976) CONF-750989--P3

SUBJECT DESCRIPTORS: ALUMINIUM HYDRIDES: T4;DEUTERIUM: T5;HYDROGEN: T6;ISOTOPE EFFECTS: Q5;LIQUID METALS;LITHIUM: T3;LITHIUM DEUTERIDES: T2;LITHIUM HYDRIDES: T1;SOLUBILITY: Q2,Q3;SOLVENT PROPERTIES: Q1,Q4,Q6;THERMONUCLEAR REACTOR MATERIALS

ABSTRACT: Recent ANL work on the solution thermodynamics of systems composed of a hydrogen isotope and either pure lithium or a lithium-containing alloy has been directed toward (1) the sources and magnitude of isotope effects in the systems Li--LiH and Li--LiD, (2) the solubility of LiD in liquid lithium (200 to 700$sup 0$C), and (3) the solubility and decomposition pressure of hydrogen in the ternary Li--Al--H system. The H/D isotope effect appears to originate primarily in the gas phase and within the two-phase regions of the phase diagram, its range of values is 1.43 +- 0.05. At 200$sup 0$C, the solubility of LiD in lithium is approximately 250 appM D, thus essentially ruling out hydrogen isotope separation methods based on cold-trapping concepts. Two isotherms (at 550 and 599$sup 0$C) have been obtained for solutions of hydrogen in the $beta$-phase of the Li--Al system (48 to 56 mol % Li). They indicate that, at low hydrogen concentrations (<1 atom % H), the dissociation pressures are much higher (x100) than those over the lithium metal. Within the miscibility gap, which extends from 6 to 33.3 atom % D, the plateau pressures, P, may be represented by ln P (torr) = 20.46 to 11,600 T$sup -1$.

EDB SUBJECT CATEGORY: EDB-360603;700209;400203
INIS CATEGORY: B24;A14;B12

<664>
Vinogradov, E.E.; Kirilenko, I.A.; Krasilov, Yu.I.; Solokha, A.F. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Structure of Nd$sup 3+$ terms in nitrate glasses
AIX-08:283412;EDB-77:036910; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 11:(8):1501-1505 (Aug 1975)

SUBJECT DESCRIPTORS: CATIONS;ENERGY LEVELS: Q1,Q2,Q3;GLASS;LUMINESCENCE;MAGNESIUM NITRATES: T1;NEODYMIUM NITRATES: T2;SODIUM NITRATES: T3;SPECTRA;STARK EFFECT

ABSTRACT: The structure of the neodymium energy levels in nitrate glasses and crystals has been studied. In these matrices an activator has a highly-symmetrical identical surroundings conditioned by the existence of weakly distorted neodymium-nitrate complexes. Great amounts of water and hydroxyl present in the matrix cause deactivation of the neodymium excited state.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<665>
Vinogradov, E.E.; Kirilenko, I.A. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Constitution equilibrium diagram of the LiNO$sub 3$-LiIO$sub 3$, NaNO$sub 3$-NaIO$sub 3$, KNO$sub 3$-KIO$sub 3$ system
AIX-08:289374;EDB-77:050852; (ZNOKAZh. Neorg. Khim.) 21:(4):1157-1159 (Apr 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<666>
Vinogradov, E.E.; Kirilenko, I.A.

Glass formation in nitrate systems containing rare earth ions
AIX-08:289375;EDB-77:050853; (ZNOKAZh. Neorg. Khim.) 21:(4):1130-1132 (Apr 1976)

SUBJECT DESCRIPTORS: DIFFERENTIAL THERMAL ANALYSIS;GLASS;MAGNESIUM NITRATES: T1;PHASE DIAGRAMS: Q1,Q2,Q3;RARE EARTH COMPOUNDS: T2;SODIUM NITRATES: T3;VITRIFICATION

<666>

<666> CONT.
ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<667>
Vinogradov, E.E.; Kirilenko, I.A. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Phase diagram of NaNO$sub 3$--Nd(NO$sub 3$)$sub 3$ system
AIX-08:295420;EDB-77:056239; Zh. Neorg. Khim. (ZNOKA) 21:(7):1986-1987 (Jul 1976)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION;HIGH TEMPERATURE;NEODYMIUM NITRATES: T1;PHASE DIAGRAMS: Q1,Q2;QUANTITY RATIO;SODIUM NITRATES: T2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<668>
Vinogradov, E.E.; Kirilenko, I.A. (AN SSSR, Moscow. Inst. Obshchej i Neorganicheskoj Khimii)

Phase diagrams of the Mg(NO$sub 3$)$sub 2$-Nd(NO$sub 3$)$sub 3$ system AIX-08:337041;EDB-77:140956; Zh. Neorg. Khim. (ZNOKA) 22:(2):583-585 (Feb 1977)

SUBJECT DESCRIPTORS: EUTECTICS;MAGNESIUM NITRATES: T1;MELTING POINTS;NEODYMIUM NITRATES: T2;PHASE DIAGRAMS: Q1,Q2

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<669>
Visser, R.G.; Schiavi, W.F.; Berard, M.F.

Interdiffusion in the CaF$sub 2$--YF$sub 3$ system
ERA-01:016754;EDB-76:042456; J. Am. Ceram. Soc. (JACTA) 58:(9-10):438-441 (1975)

SUBJECT DESCRIPTORS: CALCIUM FLUORIDES: T1;DEFECTS;DIFFUSION: Q1,Q2;ELECTRON PROBES;SOLUBILITY;TEMPERATURE DEPENDENCE;VERY HIGH TEMPERATURE;YTTRIUM FLUORIDES: T2

<669> CONT.

ABSTRACT: An electron microprobe interdiffusion study was made in single crystals between 1200 and 1331$sup 0$C over the solid-solution compositional range 0 to 20 mol percent YF$sub 3$ in CaF$sub 2$. At constant temperature, the value tilde D, the interdiffusion coefficient, increased approximately exponentially with increasing YF$sub 3$ content. As YF$sub 3$ content increased, the temperature dependence of tilde D decreased. Extrapolation of tilde D to 0 percent YF$sub 3$ combined with consideration of the defect formation mechanism at infinite dilution allowed estimation of the impurity diffusion coefficient for Y in essentially pure CaF$sub 2$.

EDB SUBJECT CATEGORY: EDB-360603

<670>

Viting, L.M.; Gorbovskaya, G.P. (Moskovskii Gosudarstvennyi Univ. (USSR))

Estimate of cryoscopic calculations accuracy from fusibility diagrams AIX-08:280706;EDB-77:031069; Izv. Akad. Nauk SSSR, Neorg. Mater. (IVNMA) 11:(7):1237-1240 (Jul 1975)

ABSTRACT: The melting points of some lead and zinc salts, that can be used as solvents for ferrites in systems: PbMoO$sub 4$-MgFe$sub 2$O$sub 4$, Zn$sub 2$V$sub 2$O$sub 7$-NiFe$sub 2$C$sub 4$, Pb$sub 3$(VO$sub 4$)$sub 2$-MgFe$sub 2$O$sub 4$, have been calculated in accordance with the hypothetical mechanism of the solvent dissociation. The accuracy of cryoscopic calculations based on melting point curves is evaluated. Cryoscopic calculations permit to determin the solvent activity with the accuracy of +-0.3% and the heat of its fusion, with the accuracy of +-3%. The comparison of the calculated and experimental values of the entropy of melting, as well as calculated and experimental values of the cryoscopic constant elucidates the mechanism of dissociation of both the dissolved compound and the solvent.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: B12

<671>

Vivchar, O.I.; Zarechnyuk, O.S. (L'vovskij Gosudarstvennyj Univ. (Ukrainian SSR)) ** Ministerstvo Vysshego i Srednego Spetsial'nogo Obrazovaniya SSSR, Moscow; L'vovskij Gosudarstvennyj Univ. (Ukrainian SSR)

Compounds with the structure of ThMn$sub 12$ type in the R--Fe--Al systems In 2. all-union conference on crystallochemistry of intermetallic compounds ** AIX-07:275147;EDB-77:050198; (1974) INIS-mf--3191

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<671> CONT.
SUBJECT DESCRIPTORS: ALKALI METALS: M4;ALUMINIUM ALLOYS: M1;INTERMETALLIC COMPOUNDS;IRON ALLOYS: M2;LATTICE PARAMETERS: Q1,Q2,Q3,Q4;RARE EARTH ALLOYS: M3;TERNARY ALLOY SYSTEMS;TETRAGONAL LATTICES;X-RAY DIFFRACTION

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<672>
Volkov, S.V. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Isorhodanide complexes of 3d-metal ions in molten salts
AIX-08:286214;EDB-77:044310; Koord. Khim. (KOKHD) 2:(8):1106-1109 (Aug 1976)

SUBJECT DESCRIPTORS: CHEMICAL BONDS;ELECTRONIC STRUCTURE;MOLTEN SALTS;RHODIUM COMPLEXES: T2;SPECTROSCOPY;THERMODYNAMICS: Q1,Q2;THIOCYANATES;VANADIUM COMPLEXES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<673>
Volkov, S.V.; Buryak, N.I. (AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Effect of second sphere cations on formation of nickel (2) chloride complexes in molten salts
AIX-08:339996;ERA-03:012887;EDB-78:022276; Zh. Neorg. Khim. (ZNOKA) 22:(1):150-154 (Jan 1977)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA;ALKALI METAL COMPLEXES: T2;CESIUM CHLORIDES;CESIUM NITRATES;CHEMICAL PREPARATION;ELECTRONIC STRUCTURE: Q1,Q2;EQUILIBRIUM;MOLTEN SALTS;NICKEL COMPLEXES: T1

ABSTRACT: The effect of the outer-sphere cations of alkali metals (A-Li$sup +$, Na$sup +$, K$sup +$+ Rb$sup +$+ or Cs$sup +$) on complexing of Ni(2) in melts of ANO$sub 3$ and ACl has been studied. The effect of these cations on the equilibrium octahedral-tetrahedral nickel (2) complexes in melts of ANO$sub 3$ and ACl has been elucidated. It has been established that octahedral complex [NiCL$sub 6$]$sup 4-$ is formed with an outer-sphere cation Li$sup +$, tetrahedral complex [NiCl$sub 4$]$sup 2$ with Rb$sup +$ and Cs$sup +$,

<673> CONT.
and equilibrium [NiCl$sub 6$]$sup 4-$reversible[NiCl$sub 4$]$sup 2-$ is observed in the case of Na$sup +$ and K$sup +$. The regularities in a change of spectroscopic parameters of the complex depending on an outer-sphere cation have been investigated.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<674>
Volkov, S.V.; Evtushenko, N.P.; Yatsimirskii, K.B. (AN Ukrainskoj SSR, Kiev. Inst. Fizicheskoj Khimii; AN Ukrainskoj SSR, Kiev. Inst. Obshchej i Neorganicheskoj Khimii)

Spectra of combination scattering and structure of 3d-metals chloride complexes in molten salts
AIX-08:286215;EDB-77:044239; Teor. Eksp. Khim. (TEKHA) 12:(1):111-115 (Jan 1976)

SUBJECT DESCRIPTORS: CESIUM COMPLEXES: T1;CHLORIDES;CRYSTAL STRUCTURE: Q1;ELECTRON SPECTRA;MOLTEN SALTS;SCATTERING;SPECTRA;VALENCE;VIBRATIONAL STATES

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<675>
Volkovich, A.V.; Potapenko, O.G.; Semin, A.N.; Nichkov, I.F. (Moskovskij Khimiko-Tekhnologicheskij Inst. (USSR). Novomoskovskij Filial; Ural'skij Politekhnicheskij Inst., Sverdlovsk (USSR))

Anodic behavior of cadmium and cadmium-zinc alloys in eutectic melt of potassium- and lithium chlorides
AIX-07:272465;EDB-77:026035; Izv. Vyssh. Uchebn. Zaved., Tsvet. Metall. (IVUTA) (4):153-155 (1975)

SUBJECT DESCRIPTORS: ANODES;CADMIUM: T1;CADMIUM ALLOYS: T2;DISSOLUTION;ELECTROCHEMISTRY: Q1,Q2,Q3;EUTECTICS;LITHIUM CHLORIDES;MOLTEN SALTS;POLARIZATION;POTASSIUM CHLORIDES;TEMPERATURE DEPENDENCE;ZINC ALLOYS: T3

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360100;400400
INIS CATEGORY: B12

<676>

<676>
Vollrath, D., Kernforschungszentrum Karlsruhe (Germany, F.R.).
Inst. fuer Material- und Festkoerperforschung

In Parameter for optimizing the synthesis of (U,Pu)C **
INS-76:022946;ERA-02:007615;EDB-77:003012; (1976)
CRNL-tr--4179

SUBJECT DESCRIPTORS: ACTIVATION ENERGY;BINARY MIXTURES;CHEMICAL REACTION KINETICS:
Q3,Q4;GRAPHITE;GRINDING;LOSSES;OPTIMIZATION;PHASE STUDIES;PLUTONIUM CARBIDES: T2;PLUTONIUM DIOXIDE: T4;SYNTHESIS: Q1,Q2;THERMAL GRAVIMETRIC ANALYSIS;URANIUM CARBIDES: T1;URANIUM DICXIDE: T3

ABSTRACT: Experiments were carried out on the carbothermal reaction of mixed (U,Pu)O$sub 2$ with graphite. The reaction was followed with an electronic thermobalance, and the phases were analyzed roentgenographically. Results showed that for the mixed powder, the reactions of the U and Pu phases are independent of each other, whereas in powders ground for 36 h, U$sub 0$.$sub 8$Pu$sub 0$.$sub 2$O$sub 2$ formed first, followed by (U,Pu) (O/sub x/,C/sub 1-x/), (U,Pu)$sub 2$C$sub 3$, and finally U$sub 0$.$sub 8$Pu$sub 0$.$sub 2$C. Nucleus formation occurs in the 36-h-milled UO$sub 2$--PuO$sub 2$--graphite mixture during the milling process. Pu losses can be minimized by lower temperatures and by formation of mixed carbide. (DLC)

EDB SUBJECT CATEGORY: EDB-360201;050700
INIS CATEGORY: B23

<677>
Voloshin, V.A.; Krimnus, M.G. (Donetskij Fiziko-Tekhnicheskij Inst. (Ukrainian SSR))

Pressure effect on spectral properties of CeF$sub 3$:Pr$sup 3+$
AIX-08:286216;EDB-77:044216; Ukr. Fiz. Zh. (Russ. Ed.) (UFIZA) 20:(8):1266-1272 (Aug 1975)

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1,Q2;CATIONS;CERIUM FLUORIDES: T1;COUPLING CONSTANTS;ELECTROMAGNETIC INTERACTIONS;INTERATOMIC DISTANCES;L-S COUPLING;LOW TEMPERATURE;MONOCRYSTALS;PRASEODYMIUM;PRASEODYMIUM COMPOUNDS: T2;PRESSURE DEPENDENCE;ULTRALOW TEMPERATURE;VERY HIGH PRESSURE

ABSTRACT: The absorption spectrum of a single crystal of CeF$sub 3$:Pr$sup 3+$ has been studied in the range of 400 to 700 nm at the atmospheric pressure and temperatures of 78 and 4.2 deg K, as well as at the pressure of 25 kbar and a temperature of 78 deg K. Under pressure a slight change in the Stark splitting has been observed together with a more

<677> CONT.
significant shift of the j-levels into the long-wavelength region of the spectrum (approximately by 15 cm$sup -1$). Calculated from the experimental data are the parameters of the electrostatic and spin-orbital interactions F$sub 2$ and zetasub(4f), as well as the nephelauxetic factor $beta$=sub(2)sup(K)/Fsub(2)sup(fr), where Fsub(2)sup(K) and Fsub(2)sup(fr) are the Slater parameters for Pr$sup 3+$ in the crystal and free ion of Pr (4), respectively. Also observed under pressure is an increase in the parameter of bond bsup(1/2)[(1-$beta$)/2]sup(1/2). It is assumed that the shorter interatomic distances in the case of higher pressure result in the covalence contribution into the chemical bond becoming more substantial.

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<678>
von Amberger, H.D.; Rosenbauer, G.G. (Erlangen-Nuernberg Univ., Erlangen (Germany, F.R.). Inst. fuer Anorganische Chemie); Fischer, R.D.

Electronic structure of highly symmetric lanthanoid and actinoid compounds. VI. The electronic Raman spectrum of Cs$sub 2$NaCe(III)Cl$sub 6$ AIX-08:294154;EDB-77:068761; Mol. Phys. (MOPHA) 32:(5):1291-1298 (Nov 1976)

SUBJECT DESCRIPTORS: CERIUM CHLORIDES: T1;CESIUM CHLORIDES: T2;CRYSTAL FIELD;ELECTRONIC STRUCTURE: Q1,Q2,Q3;GROUND STATES;LOW TEMPERATURE;MAGNETIC SUSCEPTIBILITY;RAMAN SPECTRA;SODIUM CHLORIDES: T3;TEMPERATURE DEPENDENCE

ABSTRACT: The low-temperature Raman spectrum of the elpasolite system Cs$sub 2$NaCe(III)Cl$sub 6$ exhibits five new sharp lines (compared with the room-temperature spectrum) which are assigned to crystal-field (=CF) Raman transitions between the CF ground state GAMMA$sub 7$($sup 2$Fsub(5/2)) and the partially split 'octahedral' CF states of the free ion terms $sup 2$Fsub(5/2) and $sup 2$Fsub(7/2). A crystal-field calculation yields: zetasub(4f) = 635 cm$sup -1$, B$sub 4$$sup 0$ = 248 cm$sup -1$ and B$sub 6$$sup 0$ = 2,4 cm$sup -1$. The temperature dependence of the paramagnetic susceptibility calculated on the basis of these parameters is in good agreement with earlier experimental results.

EDB SUBJECT CATEGORY: EDB-360602
INIS CATEGORY: A12

<679>

<679>
von Goldbeck, O. ** Kubaschewski, O. (ed.)

Phase diagrams In Thorium: physico-chemical properties of its compounds and alloys ** EDB-76:036261; (1975) International Atomic Energy Agency

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;HIGH TEMPERATURE;MEDIUM TEMPERATURE;PHASE DIAGRAMS: Q1;REVIEWS;THORIUM ALLOYS: T1;THORIUM CARBIDES;VERY HIGH TEMPERATURE

ABSTRACT: The phase diagrams of binary alloy systems of thorium with different elements in various temperature regions from 400$sup 0$C to 3000$sup 0$C are given. Altogether 44 binary systems are reviewed.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<680>
von Goldbeck, O. (Technische Hochschule Aachen (Germany, F.R.). Lehrstuhl fuer Metallurgie der Kernbrennstoffe und Theoretische Huettenkunde)

Phase diagrams In Zirconium: Physico-chemical properties of its compounds and alloys ** AIX-07:277762;EDB-77:026064; (1976) IAEA

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;PHASE DIAGRAMS: Q1;REVIEWS;SILVER ALLOYS;SOLUBILITY;ZIRCONIUM ALLOYS: T1

ABSTRACT: The phase diagrams of binary alloys of Zr with 64 different elements are discussed and the diagrams given. For a few of the alloys, a complete phase diagram was not available. The elements are: Ag, Al, As, Au, B, Be, Bi, C, Cd, Ce, Co, Cr, Cu, Dy, Er, Fe, Ga, Gd, Ge, H, Hf, Hg, Ho, In, Ir, K, La, Li, Mg, Mn, Mo, N, Na, Nb, Nd, Ni, O, Os, P, Pd, Pt, Pu, rare earths (solubility in $alpha$-Zr and $beta$-Zr), Re, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Ta, Tb, Tc, Te, Th, Ti, U, V, W, Y, Zu.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B12

<681>
von Tippelskirch, H. (Karlsruhe Univ. (TH) (Germany, F.R.). Inst. fuer Physikalische Chemie und Elektrochemie)

Viscosities of cesium vapor to 1620 K and of liquid gallium to 1800 K AIX-08:334614;EDB-77:132682; Ber. Bunsenges. Phys. Chem. (BBPCA) 80:(8):726-729 (Aug 1976)

SUBJECT DESCRIPTORS: CESIUM: T3;DENSITY;GALLIUM: T1;LIQUID METALS;MEASURING METHODS;TABLES;TEMPERATURE DEPENDENCE;VAPOR PRESSURE;VAPORS;VERY HIGH TEMPERATURE;VISCOSITY: Q1,Q3

ABSTRACT: The viscosity of cesium at 1620 K and 40 bar has been determined to 41 x 10$sup -6$ (Pa.s) by the oscillating cup method. The saturated vapor density at 1580 K could be derived from the viscosity measurements. The viscosity of liquid gallium has been determined from 370 K to 1800 K. The experimental results have been compared with calculations based on the Enskog hard-sphere transport theory for dense fluids.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<682>
Vorobei, M.P.; Desyatnik, V.N.; Kurbatov, N.N.; Skiba, O.V.

Interaction of plutonium trichloride in melts of ternary systems AIX-08:334441;EDB-77:133673; Radiokhimiya (RADKA) 18:(1):119-122 (Jan 1976)

ABSTRACT: The systems KCl-UCl$sub 3$-PuCl$sub 3$, NaCl-ThCl$sub 4$-PuCl$sub 3$, KCl-ThCl$sub 4$-PuCl$sub 3$ have been studied by differential-thermal analysis. Meltability diagrams have been plotted and invariant points of the systems have been determined as well as low-temperature regions of the compositions which can be recommended for using as electrolytes in the process of producing ot refining plutonium by electrochemical method.

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<683>

<683>
Waber, J.T. (Commission of the European Communities, Karlsruhe (F.R. Germany). European Inst. for Transuranium Elements) ** Mueller, W.; Lindner, R. (eds.)

Electronic structure of actinides and related metals In Transplutonium 1975 **
AIX-07:270441;ERA-02:020483;EDB-77:036581; (1976)
North-Holland

SUBJECT DESCRIPTORS: AMERICIUM: T6;BAND THEORY;BRILLOUIN ZONES;CERIUM;CURIUM: T7;EIGENVALUES;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6,Q7;MATRIX ELEMENTS;NEPTUNIUM: T4;OCCUPATION NUMBER;PLUTONIUM: T5;PROTACTINIUM: T2;SLATER METHOD;THORIUM: T1;TITANIUM;URANIUM: T3;WAVE FUNCTIONS

ABSTRACT: In order to elucidate the role of 5f-electrons in the light actinide elements, a series of Confined Atom calculations are reported. These emphasize the sensitivity of the 5f electrons to the volume available for the Pu atoms i.e. the electronic configurations which minimize the total energy vary with the sphere radius Rsub(s). The problems and significance of finding which states are occupied in the Brillouin zone, are reviewed to illustrate a point made by Freeman at other conferences. Since relativistic effects are of considerable importance in discussing both light and heavy actinides, the structure of Dirac-Slater wave functions are briefly commented on.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<684>
Walch, P.F.; Ellis, D.E.

Effects of secondary ligands on the electronic structure of uranyls INS-76:020005;ERA-02:001215;EDB-76:081893; J. Chem. Phys. (JCPSA) 65:(6):2387-2392 (15 Sep 1976)

SUBJECT DESCRIPTORS: CRYSTAL FIELD;ELECTRONIC STRUCTURE: Q1;LIGANDS;MOLECULAR ORBITAL METHOD;URANIUM OXIDES;URANYL COMPLEXES: T1

ABSTRACT: The effects of secondary ligands on the electronic structure of uranyl, UO$sub 2$$sup 2+$, are investigated in a perturbing point ion model, making use of the relativistic Dirac--Slater molecular orbital (MO) approach. Variation of ''crystal-field splittings'' with primary U--O bond length is explored; relaxation of the uranyl MO's is taken into account by self-consistent iterations. The theoretical splittings are found to agree rather well with the x-ray photoemission spectroscopy (XPS) data of Veal et al. Comparison is made

<684> CONT.
with optical data and reasons are given for the poor agreement. (AIP)

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<685>
Wang, W.L.; Singh, R.N.

Equilibrium index for fission gas bubbles
ERA-02:056709;INS-77:015992;EDB-77:131685; Trans. Am. Nucl. Soc. (TANSA) 26::377-378 (Jun 1977)

SUBJECT DESCRIPTORS: BUBBLES: Q1;COALESCENCE;FISSION PRODUCTS;GASES;SOLID FUELS: T1;URANIUM DIOXIDE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-220300
INIS CATEGORY: E23

<686>
Waseda, Y. (Tohoku Univ., Sendai (Japan). Research Inst. of Mineral Dressing and Metallurgy) ** Evans, R.; Greenwood, D.A. (eds.)

Structure of liquid transition metals and their alloys In Liquid metals, 1976 ** AIX-08:319649;EDB-77:113431; (1977) Institute of Physics

SUBJECT DESCRIPTORS: ATOMIC NUMBER;BIBLIOGRAPHIES;ELECTRONIC STRUCTURE: Q1;INTERATOMIC DISTANCES;INTERATOMIC FORCES;LIQUID METALS;RARE EARTH ALLOYS;RARE EARTHS;REVIEWS;TRANSITION ELEMENT ALLOYS: T1;TRANSITION ELEMENTS;VARIATIONS

ABSTRACT: An attempt is made in this review to cover the characteristics of the structure of liquid transition metals, including the lanthanide elements, and alloys with a transition metal as a constituent. One difference in the structure of liquid transition metals from that of normal metals is that, as the atomic number increases from Ti to Ni or from Ce to Yb, the oscillations in the structure factor increase in amplitude. This gives qualitative support for the suggestion that the partial overlap between atoms which have a nearly empty 3d-shell of 4f-shell, such as Ti or Ce, is larger than those having a nearly filled 3d-shell or 4f-shell, such as Ni or Yb. Similar behaviour is found in the structure of liquid Al-Ti and Al-Fe alloys. Results are

<686>

<686> CONT.
also given for liquid transition metal-metalloid systems, such as Ni-P alloys.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<687>
Waseda, Y.; Tamaki, S.

Structures of 3d-transition metals in the liquid state
EDB-76:042168; Philos. Mag. (PHMAA) 32:(2):273-281 (1975)

SUBJECT DESCRIPTORS: CHROMIUM: T3;COBALT: T6;COORDINATION NUMBER;FOURIER ANALYSIS;INTERATOMIC DISTANCES;IRON: T5;LIQUID METALS;MANGANESE: T4;MELTING POINTS;MOLECULAR STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6,Q7;NICKEL: T7;TITANIUM: T1;TRANSITION ELEMENTS;VANADIUM: T2;X-RAY DIFFRACTION

ABSTRACT: The structures of 3d-transition metals (Ti, V, Cr, Mn, Fe, Co, Ni, and Cu) in the liquid state have been systematically examined by x-ray diffraction at temperatures above their mp. In terms of the usual Fourier analysis, the atomic radial distribution functions were obtained from which interatomic distances and coordination numbers were estimated.

EDB SUBJECT CATEGORY: EDB-360102

<688>
Waseda, Y.; Tamaki, S. (Tohoku Univ., Sendai (Japan). Research Inst. of Mineral Dressing and Metallurgy)

Structure of rare earth metals in the liquid state
AIX-08:338942;EDB-78:021630; Philos. Mag. (PHMAA) 36:(1):1-8 (Jul 1977)

SUBJECT DESCRIPTORS: CERIUM: T1;COORDINATION NUMBER;DISTRIBUTION FUNCTIONS;ELECTRONIC STRUCTURE: Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;EUROPIUM: T2;FOURIER ANALYSIS;GADOLINIUM: T3;INTERATOMIC DISTANCES;LANTHANUM: T4;LIQUID METALS: T5;PRASEODYMIUM: T6;SCANDIUM: T7;TERBIUM: T8;X-RAY DIFFRACTION;YTTERBIUM: T9

ABSTRACT: The structure of liquid rare earth metals (Sc, La, Ce, Pr, Eu, Gd, Tb and Yb) have been systematically examined by X-ray diffraction at temperatures above their melting points. The structure factors of liquid La, Ce, Pr, Eu and Yb were temperature insensitive in the presently available experimental temperature range. In terms of the usual Fourier analysis, the atomic radial distribution functions

<688> CONT.
were obtained from which interatomic distances and coordination numbers were estimated.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<689>
Waseda, Y.; Tamaki, S. (Tohoku Univ., Sendai (Japan). Research Inst. of Mineral Dressing and Metallurgy)

Structure of liquid Ce-Ni alloys AIX-08:329099;EDB-78:021633; J. Phys., F (London) (JPFMA) 7:(6):L151-L153 (Jun 1977)

SUBJECT DESCRIPTORS: CERIUM ALLOYS: T1;CHARGE TRANSPORT;CRYSTAL STRUCTURE: Q1,Q2;HARD-CORE POTENTIAL;LIQUID METALS;NICKEL ALLOYS: T2;X-RAY DIFFRACTION

ABSTRACT: The structures of liquid Ce-Ni alloys with 25 and 75at% Ni have been investigated by x ray diffraction. The results suggest that the charge transfer effect makes a major contribution to the effective hard core diameter of Ce-Ce pairs in these alloys.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: A13

<690>
Waterbury, G.R. (comp.), Los Alamos Scientific Lab., N.Mex. (USA)

In Analytical methods for fissionable materials in the nuclear fuel cycle. Progress report, July 1, 1975--September 30, 1976 ** INS-77:008150;ERA-02:032889;EDB-77:082774; (Dec 1976) LA--6577-PR

SUBJECT DESCRIPTORS: AUTOMATION;CHEMICAL ANALYSIS: Q2,Q3,Q4;DISSOLUTION;FISSIONABLE MATERIALS: T2;FUEL CYCLE;HALF-LIFE: Q1;ISOTOPE DILUTION;MASS SPECTROSCOPY: Q5;PLUTONIUM: T3;PLUTONIUM 239: T1;PLUTONIUM OXIDES;SAMPLE PREPARATION: Q1;SEPARATION PROCESSES;URANIUM: T4;URANIUM 235: T5

ABSTRACT: Progress continued on development of dissolution techniques for difficult-to-dissolve nuclear materials, development of methods and automated instruments for determinations of plutonium and uranium, preparation of plutonium-containing materials for the Safeguards Analytical Laboratory Evaluation (SALE) program, analysis of SALE uranium materials, and measurement of plutonium isotope half-lives. Gas-solid reactions at elevated temperatures using reactive gases such as chlorine continue to show

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<690> CONT.
promise for separating uranium from refractory materials. An extensive study of nonaqueous solvents for the dissolution of refractory materials is in progress. An extraction-separation procedure, highly specific for microgram amounts of uranium, has been developed, and its adaptation to the Los Alamos Scientific Laboratory (LASL) automated spectrophotometer is being evaluated. Development of an electrometric analysis method for plutonium is nearing completion, and design of an automated instrument using the method has been started. Batches of plutonium oxide and mixed uranium--plutonium, intended for issue as Secondary Reference and Calibration Test Materials, are being recharacterized for assay and isotopic contents. The half-life of $sup 239$Pu has been determined by isotope-dilution mass-spectrometric measurement of $sup 235$U grow-in as a function of time.

EDB SUBJECT CATEGORY: EDB-400100;055001
INIS CATEGORY: B11;F41

<691>
Wedemeyer, H.; Guenther, E., Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Material- und Festkoerperforschung; Kernforschungszentrum Karlsruhe (Germany, F.R.). Projekt Schneller Brueter

In Fabrication of uranium-plutonium mixed carbide **
AIX-07:255197;ERA-02:020576;EDB-77:068633; (Dec 1975)
KFK--2238

SUBJECT DESCRIPTORS: CHEMICAL COMPOSITION;CHEMICAL PREPARATION;DENSITY;FABRICATION: Q1,Q2;GRINDING;LOSSES;MICROSTRUCTURE;MIXTURES;PHASE DIAGRAMS;PLUTONIUM;PLUTONIUM CARBIDES: T1;PRESSURE DEPENDENCE;PRODUCTION;REDUCTION;SINTERING;SOLID SOLUTIONS;TEMPERATURE DEPENDENCE;TIME DEPENDENCE;URANIUM CARBIDES: T2;X-RAY DIFFRACTION

ABSTRACT: In the present report the carbide fuel fabrication-line of the Institut fuer Material- und Festkoerperforschung (IMF) is outlined. The carbide fabrication by carbothermic reduction as well of original produced urania-/plutonia-powders as of sintered oxide waste is described. In special, test-results of the stoichiometry-behaviour and the reduction of plutonium-losses are given. With this, the reduction of losses is possible by an early step of formation of mixed-crystals within the carbide fabrication process. With the present results it

<691> CONT.
seems to be possible, to depress the total material-loss to values lower than 1 wt.% if the batch-size is large enough.

EDB SUBJECT CATEGORY: EDB-360201;050700
INIS CATEGORY: B23

<692>
Weeks, R.W. ** Hill, M.R. (comp.), Oak Ridge National Lab., Tenn. (USA)

Argonne National Laboratory In Mechanical properties test data for structural materials. Quarterly progress report for period ending April 30, 1977 ** ERA-03:004353;EDB-78:004435; (Jun 1977) ORNL--5287

SUBJECT DESCRIPTORS: CORROSION;CORROSIVE EFFECTS;DEFORMATION;FATIGUE: Q1,Q2;FRACTURE PROPERTIES: Q1,Q2;INCOLOY 800: T3;LMFBR TYPE REACTORS;REACTOR MATERIALS;SODIUM;STAINLESS STEEL-16-8-2: T2;STAINLESS STEEL-304: T1;STAINLESS STEEL-316: T4;TENSILE PROPERTIES: Q3,Q4

ABSTRACT: Results obtained on the fatigue behavior of Type 16-8-2 stainless steel weld metal, additional analysis of notch effects on the cyclic life of Type 304 stainless steel, and results from an experimental determination of bilinear stress-strain parameters for Incoloy 800 are described. An analysis of true stress-true strain tensile data obtained on titanium-modified Type 316 stainless steel exposed to flowing sodium is presented, and additional results on the effects of sodium environment on the fatigue behavior of Type 304 stainless steel are reported.

EDB SUBJECT CATEGORY: EDB-360103;210500

<693>
Wenzl, H.; Sorajic, V.; Bischof, B., Kernforschungsanlage Juelich G.m.b.H. (Germany, F.R.). Inst. fuer Festkoerperforschung

In Investigation of the solubility and diffusion of Fe atoms in Cu at high temperature using molten salt electrochemistry ** AIX-08:334389;EDB-78:016794; (Jan 1977) Juel--1384

SUBJECT DESCRIPTORS: COPPER ALLOYS: T1;DIFFUSION: Q2;ELECTROCHEMISTRY;HIGH TEMPERATURE;IRON: T2;IRON ALLOYS;MOLTEN SALTS;PERMEABILITY: Q1;SOLUBILITY;VERY HIGH TEMPERATURE

ABSTRACT: The electrochemical cell CuFesub(n)/KF, LiF, FeF$sub

<693>

<693> CONT.
2$ (molten solution)/Fe was used between 800 and 1,000$sup 0$C to produce CuFesub(n) alloys of various copper rich compositions n by electrochemically controlled diffusion. From measurements of cell voltage and current we determined composition, bulk diffusion coefficient D, and atomic solubility limit x$sub 0$ of Fe in Cu. The numerical values at the temperature of 950$sup 0$C are D = 0.9 x 10$sup -9$ cm$sup 2$/sec, x$sub 0$ = 1.2 at%.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B12

<694>
Wichmann, U.; Berndt, U.; Keller, C. (Kernforschungszentrum Karlsruhe (Germany, F.R.). Inst. fuer Radiochemie)

Phase equilibria and thermodynamic data for the ternary UO$sub 2$-UO$sub 3$-REOsub(1.5) (Ho, Tm, Lu) systems
AIX-08:346212;EDB-78:027694; Rev. Chim. Miner. (RVCMA) 14:(2):105-118 (1977)

ABSTRACT: Investigations of the phase equilibria in the oxygen-rich part of the ternary systems U-RE-O with the heavy lanthanides holmium, thulium and lutetium by using X-ray and EMF methods have shown that the following single phase regions exist in all systems: a fluorite phase (Usub(1-y), REsub(y))Usub(2+x), a rhombohedral phase and a C-type phase. The phase width in the three systems for the different single phases differs, however, especially for the rhombohedral phase. No solubility of REOsub(1.5) in U$sub 3$O$sub 8$ could be detected whereas REOsub(1.5) dissolves small quantities of UOsub(2+x) the amount being the higher, the smaller the value of x is. The stoichiometric members of the fluorite phase, (Resub(0.5)Usub(0.5))O$sub 2$, are thermodynamically stable only at high temperatures for RE=Ho, Tm, Lu. A detailed description of the phase diagrams of these systems is given together with thermodynamic data for the free solution enthalpy of oxygen in selected compounds of these systems, obtained by using a specially developed high-temperature galvanic cell.

EDB SUBJECT CATEGORY: EDB-360202;400702
INIS CATEGORY: B12

<695>
Williams, J.M. (Argonne National Lab., IL); Dowling, N.; Gunde, R.; Hadzi, D.; Orel, B.

X-ray diffraction and infrared: Raman spectroscopic study of the hydrogen dinitrate ion, (O$sub 2$NO-H-ONO$sub 2$)$sup -$, in cesium hydrogen dinitrate
ERA-01:016813;INS-76:014750;EDB-76:049146; J. Am. Chem. Soc. (JACSA) 98:(6):1581-1582 (17 Mar 1976)

SUBJECT DESCRIPTORS: BOND ANGLE;BOND LENGTHS;CESIUM NITRATES: T3;CRYSTAL GROWTH;DEUTERIUM: T4;HYDROGEN COMPOUNDS: T1;INFRARED SPECTRA;ISOTOPE EFFECTS: Q4;PATTERSON METHOD;RAMAN SPECTRA;STRUCTURAL CHEMICAL ANALYSIS: Q1,Q3;X-RAY DIFFRACTION

ABSTRACT: A structural chemical analysis of CsH(NO$sub 3$)$sub 2$ was performed using the Patterson map and the least squares technique. The Cs ion coordination sphere was found to consist of ten oxygen atoms from surrounding nitrate groups; and the H(NO$sub 3$)$sub 2$$sup -$ ion was found to have four oxygen atoms from two nitrate groups arranged in tetrahedral fashion. Bond angles and lengths were reported, and deuterium isotope effects were discussed. (DDA)

EDB SUBJECT CATEGORY: EDB-400201;400202
INIS CATEGORY: B12

<696>
Wit, H.P.; Niesen, L. (Rijksuniversiteit Groningen (Netherlands))

Accurate nuclear parameters derived from the Moessbauer spectrum of thulium metal AIX-07:276505;EDB-77:026148; Hyperfine Interact. (HYIND) 1:(6):501-504 (Aug 1976)

SUBJECT DESCRIPTORS: ALUMINIUM;ERBIUM 169: T2;ERBIUM IONS;HYPERFINE STRUCTURE: Q1;ION IMPLANTATION;MOESSBAUER EFFECT: Q2;SPECTRA;THULIUM: T1;ULTRALOW TEMPERATURE

ABSTRACT: Accurate values of hyperfine interaction parameters have been obtained for thulium metal from Moessbauer spectra, using an implanted source of $sup 169$Er in Al and Moire velocity calibration. A magnetic moment ratio mu*/mu=-2.223(13) has been measured along with a ground state magnetic dipole coupling strength muH=33.26(9) cm/sec and an excited state quadrupole coupling strength e$sup 2$qQ*/h=1933(12) MHz.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<697>

<697>
Wcolfrey, J.L. (Australian Atomic Energy Commission Research Establishment, Lucas Heights. Materials Div.); Wright, S.J. (New South Wales Univ., Kensington (Australia). Dept. of Ceramic Engineering)

Measurement of interfacial energies in the UO$sub 2$-Gd$sub 2$O$sub 3$ system AIX-08:327849;EDB-77:140670; J. Aust. Ceram. Soc. (JAUCA) 12:(2):21-26 (Nov 1976)

SUBJECT DESCRIPTORS: GADOLINIUM OXIDES: T2;GRAIN BOUNDARIES: Q1,Q2;INTERFACES;PHASE STUDIES;POROSITY;SURFACE TENSION: Q1,Q2;SURFACES;THERMAL EQUILIBRIUM;URANIUM DIOXIDE: T1

ABSTRACT: The multiphase equilibration method is being used to investigate the interfacial energies in the UO$sub 2$-Gd$sub 2$O$sub 3$ system as part of a program to determine the effect of Gd$sub 2$O$sub 3$ additions on the surface energy of UO$sub 2$. The methods used for determining surface and interfacial energies are reviewed, the experimental techniques used in the present investigation are described and some results are presented. Specimens of UO$sub 2$-5 weight per cent Gd$sub 2$O$sub 3$ were equilibrated at 1700$sup 0$C for two weeks in hydrogen. High purity nickel (99.99%) was used to investigate the solid-liquid equilibrium. The results indicated that the presence of gadolinia reduced the ratios of grain boundary to solid surface energy and grain boundary to solid-liquid interfacial energy for UO$sub 2$ by approximabely 13 and 47 per cent respectively. It also increased the grain boundary-pore 'dihedral' angle of UO$sub 2$ from 90.6 to 100.1 degrees.

EDB SUBJECT CATEGORY: EDB-360202
INIS CATEGORY: B23

<698>
Wurzinger, H.; Mueller, K. (Technische Hochschule, Graz (Austria))

Determination of trace impurities of titanium and zirconium in molybdenum and tungsten and their oxygen compounds by X-ray fluorescence spectrometry AIX-08:331932;EDB-78:022212; Z. Anal. Chem. (ZACFA) 284:(2):101-105 (Apr 1977)

ABSTRACT: A method for the determination of trace impurities of titanium and zirconium in metallic molybdenum and tungsten or in their basic products MoO$sub 3$, WO$sub 3$ and H$sub 2$WO$sub 4$ is presented. The method is based on coprecipitation of the trace impurities titanium and zirconium with cobalt hydroxide as carrier from molybdenum and tungsten matrices. The hydroxide precipitates are collected on filter paper and measured by XRF after drying.

<698> CONT.
That way it is possible to get linear calibration curves up to 1 x 10$sup -4$ g; the limits of detection are determined to be 3.4 x 10$sup -8$ g for titanium and 5.0 x 10$sup -7$ g for zirconium. About 45 min are necessary for one analysis, but several samples can be analyzed simultaneously.

EDB SUBJECT CATEGORY: EDB-400103
INIS CATEGORY: B11

<699>
Yagi, E.; Maeda, M.; Miyajima, K.; Kagami, H., Japan Atomic Energy Research Inst., Tokyo

In Technical experiences in an engineering-scale facility for uranium flucrination studies **
AIX-C8:300964;ERA-02:041098;EDB-77:092370; (Mar 1976)
JAERI-M--6488

SUBJECT DESCRIPTORS: FLOWSHEETS;FLUIDIZED BED;FLUORIDE VOLATILITY PROCESS;FLUORINATION: Q1;FLUORINE;FUEL CYCLE;OFF-GAS SYSTEMS;OPERATION;PERFORMANCE;PILOT PLANTS;POWER REACTORS;URANIUM: T1;URANIUM DIOXIDE;URANIUM HEXAFLUORIDE

ABSTRACT: In the research program of power reactor fuel reprocessing by fluoride volatility process, an engineering-scale facility for uranium fluorination has been operated batchwise and semi-continuously since 1969 in Fuel Reprocessing Laboratory, JAERI, to establish the techniques of handling kilogram quantities of fluorine and uranium hexafluoride and to obtain engineering data on the uranium fluidized-bed fluorination. The experiences gained with the facility are described, giving some evaluations and recommendations for the equipment design, its performance and operation of the system.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<700>
Yagi, E.; Saito, S.; Horiuchi, M., Japan Atomic Energy Research Inst., Tokyo

In Description of an engineering-scale facility for uranium flucrination studies **
AIX-C8:300965;ERA-02:041097;EDB-77:092369; (Mar 1976)
JAERI-M--6487

SUBJECT DESCRIPTORS: DIAGRAMS;FLUIDIZED BED;FLUORIDE VOLATILITY PROCESS;FLUORINATION: Q2;FLUORINE;FUEL CYCLE;MATERIALS

<700>

<700> CONT.
HANDLING;OFF-GAS SYSTEMS;OXIDATION;PILOT PLANTS;POWER REACTORS;SAFETY;URANIUM: T2;URANIUM DIOXIDE;URANIUM HEXAFLUORIDE

ABSTRACT: In the research program of power reactor fuel reprocessing by fluoride volatility process, the engineering facility was constructed to establish the techniques of handling kilogram quantities of fluorine and uranium hexafluoride and to obtain engineering data on the uranium fluidized-bed oxidation and fluorination. This facility is designed for a capacity of 5 kg per batch. Descriptions on the facility and equipment are given, including design philosophy, safety and its analysis.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<701>
Yonco, R.M.; Maroni, V.A.

Solubility of lithium oxide in liquid lithium
INS-77:015238;ERA-02:057131;EDB-77:132589; Trans. Am. Nucl. Soc. (TANSA) 26::166-167 (Jun 1977)

SUBJECT DESCRIPTORS: HIGH TEMPERATURE;LIQUID METALS;LITHIUM: M1;LITHIUM OXIDES: M2;SOLUBILITY: Q2;SOLVENT PROPERTIES: Q1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: B22

<702>
Yonco, R.M.; Veleckis, E.; Maroni, V.A. (Argonne National Lab., Ill. (USA))

Solubility of nitrogen in liquid lithium and thermal decomposition of solid Li$sub 3$N EDB-76:057072; J. Nucl. Mater. (JNUMA) 57:(3):317-324 (Sep 1975)

SUBJECT DESCRIPTORS: FORMATION FREE ENERGY;HIGH TEMPERATURE;LIQUID METALS;LITHIUM: T1;LITHIUM NITRIDES: T3;MELTING POINTS;NITROGEN: T2;PYROLYSIS: Q3;SOLUBILITY: Q2;SOLVENT PROPERTIES: Q1;TEMPERATURE DEPENDENCE;THERMONUCLEAR REACTOR MATERIALS;VERY HIGH TEMPERATURE

ABSTRACT: The solubility of nitrogen in liquid lithium was determined from 195 to 441$sup 0$C by direct sampling and equilibrium nitrogen pressure over solid Li$sub 3$N were

<702> CONT.
measured at eight temperatures between 660 and 778$sup 0$C. The solubility data may be represented by log$sub 10$S=3.323 - 2107T$sup -1$, where S is in mol%Li$sub 3$N and T is in K. From a thermodynamic analysis of the combined solubility and decomposition data, the standard free energy of formation of solid Li$sub 3$N was estimated to be $delta$G$sup 0$(kcal/mol) = 33.2x10$sup -3$T-39.1. For dilute solutions of Li$sub 3$N in lithium, the Sieverts' law constant was determined. The system Li$sub 3$N appears to conform to a simple eutectic diagram in which the eutectic point occurs at approximately 0.05 mol%Li$sub 3$N and 180.3$sup 0$C. The melting point of Li$sub 3$N was found to be (813+-1)$sup 0$C. Implications of the results of this study regarding the compatibility of liquid lithium with the structural materials of interest to fusion reactors are discussed.

EDB SUBJECT CATEGORY: EDB-700209;360603
INIS CATEGORY: B12

<703>
Yoshida, S.; Kuroda, T. (Tokyo Inst. of Tech. (Japan). Research Lab. of Nuclear Reactor); Oyamada, Ryozo

Preparation of thorium metal by electrolysis of fused salt ThCl$sub 4$-LiCl+NaCl+KCl(eut) system
AIX-07:262603;EDB-77:018565; Bull. Tokyo Inst. Technol. (Engl. Ed.) (BTITA) (127):105-112 (Mar 1975)

SUBJECT DESCRIPTORS: CHEMICAL PREPARATION;ELECTRIC CONDUCTIVITY;ELECTROCHEMISTRY;ELECTROLYSIS;ELECTROMETALLURGY; LECTROMOTIVE FORCE;ELECTROREFINING: Q1;LITHIUM CHLORIDES;MOLTEN SALTS;NUCLEAR FUELS;PHASE DIAGRAMS;POTASSIUM CHLORIDES;SODIUM CHLORIDES;TEMPERATURE DEPENDENCE;THORIUM: T1;THORIUM CHLORIDES

ABSTRACT: Although uranium is mainly used as nuclear fuel, thorium attracts attention because it is more abundant than uranium. At present, thorium fuel is mainly in the form of ceramics for HWRs and HTGRs, and fluoride for MSBRs. In the future, thorium will be used as an alloying element. The electrolytic production of metallic thorium is most promising for industrial purpose, hence, the authors chose thorium chloride as a component of electrolyte, because they had succeeded to get high purity recrystalline ThCl$sub 4$ free from hygroscopic property. Basic data concerning the electrolytic production of high purity metallic thorium were already reported by the authors. The present study is concerned with the conditions of the electrolysis of fused salt ThCl$sub 4$-LiCl+NaCl+KCl (eut) system. ThCl$sub 4$ and the eutectic mixture of LiCl+NaCl+KCl were prepared, and their fused salt mixture was made. The measurements of

<703>

<703> CONT.
liquidus, specific electric conductance, and electromotive force were carried out, then the electrolysis of the fused salt was made. The optimum conditions for the electrolysis of the fused salt were estimated from the basic measurements as follows: ThCl$sub 4$ concentration in electrolyte 5--60 wt.%, specific conductance of the electrolyte containing 10--30 wt.% ThCl$sub 4$ at 550--650$sup 0$C is not inferior to other systems, lower e.m.f. than other systems is advantageous. Therefore, ThCl$sub 4$ concentration 30 wt.%, electrolysis temperature 550--600$sup 0$C, and initial cathode current density as high as possible, were found as most optimum conditions.

EDB SUBJECT CATEGORY: EDB-360101
INIS CATEGORY: B12

<704>
Yoshizawa, S.; Takehara, Z.; Ito, Y.; Morimoto, S.

Lithium alloys--chlorine secondary battery. I. Basic studies on a lithium alloys--chlorine secondary battery using a molten salt as the electrolyte EDB-77:112750; Denki Kagaku (DNKKA) 39:(10):834-839 (1971)

SUBJECT DESCRIPTORS: AUTOMOBILES:
T2;CARBON;ELECTROLYTES;ELECTROMOTIVE FORCE;ENERGY;FEASIBILITY STUDIES: Q1;HIGH TEMPERATURE;LEAD ALLOYS;LITHIUM ALLOYS;LITHIUM CHLORIDES;LITHIUM-CHLORINE BATTERIES: M1,Q2;MOLTEN SALTS;POTASSIUM CHLORIDES;TIN ALLOYS;ZINC ALLOYS

ABSTRACT: The feasibility as an automobile battery of a Li(Zn, Sn, or Pb)/LiCl--KCl/C--Cl$sub 2$ battery is examined. The emf was somewhat less than that of a conventional Li/Cl$sub 2$ battery. Operating temperature was 450$sup 0$, and the output energy density of the anode was about 130 Wh/kg. (RWR)

EDB SUBJECT CATEGORY: EDB-250901

<705>
Young, W.H., East Anglia Univ. (UK). School of Mathematics and Physics

In Electronic states densities from structure and thermodynamic data for liquid transition metals **
AIX-07:271683;EDB-77:055413; (1976) AED-Conf--76-087-015

SUBJECT DESCRIPTORS: COMPARATIVE EVALUATIONS;DATA;ELECTRONIC STRUCTURE: Q1;ELECTRONS;ENTROPY;LIQUID METALS;SOLIDS;THERMODYNAMIC PROPERTIES: Q1;THERMODYNAMICS;TRANSITION ELEMENTS: T1;VALENCE

<705> CONT.

ABSTRACT: The entropies of many liquid metals can be written in the form S = S/sub gas/ + S/sub pack/ + S/sub elec/, where S/sub gas/ is the ideal gas expression, S/sub pack/ arises from the finite sizes of the ions (described by effective hard spheres) and S/sub elec/ is the valence-electron contribution 1/3 $pi$$sup 2$ N(E/sub F) k/sub B/$sup 2$T. The shape of the observed structure factor tells us whether the above formalism is applicable in any given case; if it is, we thereby deduce the effective hard sphere diameter and thence S/sub pack/. Measured thermodynamic data allow us to obtain S and S/sub gas/ and so S/sub elec/ and thus N(E/sub F/) may be inferred in principle. In practice, for non-transition metals S/sub elec/ is typically 1% of S, and so it is difficult to extract meaningful results from the experimental data. However, for transition metals (for which N(E/sub F/) and the melting temperature are both much higher) S/sub elec/ is typically 20% of S and useful information on N(E/sub F/) may be obtained. Such data are presented and related to the additional relevant experimental and theoretical information available to us.

EDB SUBJECT CATEGORY: EDB-360104
INIS CATEGORY: A13

<706>

Zakharov, D.M.

Eutectic point of gallium-indium system

AIX-08:321120;EDB-77:113371; Zh. Fiz. Khim. (ZFKHA) 49:(9):2208-2210 (Sep 1975)

SUBJECT DESCRIPTORS: BINARY ALLOY SYSTEMS;COMPARATIVE EVALUATIONS;EUTECTICS;GALLIUM ALLOYS: T1;INDIUM ALLOYS: T2;LIQUID METALS;MELTING;PHASE DIAGRAMS: Q1,Q2;THERMODYNAMICS

ABSTRACT: On the base of thermodynamic analysis of the gallium-indium alloy system its eutectic concentration has been determined: 13.8+-0.4 at.% of In, The computed value agrees with the experimental value determined by a chemical analysis of liquid indium-gallium alloy formed in the process of a contact melting of Ga and In at the eutectic temperature.

EDB SUBJECT CATEGORY: EDB-360102
INIS CATEGORY: B22

<707>

<707>
Zavalishin, N.I.; Mal'tsev, A.A. (Moskovskij Gosudarstvennyj Univ. (USSR). Kafedra Fizicheskoj Khimii)

IR spectra of the NbCl$sub 5$, TaCl$sub 5$, NbBr$sub 5$ and NbOCl$sub 3$ vapors AIX-08:283089;EDB-77:069073; Vestn. Mosk. Univ., Ser. II. Khim. (VMUKA) 17:(3):314-317 (May 1976)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<708>
Zhul'kov, V.I. (Vsesoyuznyj Nauchno-Issledovatel'skij Inst. Sinteticheskogo Kauchuka, Leningrad (USSR))

Investigation into properties of liquidus curves of binary salt system melts where chemical compounds formation. 2. Systems of mono-monovalent and bi-bivalent cations with common anion AIX-08:340003;EDB-78:017351; Zh. Fiz. Khim. (ZFKHA) 51:(1):11-15 (Jan 1977)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<709>
Zimina, T.D.; Zhukova, L.D. (Irkutskij Gosudarstvennyj Univ. (USSR))

Cesium, calcium and barium chlorides ternary system AIX-08:286228;EDB-77:044209; Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. (IVUKA) 18:(8):1307-1309 (1975)

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<710>
In High density thoria-silica-metal (III) oxide fibers ** AIX-07:233183;EDB-76:060445; (18 Dec 1974)

SUBJECT DESCRIPTORS: ALUMINIUM OXIDES: T1;BAKING;BORON OXIDES: T4;CHEMICAL COMPOSITION;CHEMICAL PREPARATION: Q1,Q2,Q3,Q4;DENSITY;DISPERSIONS;EXTRUSION;FIBERS;FLEXIBILITY; ROTECTIVE CLOTHING;SHIELDING MATERIALS;SILICON OXIDES: T2;THORIUM OXIDES: T3;VISCOSITY

<710> CONT.

ABSTRACT: Transparent refractory fibers, at least 50% thoria and additionally containing silica and metal(III) oxides, particularly Al$sub 2$O$sub 3$ and B$sub 2$O$sub 3$ or Cr$sub 2$O$sub 3$ are made by shaping and dehydratively gelling, particularly by extruding in air, viscous aqueous thoria solutions or sols containing colloidal silica with boric acid-stabilized aluminum acetate, or additionally chromium acetate or colloidal Cr$sub 2$O$sub 3$, and heating the resulting gelled fibers in a controlled manner to decompose and volatilize undesired constituents and convert fibers to refractory fibers which are useful to form, for example, refractory fabrics, or as reinforcement for composites. The fabrics are heat resistant. A special application is X-ray protective clothing.

EDB SUBJECT CATEGORY: EDB-360204
INIS CATEGORY: B24

<711>

Standard methods for chemical, mass spectrometric, and spectrochemical analysis of nuclear-grade uranium dioxide powders and pellets INS-76:013238;EDB-76:042495; Annu. Book ASTM Stand. (ASTSA) (45):175-213 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM: T11;ANTIMONY: T31;ARSENIC: T12;BARIUM: T14;BERYLLIUM: T15;BISMUTH: T16;BORON: T13;CADMIUM: T18;CALCIUM: T17;CARBON: T4;CHEMICAL ANALYSIS: Q1;CHLORINE: T5;CHROMIUM: T20;COBALT: T19;COPPER: T21;EMISSION SPECTROSCOPY: Q8,Q9,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18,Q19,Q20,Q21,Q22,Q23,Q24 Q25,Q26,Q27,Q28,Q29,Q30,Q31,Q32,Q33,Q34,Q35,Q36,Q37,Q40,Q41,Q 2;FLUORINE: T6;FUEL PELLETS;GRAVIMETRIC ANALYSIS: Q2,Q3;INDIUM: T23;ION SELECTIVE ELECTRODE ANALYSIS: Q5,Q6;IRON: T22;LEAD: T30;MAGNESIUM: T24;MANGANESE: T25;MASS SPECTROSCOPY: Q38;MERCURY: T40;MOISTURE;MOLYBDENUM: T26;NICKEL: T28;NITROGEN: T7;OXYGEN: T3;PHOSPHORUS: T29;POTASSIUM: T42;POWDERS;QUANTITATIVE CHEMICAL ANALYSIS: Q4;RARE EARTHS: T9;SILICON: T32;SILVER: T8;SODIUM: T27;SPECTROPHOTOMETRY: Q10;SULFUR: T10;THORIUM: T41;TIN: T33;TITANIUM: T34;TITRATION: Q7,Q2;TRACE AMOUNTS;URANIUM: T2;URANIUM DIOXIDE: T1;URANIUM ISOTOPES: T38;VANADIUM: T35;VOLTAMETRY;ZINC: T36;ZIRCONIUM: T37

ABSTRACT: Chemical methods are described for the determination of U by FeSO$sub 4$ reduction in H$sub 3$PO$sub 4$ and titration with Cr$sub 2$O$sub 7$$sup 2$-, atomic ratio by ignition (gravimetric) impurity correction method, total C by direct combustion-thermal conductivity method, N by the Kjeldahl method, surface area of powders by the N-absorption method, and total gas (other than H$sub 2$O) in pellets by a vacuum outgassing and heat release method. Electrochemical

<711>

<711> CONT.
methods for the determination of moisture, Cl$sup -$, F$sup -$, and O:U atomic ratio are described. The isotopic U content is determined by a mass spectrometric method, and S is determined by a distillation spectrophotometric method. Various spectrochemical methods are included for the following trace elements present in the UO$sub 2$: volatile F$sup -$, Ag, rare earths, and 26 other elements whose concentration ranges and recommended analytical spectral lines are tabulated. A spark-source mass spectrographic method is described for the determination of impurities in the atom-ppB range. All methods are described in detail including procedure, detection limits, and interferences when applicable. (BLM)

EDB SUBJECT CATEGORY: EDB-400102;400104;050700
INIS CATEGORY: B11

<712>
Standard methods for chemical, mass spectrometric, and spectrochemical analysis of nuclear-grade plutonium dioxide powders and pellets INS-76:013239;EDB-76:042496; Annu. Book ASTM Stand. (ASTSA) (45):214-250 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM: T8;AMPEROMETRY: Q45;ANTIMONY: T32;ARSENIC: T10;BARIUM: T13;BERYLLIUM: T14;BISMUTH: T15;BORON: T12;CADMIUM: T17;CALCIUM: T16;CARBON: T3;CHEMICAL ANALYSIS: Q1;CHLORINE: T5;CHROMIUM: T20;COBALT: T18;COPPER: T19;EMISSION SPECTROSCOPY: Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18,Q19,Q20,Q21,Q22,23,Q24,Q25,Q26,Q27,Q28,Q29,Q30,Q31,Q32,Q33,Q34,Q35,Q36,Q37,Q3,Q39,Q40,Q41,Q42;FLUORINE: T4;FUEL PELLETS;GALLIUM: T22;GOLD: T11;INDIUM: T23;ION SELECTIVE ELECTRODE ANALYSIS: Q4,Q5;IRON: T21;LEAD: T30;MAGNESIUM: T25;MANGANESE: T26;MASS SPECTROSCOPY: Q44;MERCURY: T41;MOISTURE;MOLYBDENUM: T27;NICKEL: T28;NITROGEN: T2;PALLADIUM: T31;PHOSPHORUS: T29;PLUTONIUM: T45;PLUTONIUM DIOXIDE: T1;PLUTONIUM ISOTOPES: T44;POTASSIUM: T24;POWDERS;QUANTITATIVE CHEMICAL ANALYSIS: Q3;RARE EARTHS: T7;SILICON: T33;SILVER: T9;SPECTROPHOTOMETRY: Q2,Q4,Q5,Q6;STRONTIUM: T35;SULFUR: T6;THORIUM: T42;TIN: T34;TITANIUM: T36;TITRATION: Q4,Q45;TRACE AMOUNTS;TUNGSTEN: T38;VANADIUM: T37;VOLTAMETRY: Q45;ZINC: T39;ZIRCONIUM: T40

ABSTRACT: Various methods are described in detail as to procedure, interferences, and limits of detection or applicability for the determination of Pu and various impurities in PuO$sub 2$ powders and pellets. Methods for the determination of Pu are controlled-potential coulometry, ceric sulfate titration, and amperometric titration with Fe$sup 2+$. Spectrophotometric methods are given for N and S, and a direct combustion-thermal conductivity method for the determination of total C is described. A pyrohydrolysis

<712> CONT.
method is described for the determination of mug amounts of Cl$sup -$ and F$sup -$. A mass spectrometric determination of the Pu isotopic content of the oxide is included, and general chemical methods are included for the determination of moisture in both powders and pellets and for total gas--exclusive of moisture--in pellets. Spectrochemical methods are described for the determination of rare earths, 36 trace elements whose recommended analytical spectral lines and concentration ranges are tabulated, and impurities occurring in the atom-ppB range. (BLM)

EDB SUBJECT CATEGORY: EDB-400102;400104;050700
INIS CATEGORY: B11

<713>
Standard methods for chemical, mass spectrometric, and spectrochemical analysis of nuclear-grade mixed oxides (U,Pu)O$sub 2$ INS-76:013240;EDB-76:042497; Annu. Book ASTM Stand. (ASTSA) (45):251-292 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM: T16;AMPEROMETRY: Q4;BARIUM: T18;BERYLLIUM: T19;BISMUTH: T20;BORON: T17;CADMIUM: T22;CALCIUM: T21;CARBON: T8;CHEMICAL ANALYSIS: Q1,Q2;CHLORINE: T9;CHROMIUM: T24;COBALT: T23;COPPER: T25;EMISSION SPECTROSCOPY: Q14,Q15,Q16,Q17,Q18,Q19,Q20,Q21,Q22,Q23,Q24,Q25,Q26,Q27,Q28,Q9,Q30,Q31,Q32,Q33,Q34,Q35,Q36,Q37,Q38,Q39,Q40,Q42,Q43;FLUORIN: T10;FUEL PELLETS;ION SELECTIVE ELECTRODE ANALYSIS: Q9,Q10;IRON: T26;LEAD: T33;MAGNESIUM: T27;MANGANESE: T28;MASS SPECTROSCOPY: Q5,Q6;MERCURY: T42;MOLYBDENUM: T29;NICKEL: T31;NITROGEN: T11;PHOSPHORUS: T32;PLUTONIUM: T4;PLUTONIUM DIOXIDE: T2;PLUTONIUM ISOTOPES: T6;POTASSIUM: T40;POWDERS;QUANTITATIVE CHEMICAL ANALYSIS: Q8;RARE EARTHS: T14;SILICON: T34;SILVER: T15;SODIUM: T30;SPECTROPHOTOMETRY: Q9,Q10,Q11,Q12,Q13;SULFUR: T12;THORIUM: T43;TIN: T35;TITANIUM: T36;TITRATION: Q4,Q9;TRACE AMOUNTS;TUNGSTEN: T13;URANIUM: T3;URANIUM DIOXIDE: T1;URANIUM ISOTOPES: T5;VANADIUM: T37;VOLTAMETRY: Q3,Q4;ZINC: T38;ZIRCONIUM: T39

ABSTRACT: Methods are described for the determination of both Pu and U in mg quantities and for trace impurities in mixed oxides (U,Pu)O$sub 2$. Controlled-potential coulometry methods are described for both U and Pu, and an amperometric titration method using Fe$sup 2+$ is included for Pu. The isotopic content of the oxide is determined by a mass spectrometric method. Methods are described for the determination of moisture and of total gas-other than moisture-in mixed oxide pellets. Direct combustion-thermal conductivity and pyrohydrolysis methods are included for the determination of C and Cl$sup -$ and F$sup -$, respectively. Spectrophotometric methods are described for the

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<713> CONT.
determination of N, S, and W. Trace amounts of rare earths and 25 other elements whose recommended analytical spectral lines and concentration ranges are tabulated are determined by spectroscopic methods. (BLM)

EDB SUBJECT CATEGORY: EDB-400102;400104;050700
INIS CATEGORY: B11

<714>
Standard methods for chemical, mass spectrometric, spectrochemical, nuclear, and radiochemical analysis of nuclear-grade plutonium metal INS-76:013241;EDB-76:042498; Annu. Book ASTM Stand. (ASTSA) (45):356-366 (1975)

SUBJECT DESCRIPTORS: ALUMINIUM: T16;AMERICIUM 241: T10;ANTIMONY: T39;ARSENIC: T18;BARIUM: T21;BERYLLIUM: T22;BISMUTH: T23;BORON: T20;CADMIUM: T25;CALCIUM: T24;CARBON: T2;CHEMICAL ANALYSIS: Q1;CHLORINE: T6;CHROMIUM: T28;COBALT: T26;COPPER: T27;EMISSION SPECTROSCOPY: Q5,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18,Q19,Q20,Q21,Q22,Q23,Q24,Q2 ,Q26,Q27,Q28,Q30,Q31,Q32,Q33,Q34,Q35,Q36,Q37,Q38,Q39,Q40,Q41, 42,Q43,Q44,Q45,Q46,Q47;FLUORINE: T7;GALLIUM: T30;GAMMA SPECTROSCOPY: Q3,Q4;GOLD: T19;INDIUM: T31;IRON: T5;LEAD: T38;LITHIUM: T15;MAGNESIUM: T33;MANGANESE: T34;MERCURY: T47;MOLYBDENUM: T35;NICKEL: T36;NIOBIUM: T13;NITROGEN: T8;PHOSPHORUS: T37;PLUTONIUM: T1;POTASSIUM: T32;RADIOMETRIC ANALYSIS: Q10;RARE EARTHS: T11;SILICON: T40;SILVER: T17;SODIUM: T14;SPECTROPHOTOMETRY: Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9;STRONTIUM: T42;SULFUR: T9;THORIUM: T4;TIN: T41;TITANIUM: T43;TRACE AMOUNTS;TUNGSTEN: T12;URANIUM: T3;VANADIUM: T44;ZINC: T45;ZIRCONIUM: T46

ABSTRACT: Methods are described for the analysis of matrix materials and various impurities in Pu metal. Controlled-potential coulometry, amperometric titration with Fe$sup 2+$, or titration with ceric sulfate methods are described for the determination of Pu. A mass spectrometric method is given for determination of the isotopic content of the metal. Determination of C by direct combustion-thermal conductivity is described. Methods for the spectrophotometric determination of U with arsenazo I, Th with thorin, Fe with 1,10-phenanthroline or $alpha$,$alpha$'-dipyridyl, and Cl$sup -$, F$sup -$, N, and S following separation by distillation are described. If the Pu metal does not contain significant amounts of other radioactive fission products or high specific-activity $gamma$ emitters, $sup 241$Am may be determined by $gamma$ counting. Determination of $gamma$-emitting fission products, U and Th, is determined by $gamma$ spectroscopy. Spectrochemical methods for the

<714> CONT.
determination of rare earths, W, Nb, Ta, and about 40 other trace elements are included. (BLM)

EDB SUBJECT CATEGORY: EDB-400102;400103;400104;050700
INIS CATEGORY: B11

<715>
Standard method of test for atom percent fission in uranium and plutonium fuel (mass spectrometric method)
INS-76:014736;EDB-76:049037; Annu. Book ASTM Stand. (ASTSA) (45):739-744 (1975)

SUBJECT DESCRIPTORS: BURNUP: Q3;FUEL ELEMENTS: T3;MASS SPECTROSCOPY: Q4,Q5,Q6,Q7,Q8,Q9,Q10;PLUTONIUM;PLUTONIUM 239: T6;PLUTONIUM 240: T7;PLUTONIUM 241: T8;PLUTONIUM 242: T9;URANIUM;URANIUM 235: T4;URANIUM 236: T5;URANIUM 238: T10

ABSTRACT: A method is described for the determination of the heavy element atom percent fission in irradiated U fuel with initial Pu content of from 0 to 50 percent from the isotopic content of the fuel before and after irradiation. The method is restricted to samples where accurate preirradiation isotopic analysis can be obtained, and both analyses should be performed on the same instrument under similar conditions. Atomic ratios of the isotopes $sup 235$U, $sup 236$U , $sup 239$Pu, $sup 240$Pu, $sup 241$Pu, and $sup 242$Pu to $sup 238$U are determined by mass spectrometry. The atom percent fission attributed to fission of $sup 235$U, $sup 238$U, and $sup 241$Pu is separately calculated and then summed to obtain the total heavy element atom percent fission. The calculations for the determination are explained in detail. (BLM)

EDB SUBJECT CATEGORY: EDB-400104;050800
INIS CATEGORY: B11;B16

<716>
Standard method of test for atom percent fission in uranium and plutonium fuel (neodymium-148 method)
INS-76:014738;EDB-76:049039; Annu. Book ASTM Stand. (ASTSA) (45):806-814 (1975)

SUBJECT DESCRIPTORS: BURNUP: Q4;CHEMICAL ANALYSIS;FISSION PRODUCTS;ION EXCHANGE;ISOTOPE DILUTION;MASS SPECTROSCOPY: Q3;NEODYMIUM 148: T3;NUCLEAR FUELS: T4;PLUTONIUM;URANIUM

ABSTRACT: Measurement of $sup 148$Nd by mass spectroscopy in irradiated U fuel with initial Pu content of 0 to 50 percent is described as a method for determination of burnup. A blended spike of $sup 150$Nd, $sup 233$U, and $sup 242$Pu is

<716>

<716> CONT.
added to the sample, and then the Nd, U, and Pu fractions are separated from each other by ion exchange. The decontaminated Nd is mounted on a Re filament for mass analysis. The atom percent fission is directly proportional to the $sup 148$Nd-to-fuel ratio in the irradiated fuel. (BLM)

EDB SUBJECT CATEGORY: EDB-400104;050800
INIS CATEGORY: B11;B16

<717>
CODATA recommended key values for thermodynamics, 1976. Report of the CODATA Task Group on key values for thermodynamics, 1976 AIX-08:339840;EDB-78:017278; J. Chem. Thermodyn. (JCTDA) 9:(8):705-706 (Aug 1977)

SUBJECT DESCRIPTORS: BERYLLIUM: T1;BERYLLIUM OXIDES: T2;DATA;ENTHALPY: Q1,Q2,Q3,Q4,Q5;ENTROPY: Q1,Q2,Q3,Q4,Q5;FORMATION HEAT: Q1,Q2,Q3,Q4,Q5;INTERNATIONAL ORGANIZATIONS;RECOMMENDATIONS;THORIUM: T3;THORIUM OXIDES: T4;URANIUM: T5

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-400201
INIS CATEGORY: B12

<718>
Carnegie Institution of Washington, D.C. (USA). Dept. of Terrestrial Magnetism

In Optical spectroscopy of $sup 237$Np in CaF$sub 2$. Final report ** INS-77:011429;ERA-02:043798;EDB-77:101128; (1976) COO--3245-5

SUBJECT DESCRIPTORS: ABSORPTION SPECTRA: Q1;CALCIUM FLUORIDES: T1;DOPED MATERIALS;EMISSION SPECTRA: Q1;FLUORESCENCE;NEPTUNIUM 237: T

ABSTRACT: An analysis was made of the optical absorption and fluorescence spectra of green-colored Np : CaF$sub 2$ specimens. The absorption spectra were attributed to Np$sup 3+$(5f$sup 4$) substituents at Ca$sup 2$+ [000] sites with three distinct modes of charge compensation and correspondingly lowered local symmetries: (1) C/sub 3v/, associated with an F$sup -$ compensator at a [$sup 1$/$sub 2$$sup 1$/$sub 2$$sup 1$/$sub 2$]-type site, (2) C/sub 3v/, associated with the replacement of a nn F$sup -$ by an O$sup 2-$, (3) C/sub 4v/, associated with an F$sup -$ compensator at a [00$sup 1$/$sub 2$]-type site. A two-parameter fit to the positions of the multiplet centers yielded for these

<718> CONT.
sites, the following F$sub 2$ and zeta values (in cm$sup -1$): (1) 214.5 and 2032, (2) 212.7 and 2001, (3) 219.1 and 2083. ''Crystal-field'' parameters, derived from fits to the multiplet splittings, were calculated by molecular orbital techniques. Fluorescence, observed in the infrared, was assigned solely to the C/sub 4v/-symmetry site.

EDB SUBJECT CATEGORY: EDB-400201;400702
INIS CATEGORY: B12;B13

<719>
Combustion Engineering, Inc., Windsor, Conn. (USA)

In Fuel-clad interaction. C-E thermo-structural fuel evaluation methods **
INS-76:017364;ERA-01:023241;EDB-76:064254; (Apr 1976)
CENPD--179

SUBJECT DESCRIPTORS: CRACKS;FUEL CANS;FUEL PELLETS;FUEL-CLADDING INTERACTIONS: M2,Q1;MATHEMATICAL MODELS: Q2;PWR TYPE REACTORS: T1;STRAINS;STRESSES;URANIUM DIOXIDE;ZIRCALOY

ABSTRACT: Thermal and irradiation induced distortions experienced during the service life of a fuel rod lead to pellet-clad gap closure and local clad stresses and strains. In addition, presence of fission products can be detrimental to the ability of the clad to sustain such stresses and strains. A thermo-structural fuel evaluation model is described which has been developed to analyze the response of Zircaloy clad uranium dioxide fuel rods during pellet-clad interaction (PCI). The approach taken has been to utilize several analyses consisting of (1) an axisymmetric, cylindrical, pellet average model of history dependent behavior of the fuel rod and (2) pellet distortion and cracking models. Stresses and strains are to be compared with failure criteria to define conditions for which incipient fuel rod failure would exist. A description of the mathematical and behavioral models, failure criteria, and results for typical fuel rod geometries and power histories is presented.

EDB SUBJECT CATEGORY: EDB-210200
INIS CATEGORY: E32

<720>

<720>
Electrochimica Corp., Menlo Park, Calif. (USA)

In Research on a high-energy nonaqueous battery system.
Quarterly progress report No. 1, 1 Dec 1965--1 Mar 1966 **
EDB-76:047724; (Mar 1966) AD--484014

SUBJECT DESCRIPTORS: ELECTRODES: Q1;LITHIUM-COPPER CHLORIDE BATTERIES: T1

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250901;400201

<721>
Florida Univ., Gainesville (USA). Dept. of Chemistry

In Electrochemical methods for monitoring purity of molten salts. Semiannual progress report, July--December 1975 **
INS-76:014764;ERA-01:020254;EDB-76:054434; (1975) ORO--4947-1

SUBJECT DESCRIPTORS: CHEMICAL ANALYSIS: Q1,Q2;ELECTROCHEMISTRY: Q1,Q2;ELECTRODES;EUTECTICS;LITHIUM CHLORIDES: T1;MOLTEN SALTS;PLATINUM;POTASSIUM CHLORIDES: T2;QUALITATIVE CHEMICAL ANALYSIS;RESEARCH PROGRAMS

ABSTRACT: The tentative determination of visible impurities in the LiCl-KCl eutectic salt as Fe, silica, and nitrides was reported. Moisture was removed by bubbling HCl through the melt. Of the three electrodes tested Pt had the least residual current and was the most stable. Some etching of the Pt electrode was observed in the preliminary stages of the experiment. (JSR)

EDB SUBJECT CATEGORY: EDB-400400;360603
INIS CATEGORY: B24

<722>
General Atomic Co., San Diego, Calif. (USA)

In Thorium utilization program. Quarterly progress report for the period ending May 31, 1977 **
ERA-03:006028;EDB-78:001097; (Jun 1977) GA-A--14441

SUBJECT DESCRIPTORS: ADSORPTION;CENTRIFUGATION;COATED FUEL PARTICLES: T8;COMBUSTION PROPERTIES;CONTAINMENT SYSTEMS;CONTROL ELEMENTS;CONVEYORS;CRUSHING: Q2;DESIGN: Q7;DISSOLVERS;DUSTS;FLOWSHEETS: Q4;FLUIDIZED-BED COMBUSTION: Q8,Q2;FLUIDIZED-BED COMBUSTORS: T9;FUEL CYCLE: Q1;FUEL REPROCESSING PLANTS: T5;GAS FLOW;GRAPHITE;HEAD END PROCESSES;HTGR TYPE REACTORS:

<722> CONT.
T1;IODINE;MAINTENANCE;MANAGEMENT;MATERIAL BALANCE;MATERIALS HANDLING;NITROGEN OXIDES;NON-PROLIFERATION TREATY: T;OFF-GAS SYSTEMS: T4;OPERATION;PERFORMANCE TESTING: Q9;PILOT PLANTS: Q5;QUANTITY RATIO;RESEARCH PROGRAMS: Q3;RUTHENIUM FLUORIDES;SEALS;SEPARATION PROCESSES;SILICON CARBIDES;SOLIDS;SOLVENT EXTRACTION;SPENT FUEL CASKS: T7;SPENT FUEL ELEMENTS: T2;SULFUR DIOXIDE;THOREX PROCESS: T3;TRITIUM;URANYL NITRATES;VENTILATION;VOLATILITY

ABSTRACT: Results of work performed under the National HTGR Fuel Recycle Program (also known as the Thorium Utilization Program) at General Atomic Company are presented. Results of work on this program prior to June 1974 were included in a quarterly series on the HTGR Base Program. The work reported includes the development of unit processes and equipment for reprocessing of High-Temperature Gas-Cooled Reactor (HTGR) fuel, the design and development of an integrated pilot line to demonstrate the head end of HTGR reprocessing using unirradiated fuel materials, and design work in support of Hot Engineering Tests (HET). Work is also described on trade-off studies concerning the required design of facilities and equipment for the large-scale recycle of HTGR fuels in order to guide the development activities for HTGR fuel recycle.

EDB SUBJECT CATEGORY: EDB-050800

<723>
Institute of Nuclear Physics, Krakow (Poland)

Nuclear spectroscopy. Laboratory of chemistry and radiochemistry In Progress report 1971. Vol. 1 ** EDB-76:037142; (Nov 1972) INIS-mf--1946

SUBJECT DESCRIPTORS: CARRIER-FREE ISOTOPES: T1;CHEMISTRY;COMPLEXES;ELEMENTS;EXTRACTION CHROMATOGRAPHY;METALS;RADIOCHEMISTRY: T,Q1;RARE EARTHS;SOLVENT EXTRACTION;SYNTHESIS;TRANSPLUTONIUM ELEMENTS

ABSTRACT: NONE

EDB SUBJECT CATEGORY: EDB-400702
INIS CATEGORY: B13

<724>

<724>
Japan Atomic Energy Research Inst., Tokyo

In Adaptation of the continuous cold trap system of fluidized-bed to the fluoride volatility process ** AIX-08:300953;ERA-02:041078;EDB-77:092326; (Feb 1976) JAERI-M--6405

SUBJECT DESCRIPTORS: COLD TRAPS: Q1;DECONTAMINATION;EFFICIENCY;FLUIDIZED BED;FLUORIDE VOLATILITY PROCESS: T1,Q2,Q3;PERFORMANCE;PLUTONIUM FLUORIDES: T2;PURIFICATION;RADIOLYSIS;URANIUM HEXAFLUORIDE: T3;VAPOR CONDENSATION

ABSTRACT: A continuous cold trap system consisting of fluidized condenser and stripper has been evaluated with a view to adapt it to the Fluoride Volatility Process in establishing the continuous purification process without radiation decomposition of PuF$sub 6$. Its feasibility is shown by the test with UF$sub 6$-air. Necessary conditions for the cold trap, and performance of the 2-in. dia fluidized bed cold trap system are presented, and also a model of mist formation in the condenser.

EDB SUBJECT CATEGORY: EDB-050400;050800
INIS CATEGORY: B16

<725>
Japan Atomic Energy Research Inst., Tokyo

In Fluorination process studies of plutonium dioxide by fluid-bed ** AIX-08:300956;ERA-02:041095;EDB-77:092367; (Feb 1976) JAERI-M--6392

SUBJECT DESCRIPTORS: CONTROL;FLUIDIZED BED;FLUORIDE VOLATILITY PROCESS;FLUORINATION: Q2,Q3;NEUTRON MONITORS;PERFORMANCE TESTING;PLUTONIUM: T1;PLUTONIUM DIOXIDE: T2;POWDERS;RECOVERY: Q1;SAMPLERS;SAMPLING;SYSTEMS ANALYSIS;URANIUM DIOXIDE: T3

ABSTRACT: As the first stage towards establishing the F$sub 2$ two-step fluorination process for stable recovery of plutonium, the fluorination process has been studied with PuO$sub 2$ and UO$sub 2$ powder in the 2''phi fluid-bed. Fluorination process characteristics and related problems were clarified. This report describes outlines of experimental system and its design philosophy, overall operating test with UO$sub 2$, fluorination studies of

<726> CONT.
PuO$sub 2$, analysis with a neutron process monitor and powder sampling.

EDB SUBJECT CATEGORY: EDB-050800
INIS CATEGORY: B16

<726>
Japan Atomic Energy Research Inst., Tokyo

In Analysis of uranium carbides ** AIX-08:300779;EDB-77:094584; (Mar 1976) JAERI--1242

ABSTRACT: The Committee on the Analytical Chemistry of Nuclear Fuels and Reactor Materials, JAERI, undertook the analytical problems on the analysis of uranium carbides during the period November, 1971 to September, 1973. Nine laboratories participated in the cooperative analyses of three uranium carbide samples (Samples K, M, N; two uranium monocarbide and one uranium dicarbide) for total carbon, free carbon, oxygen and nitrogen, and useful information was obtained. The analyzed samples were also useful, and the preparation and the characteristics were described together with the analytical results.

EDB SUBJECT CATEGORY: EDB-400100
INIS CATEGORY: B11

<727>
Mallory (P.R.) and Co., Inc., Burlington, Mass. (USA)

In Research on electrochemical parameters for nonaqueous batteries: task I. Quarterly progress report No. 3 ** EDB-76:059426; (Jul 1970) AD--874598

SUBJECT DESCRIPTORS: BATTERY SEPARATORS;COMPARATIVE EVALUATIONS;COPPER CHLORIDES;ELECTROCHEMISTRY: Q1;ELECTRODEPOSITION;ELECTROLYTES;LITHIUM;MEDIUM TEMPERATURE;METAL-NONMETAL BATTERIES: M1;ORGANIC NITROGEN COMPOUNDS;POLARIZATION;SOLUBILITY;STABILITY;TEMPERATURE DEPENDENCE

ABSTRACT: None

EDB SUBJECT CATEGORY: EDB-250901

<728>

<728>
Massachusetts Inst. of Tech., Cambridge (USA)

In Basic research in crystalline and noncrystalline ceramic systems. Annual report, May 1, 1975--April 1, 1976 **
INS-08:019472;ERA-02:001048;EDB-76:081613; (1976)
COO--2390-10

ABSTRACT: Activities in research programs on ceramics are reported in sections on electric conductivity and dielectric properties, microstructure and properties, ion transport and diffusion, defect interactions and grain boundary phenomena, and future developments. (JRD)

EDB SUBJECT CATEGORY: EDB-360200
INIS CATEGORY: B23

<729>
Oak Ridge National Lab., Tenn. (USA)

Molten-salt systems In Chemistry Division annual progress report for period ending November 1, 1975 **
NSA-33:28433;ERA-01:013800;EDB-76:036889; (Feb 1976)
ORNL--5111

SUBJECT DESCRIPTORS: BENCH-SCALE EXPERIMENTS;CHROMIUM FLUORIDES: T9;ELECTRODES: T10;FABRICATION: Q10;MOLTEN SALT REACTORS;MOLTEN SALTS: T11;PHASE DIAGRAMS: Q6,Q7;RESEARCH PROGRAMS: Q11;SODIUM FLUORIDES: T8;STABILITY: Q8,Q9

ABSTRACT: Progress is reported on studies concerned with the molten-salt reactor program. Estimates of the deposition of Te on Hastelloy N surfaces in a molten salt breeder reactor (MSBR) were calculated. Experiments were conducted to evaluate the extent of Te-induced grain boundary cracking that occurs when Hastelloy N or its various modified alloys are exposed to Te vapor. Results of preliminary studies on hydrogen reduction equilibrium of UF$sub 4$ dissolved in molten fluoride mixtures and studies on the effects of oxygen on the equilibrium of UF$sub 3$--UF$sub 4$ molten fluoride solutions contained in graphite are reported. In studies on the chemistry of Na fluoroborate, the following compounds were prepared and characterized: H$sub 3$OBF$sub 4$, BF$sub 3$. 2H$sub 2$O, HBF$sub 2$(OH)$sub 2$, NaBF$sub 3$OH, Na$sub 2$B$sub 2$F$sub 6$O, and Na$sub 3$B$sub 3$F$sub 6$O$sub 3$. Progress in studies on the thermodynamics of corrosion product fluorides in molten-salt reactor coolants is given. In experiments on the chemistry of fluorination and fuel reconstitution, a detailed investigation of the reaction UF$sub 5$(d) + $sup 1$/$sub 2$H$sub 2$(g) $Yields$ UF$sub 4$(d) + HF(g) was carried out. A bench-scale test assembly

<729> CONT.
incorporating a small packed-bed electrode of glassy carbon spheres was constructed and was tested on the LiCl--KCl eutectic system. (JGB)

EDB SUBJECT CATEGORY: EDB-400201;400702

<730>
Oak Ridge National Lab., Tenn. (USA)

Chemistry of transuranium elements In Chemistry Division annual progress report for period ending November 1, 1975 **
NSA-33:28596;ERA-01:013852;EDB-76:037139; (Feb 1976)
CRNL--5111

SUBJECT DESCRIPTORS: CHEMISTRY;MOLECULAR STRUCTURE: Q10;RESEARCH PROGRAMS: Q18;TRANSURANIUM ELEMENTS: T18

ABSTRACT: The half-wave amalgamation potential of No (element 102) was determined. Studies on the preparation and properties of Cf are reported; previously reported results on Es were confirmed. The heat of solution of Bk was measured. Spectroscopic and x-ray diffraction studies of Es-253 bromides are reported. Salicylate complexes with Sm(III), Am(III), Th(IV), and U(IV)O$sub 2$ were prepared; crystal data are given. Results of studies on the effect of secondary bonds on the strength of O double bond Np double bond O bonds are reported. The M series x rays of Np were measured. Anomalous spin--orbit splitting of the 4f level in the actinide series is reported. Progress is reported in studies on the Cf oxide system for oxygen pressures up to 760 mm and temperatures between 25 and 1000$sup 0$C, as well as structural parameters of transplutonium oxysulfates and oxysulfides and actinide and lanthanide hydroxides. The electron paramagnetic resonance spectrum of $sup 253$ Es$sup 2+$ was observed in the cubic monocrystal hosts BaF$sub 2$ and SrCl$sub 2$. (JGB)

EDB SUBJECT CATEGORY: EDB-400702;640302

<731>
Oak Ridge National Lab., Tenn. (USA)

In Summary of U.S. LMFBR programs on high temperature structural design and associated materials testing **
ERA-02:024426;EDB-77:047626; (Oct 1976) ERDA--76/146

SUBJECT DESCRIPTORS: DESIGN;LMFBR TYPE REACTORS: T1;MATERIALS TESTING;REACTOR COMPONENTS: T2,Q1;REACTOR MATERIALS: T3,Q1;RESEARCH PROGRAMS: Q2,Q3;REVIEWS

<731>

<731> CONT.

ABSTRACT: This document was prepared at the request of the Division of Reactor Development and Demonstration (DRDD), U.S. Energy Research and Development Administration. Four general areas of research and development are included: high-temperature structural design; irradiation effects--mechanical properties of structural materials; sodium environmental effects--influence of sodium on mechanical properties; and general material qualification.

EDB SUBJECT CATEGORY: EDB-210500

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