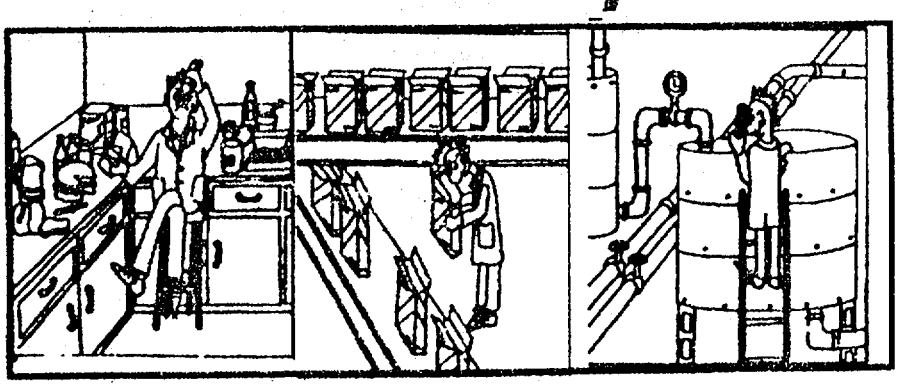
GHANA CHEMICAL SOCIETY

11TH National Annual Conference

at

CHEMU SECONDARY SCHOOL
Community 4, TEMA
from
2ND - 5TH September 1998

THEME: Chemistry in the Development of Ghana towards the 21st Century



WELCOME ADDRESS

Francis W Tuyee
Managing Director, Tuyee Manufacturing Co Ltd, Tema
& Chairman of the Organising Committee of the
11th Annual National Conference

Chemists, Distinguished Guests and Friends of the Ghana Chemical Society, I am highly elated to welcome you all to Tema to the 11th Annual National Conference of the Ghana Chemical Society. More significantly, I wish to welcome 'new' participants to this conference, to say 'welcome back' to 'old' participants and again to say 'Good To See You' to my fellow FELLOWS of the Society. Additionally, I wish to welcome with great pleasure the Minister of Environment, Science & Technology, the Director General of the CSIR, the Tema Municipal Chief Executive, the Tema Mantse, the Members of Parliament for the Tema Area and by no means less all the other distinguished personalities and our worthy Sponsors who have been invited here to grace the occasion. I am particularly grateful that you all have been able to take time off your very busy schedules to attend this Conference in this Industrial and Port City of Tema.

The Conference is playing host to Chemists and Applied Chemists from Manufacturing Industries, Research Institutes, Universities, Government and Public Organisations to deliberate on how the Chemical Science Professionals can channel their know-how, skills and expertise to solve the nation's problems in all areas of national life.
The aim of the Conference is also to examine the role of Chemistry and the Strategic role of Practitioners of Chemistry in the overall development of Ghana as we move towards the twenty-first century. The Plenary Lectures have been carefully selected to elaborate on how Chemistry can be harnessed to impact positively on critical areas of national life such as Energy, Environment, Education, Health, Agriculture, Industrial Development, Consumer Protection and Natural Resources Exploitation.
Chemistry as a science also plays key roles in certain fields in our lives which are less known and appreciated, and to that end, we are holding a special seminar on 'Chemistry in Society' to highlight the role of Chemistry in Fire Prevention, Crime

Detection, Water Quality and Custom's Operations. The aim is to emphasise that there is no area of national life which can escape the impact of Chemistry and this conference will seek to bring this fact to the fore for all to appreciate.

There will also be the opportunity to listen to Papers on selected industrial processes and the results of research work by Chemists in the field. We shall also have the Professional Lecture which will turn the mirror on ourselves to work out how the Chemical Society can be better organised and to re-state its mission clearly.Furthermore there will be a report on the African Association of Pure & Applied Chemistry to inform us of the role we have to play in the context of Chemistry in Africa as a whole. This conference will also offer a forum for the Annual General Meeting and a possible review of some clauses in our Constitution. There will be a tour to some industries in Tema as well.

May I take this opportunity to mention that Tema is a city with peculiar environmental and waste disposal problems, lake and sea pollution, etc.,etc.,etc.,.The proposed free zone in Tema is set to add further to these problems. That is why the Chemical Society has now opened its doors to the Tema Municipal Assembly to embrace the partnership we are offering in creating a pool of Chemical Expertise in Environmental Management, Waste Management, Pollution Abatement, Industrial Quality Control and Development of Small-scale industries. The TMA should adopt totally the Ghana Chemical Society so that together we can serve our municipality and the nation well. To our Sponsors who have together contributed to the financing of this conference,I have a message: Let us keep the bond of friendship and patronage and together let us exploit the magic of Chemistry to our mutual advantage.. Once again, I welcome you to Tema and to this Conference and wish you a happy stay. Thank you and God bless you.

PROFESSIONAL LECTURE

CONTAINING THE CHANGING PHASE OF THE PRACTICE OF CHEMISTRY AS WE APPROACH THE YEAR 2000

by

Professor M Dakubu
Professor of Physical Chemistry
Department of Chemistry, University of Ghana, Legon

I wish to take this opportunity to talk about the future direction of the Ghana Chemical Society.

The Ghana Chemical Society has been in existence for the past 30 years. It is therefore appropriate that as we move into the second millennium we take stock of what the society stands for and whether it is fulfilling its aims

My Paper will therefore address what indicators we should be looking at as we assess our successes and shortcomings.

In doing this, I do not claim I have the answers to all the issues involved and I also do not blame anybody or group of persons for any shortcomings, but rather, I an hoping that this paper will stimulate discussions that will lead to the solutions of any shortcomings.

Some of the questions that I will be raising to serve as indicators are as follows:

- Are we a society, getting involved in the setting up of standards for teaching chemistry at all levels since we are part of the society that has of recent complained about falling standards at all levels? If not why?
- Are we effectively promoting the public perceptions and understanding of chemistry and chemistry related issues?
- Are we involved in persuading/educating government in matters that relate to chemical sciences issues? If not how do can we begin to do this?
- Are we helping or providing leadership for improving career development assistance to all chemists, young and old, in all the varied fields of chemistry both private and government owned? If not why and how can we?
- Is the relationship between the practitioners of chemistry in academia and those in Industry working effectively? If not how do we improve upon this?

My Paper will cover in details some of the issues I have raised above and the hope is that this will lead us to re-assessing our stand as a professional society.

PROGRAMME

THURSDAY 3RD SEPTEMBER 1998

OPENING CEREMONY	:	9.00 AM - 11.00 AM
SNACK BREAK	:	11.00 AM - 11.30 AM

1ST SESSION, CHAIRMAN: DR D K DODOO

11.30am - 12.05pm [PL]	:	The Contribution of Chemical Sciences to Waste Management and Pollution Control in Ghana. (JOHN PWAMANG)
12.05pm - 12.25pm [SC]	:	Heavy Metal Pollution in the Interstitial Sediments of Accra - Tema Beaches (AKPABLI, DRAH & ASUQUOH)
12.25pm - 12.45pm [SC]	:	The Use of Paper and its effect on the Environment (DARKWA)
12.45pm - 1.05pm [SC]	:	The Metal Spectrum of River Sediments from the Densu Reservoir (DEBRAH, ARMAH, CARBOO & BRIMAH)
1.05pm - 1.35pm [PL]	:	Agricultural Chemistry: What Impact have we made? (OWUSU-BENOAH & LARYEA)
1.35pm - 2.35pm	:	*LUNCH BREAK*

2ND SESSION, CHAIRMAN: DR A S K AIDOO

2.35pm - 3.00pm	:	Open Forum on Professional Lecture
3.00pm - 3.30pm	:	Report on AAPAC

3RD SESSION, CHAIRMAN: MR N L HESSE

3.30pm - 3.50pm [PL]	:	Electricity Generation in Ghana - The Role of the Chemist (AMUASI & CO.)
3.50pm - 4.10pm [SC]	:	The Chemical Basis for Nuclear Waste Management (EPHRAIM)
4.10pm - 4.30pm	:	*SNACK BREAK*

4TH SESSION, CHAIRMAN: MR N Y NYAKU

4.30pm - 5.00pm [PL]	:	Quality and Standardisation in the Food and Drink Industry in Ghana. (MARFO)
5.00pm - 5.20pm [SC]	:	Describing and Measuring the performance of UV/Visible Spectrophotometers. (KWAKYE & TINDANA)
5.20pm - 5.40pm [SC]	:	The Calibration of the Calcium Ion Selective Electrode and the determination of its selectivity co-efficient with the presence of different concentrations of Sn^{2+} ion. (BENJAMIN)
5.40pm - 6.00pm[SC]	:	Limestone Deposits in Ghana for Cement Production - - A Paradox. (COLEMAN)
6.00pm - 7.00pm	:	*BREAK & SUPPER*

5TH SESSION, CHAIRMAN: DR FRANCIS ACQUAH

7.00pm - 7.30pm [PL]	:	The Contribution that the Scientific Community should make in the Development of a Local Industrial Base. (BENYARKO)
7.30pm - 9.00pm	:	SELECTED INDUSTRIAL PROCESSES (i) Petroleum Products Production (ii) Cocoa Processing (iii) Lube Oil Production (iv) Aluminium Smelting

FRIDAY, 4TH SEPTEMBER 1998

6TH SESSION, CHAIRMAN: MR KOSI AMEYIBOR

8.00am - 8.30am [PL]	:	Teaching and Learning Chemistry in a Technological World. (BOATENG)
8.30am - 8.50am [SC]	:	Proficiency in English Language and its effect on Cognitive Achievement in Science. (EMINAH)
8.50am - 9.20am [PL]	:	Mineral Exploration in Ghana in the 21st Century. (MANU)
9.20am - 9.40am [SC]	:	Application of Geochemistry to Hydrocarbon Exploration. (ASAFU-ADJEI)
9.40am - 10.10am [PL]	:	Herbal Medicines in Health Care Delivery System: Lost and Emerging Opportunities for the Ghanaian Researcher. (OPPONG-BUACHIE)
10.10am - 10.40am	:	*SNACK BREAK*

7TH SESSION, CHAIRMAN: MR S M MORRISON
(CHEMISTRY IN SOCIETY)

10.40am - 11.00am	:	Assuring the Safety of Public Water supplies - Current Quality Assurance Practices in the GWSC (COLERANGLE)
11.00am - 11.20am	:	The Prevention and Fighting of Fire without a knowledge of Chemistry is a recipe for an Inferno (ATTOBRAH)
11.20am - 11.40am	:	Application of Chemistry in Crime Detection (APEATU)
11.40am - 12.00 noon	:	The Contribution of Chemistry to the Operations of CEPS (R YEBOA)
12.00 noon - 1.00pm	:	*LUNCH BREAK*

8TH SESSION, CHAIRMAN: PROF A A ADIMADO

1.10pm - 1.30pm [SC]	:	A Chemical Spot Test for identification of Clay Minerals (ASARE)
1.30pm - 1.50pm [SC]	:	Stability Constants and Transport Rates of Selenium - Diamine Complexes and Water-Methanol Mixture (KAMBO-DORSA & GADZEKPO)
1.50pm - 2.10pm [SC]	:	B-Sitosterols from the stem-bark of Celtis Mildraedii (OWODO-TETTEH)
2.10pm - 2.30pm [SC]	:	Volatile Organic Matter Content of Locally manufactured Solvent-based Paints (KUMAH)
2.30pm - 2.50pm [SC]	:	Status of Ground Water in the Northern Region of Ghana. (BOATENG & KLAKE)
2.50pm - 3.10pm[SC]	:	Late Breaker.....Late Breaker....Late Breaker
3.15pm - 6.00pm	:	INDUSTRIAL TOURS
6.00pm - 7.00pm	:	*SNACK BREAK*
7.00pm - 9.00pm	:	ANNUAL GENERAL MEETING
9.00pm - 11.00pm	:	CONFERENCE DINNER
11.00pm	:	*CLOSE DOWN*

PLENARY LECTURES

TEACHING AND LEARNING OF CHEMISTRY IN A TECHNOLOGICAL WORLD

by

T A BOATENG
Former Regional Director of Education
P O Box 9182, Ashanti Region, Kumasi

ABSTRACT

Centuries back, when the individual sciences of astronomy, pharmacy and metallurgy were coming into existence, it must have seemed improbable that they could ever become closely correlated through the development of physics and chemistry. In those days, it was freely affirmed that the physical sciences and the biological sciences were poles apart and that each would contribute little to the other. Yet there were always some intellectuals who sensed the unification of science and each decade saw further steps on the road to fulfilment of their dreams.

So this presentation commends to you the viewpoint that the aim of the science educationist should be to implant the broad outlook of the scientist rather than the restricted view of the physicist, the geologist or the biologist. Nature, as we all know, recognises no boundaries between the different aspects of science; nor should we. Indeed, to study most of the problems that confront the manufacturer or the research scientist, a blend of several disciplines is quite commonly necessary. My presentation to you will therefore deal with some of the situations where two or more disciplines are needed.

ELECTRICITY GENERATION IN GHANA - THE ROLE OF THE CHEMIST

by

J H AMUASI, J H EPHRAIM, P O YEBOAH, E T GLOVER & J J FLETCHER
Ghana Atomic Energy Commission
P O Box M-80, Legon

ABSTRACT

The current electricity crisis in Ghana has mandated a holistic approach towards meeting the energy demand of the country In this paper, a brief review of the various technologies for electricity generation is presented and the role of the chemist in each technology is identified. An emphasis is placed on the nuclear option as a plausible component of a comprehensive energy portfolio and the role of the chemist in each step of the nuclear fuel cycle is outlined. The challenges facing the chemists in the country are enumerated and recommendations for ensuring the incorporation of the nuclear option into the total energy mix of the country are presented.

HERBAL MEDICINES IN HEALTH CARE DELIVERY SYSTEM: LOST AND EMERGING OPPORTUNITIES FOR THE GHANAIAN RESEARCHER

by

PROFESSOR KWABENA OPPONG-BOACHIE
Director
Centre for Scientific Research into Plant Medicine
P O Box 73, Mampong - Akuapim, Eastern Region

ABSTRACT

In our attempts to follow the so called "approved" research paradigms and methods, we have often considered our ancestral approaches to drug development, preparation and application methods as unscientific and therefore unworthy. Our altitude stems from unfounded myths propounded in the scientific community and accepted by us, without challenge, as the whole truth and nothing but the truth. Yet great opportunities in herbal medicine exit for our researchers who will be original in thought and practice by humbling themselves before nature.

THE CONTRIBUTION OF CHEMICAL SCIENCES TO WASTE MANAGEMENT AND POLLUTION CONTROL IN GHANA

by

JOHN A PWAMANG
Senior Regional Programme Officer
Environmental Protection Agency
Greater Accra Regional Office, P O Box M-326, Accra

ABSTRACT

The lecture reviews the state of waste management in Ghana with particular focus on wastewater management. It looks at the contribution of the chemical sciences to improved wastewater management and water pollution control in Ghana within the context of the current co-operation and collaboration between the Environmental Protection Agency (EPA), Research Institutions and Industry. Examples of such collaborative efforts are given in addition to some positive developments in industrial wastewater management.

The lecture concludes by exploring ways of further enhancing the contribution of the chemical sciences to improved wastewater management and water pollution control in Ghana.

QUALITY AND STANDARDISATION IN THE FOOD AND DRINK INDUSTRY IN GHANA

by

REV (DR) E K MARFO
Director
Ghana Standards Board
P O Box M-245, Accra

ABSTRACT

Our lives are dependent in many ways on industrial products, shelter, nutrition, communication, health care, work, recreation and national security. One basic aspect of products of this type (regardless of whether they are goods or services) is that they must be fit for use or fulfill the customer's expectation. The quality of a product or service can therefore be defined as:-

i) its fitness for use or

ii) ability to fulfill the customer's expectation

iii) the totality of features and characteristics of a product or

iv) service that bear on its ability to satisfy stated or implied needs.

To be able to regularly produce quality products or services, there is need to practice standardisation which was first introduced and practised by God during creation. The sun rises at the east and sets at the west regularly. Standardisation is an essential ingredient in every activity.

Lack of practice of standardisation has been one of the major causes of the failure of many Ghanaian Industries and Enterprises.

Standardisation brings about:-

i) Standardisation brings about realization of optimal economy i.e. Economic benefits throughout the industrial process from initial product to ultimate use.

ii) Standardisation brings about reduction of the variety of products being manufactured and this leads to substantial economies resulting from longer production runs, less time in tooling and setting up and increased mechanisation.

iii) Products made to Standards enjoy a wider and more reliable market, thereby ensuring a steady growth of the industry.

iv) Standards serve as an essential means of communication between purchaser and producer.

v) Standardisation of packages, containers, pellets, etc., has made it possible for larger quantities of goods to be carried and delivered safely.

vi) Standardisation is essential in environmental management.

vii) Standardised products imply a guarantee of safety, reliability, durability and maintainability.

viii) Standardisation is essential in the food and drink industry as it ensures that the products maintain the same quality constantly

In totality therefore, standardisation is the tool for achieving industrial and economic progress in any society.

Against this understanding of the concept and benefits of Standardisation, this Paper will discuss the issue of possible fraud and adulteration in the food and drink industry in Ghana and the role of Chemists in checking these and ensuring that the relevant standards are available and being made use of by all stakeholders.

AGRICULTURAL CHEMISTRY: WHAT IMPACT HAVE WE MADE?

by

E OWUSU-BENOAH AND K B LARYEA
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University of Ghana
P O Box 58, Legon

ABSTRACT

The application of basic knowledge of chemistry has made tremendous contribution to the different sectors of Ghanaian agriculture. The ever-increasing number and complexity of synthetic chemicals as we has management of natural chemicals has been of tremendous benefit to humans. This Paper discusses the impact of Agricultural Chemistry especially Soil Chemistry on agricultural production in Ghana.

It focuses to some extent on fertilisers and pesticides, which are major tools in crop production. The soil is often a depository of chemicals whether internationally or otherwise. Thus movement, sorption, and equilibria of chemicals in soils is fundamental to improved crop production and environmental management. Soil Chemists have played a unique role in explaining this dynamic behaviour and in the future, can guide efforts to integrate the effects of these processes.

This expertise can be applied to aid predictions of the fate of chemicals in the vadose zone, in groundwater, and in watersheds. The challenge facing soil chemists in the years ahead is to develop ways to use chemicals more effectively for food and fibre production. At the same time producers must learn how to manage these chemicals in the soil so as

MINERAL EXPLORATION IN GHANA IN THE 21ST CENTURY

by

DR J MANU
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Department of Geology
P O Box 58, Legon

ABSTRACT

Geologists use a number of borrowed tools. Some of these come from physicists, mathematicians, biologists and chemists. Knowledge of the behaviour of the elements and their occurrence in nature formed the basis from which both modern chemistry and geology grew in the 18th Century.

In the course of separating and characterising the properties of the elements made by modern chemistry contribution was also made by geologist.

Since the birth of geochemistry as a discipline of geology, each advance in technology has invited both geologists and chemists to scrutinise the earth more closely. The development of Ghana in the 21st Century will be met by some technological advances which will be a challenge to geologists and their allied professionals, chemists among others.

The challenges which may not be growth at basic theory will certainly be in data gathering of minerals which can be exploited for the industry.

Minerals which can be exploited for the development of Ghana in the 21st Century are discussed indicating the complementary role of chemist.

THE CONTRIBUTION THAT THE SCIENTIFIC COMMUNITY SHOULD MAKE IN THE DEVELOPMENT OF A LOCAL INDUSTRIAL BASE

by

ERIC K BENYARKO
Managing Director
Cadbury Ghana Limited, Accra

ABSTRACT

The economic development of any emerging nation depends on her ability to process her raw agricultural, forest, mineral and other natural resources into usable products in a most cost effective way. To be able to bring this about requires that the scientific resources of the Country, both human and material be harnessed and supported positively to engage in that kind of research activity which can be useful and relevant to the development of a sound industrial base. This then becomes the primary role of the scientific community towards the creation of a viable industrial base and sustaining it.

The objective of this Paper is to share the author's experiences on this very important subject.

TOPICS FOR SPECIAL SEMINAR

THE PREVENTION AND FIGHTING OF FIRE WITHOUT A KNOWLEDGE OF CHEMISTRY IS A RECIPE FOR AN INFERNO

by

KRU AGYARKO-ATTOBRAH
Assistant Chief Fire Officer
Ghana National Fire Service
Headquarters, P O Box 4129, Accra

ABSTRACT

The paper to be presented is based on the premise that unwanted fire is one of the foremost threats to human development and survival. Every human endeavour has a need to address fire prevention and protection in order to preserve our existence. Many references and guidelines address the subject of fire prevention and protection. However, they do not adequately address the basic fundamental knowledge of fire prevention and fire fighting, i.e, The Chemistry of Combustion and Methods of Extinction.

In order to make it evidently clear that a basic knowledge in Chemistry is a needed tool in Fire Prevention and Fighting, the paper will talk about the following:

a) The Chemistry of Combustion

b) Methods of Extinction

c) Types of Extinguishing Agents

d) Types of Fire Extinguishers

e) Toxicity of certain products of Fire

To end this abstract we say that Fire Prevention and Protection play important role in today's economy. There exists a critical balance between production and delivery of consumer products with the facilities and personnel to accomplish this need. To upset this balance through unnecessary occurrence of workplace, fire can have a disastrous effect on many people. We can ill afford to allow the needless waste from fire resulting in the loss of goods, services and jobs.

ASSURING THE SAFETY OF PUBLIC WATER SUPPLIES - CURRENT QUALITY ASSURANCE PRACTICES IN GWSC

by

MRS PEACE OCANSEY-COLERANGLE
Assistant Director (WQA)
Ghana Water & Sewerage Corporation
ACCRA

ABSTRACT

Sustenance of life hinges on availability of water which has no substitute. This vital natural resource occurs abundantly in nature although not uniformly. The old adage which goes thus "Water, water everywhere but not a drop to drink" stands more strongly today than ever as death and health depend on the quality of water available.

Safe, good quality drinking water is dependent upon the fulfilment of a number of criteria not least of which is the quality of the source water.

Drinking water quality assurance is a highly specialised business which must conform to a set of uncompromising regulations. Standards for drinking water are an integral part of these regulations which also cover areas such as frequency of monitoring, water quality control, sampling arrangements, quality of materials and processes, etc.

Water quality is a universal concept and as such WHO has formulated a set of guideline values for drinking water which can be modified or adopted by any country to suit its prevailing conditions.

GWSC, since 1966 has rigorously applied WHO Drinking Water Standards, now Guidelines, in its operations up till now.

However, a multidisciplinary committee headed by GWSC under the auspices of the Ghana Standards Board (GSB) has come out with a draft drinking water quality standards for Ghana. This is awaiting Government's approval and issuance of LI.

This Paper throws light on the processing, treatment and testing of water to make it safe for drinking as practiced by the GWSC.

THE CONTRIBUTION OF CHEMISTRY TO THE OPERATIONS OF THE CUSTOMS EXCISE AND PREVENTIVE SERVICE

by

MS REGINA YEBOA
Pharmaceutical Chemist
Customs Excise & Preventive Service, Accra

ABSTRACT

This Paper highlights the diverse ways in which the CEPS Laboratory employs Analytical and Biochemical techniques to analyse a wide array of materials to ensure that materials that have unacceptable composition do not gain entry into our land. It is also to ensure that the appropriate set taxes are duly paid on goods entering the country.

The paper discusses specific test cases and show how the versatility of Chemistry as a Science can be harnessed to the Public good.

THE APPLICATION OF CHEMISTRY IN CRIME DETECTION

by

DAVID ASANTE-APEATU
Police Superintendent
Ghana Police Crime Laboratory
Criminal Investigations Department, Accra

ABSTRACT

This Paper discusses how Forensic Science is of value in crime detection. It also talks about the paramount position of Chemistry in crime detection compared to all other scientific disciplines.

Specific crime cases dealt with at the Forensic Laboratory are discussed to highlight the role that Chemistry plays in almost all the sections of the Forensic Laboratory.

APPLICATION OF GEOCHEMISTRY TO HYDROCARBON EXPLORATION

by

N P ASAFU-ADJAYE
Ghana National Petroleum Corporation
TEMA

ABSTRACT

There is no one magical technique that moves all risks in petroleum exploration. However, there are various exploration technologies that are employed to lower the exploration risk. Modern methods used in petroleum exploration include various traditional branches of geology, global tectonics, seismic technology, integrated basin analysis, organic geochemistry, etc. Appropriate utilisation of these techniques makes the exploration programme as effective and competitive as possible.

Thus in order to reduce the risk considerably, it has become necessary to integrate regional geology with geochemical habitat studies so as to have a good understanding of petroleum generation, migration and accumulation. Over the past 25 - 30 years, organic geochemistry has become a significant tool in oil and gas exploration. As a prerequisite to intelligent and effective application of organic geochemistry, we must understand not only how oil and gas are formed in the subsurface, but also how we can use this knowledge to locate new hydrocarbon reservoirs. The basics of its application lie in the fact that:

i) oil and gas are generated from organic matter known as kerogen. The kerogen forms part of the organic rich source rocks which have become matured with time and through elevated temperatures and pressures;

ii) the oil and gas expelled from the source rocks migrate along carrier beds and other conduits into petroleum traps;

iii) the migrated petroleum is accumulated in reservoir rocks till it is discovered and extracted or becomes degraded with time.

Therefore, petroleum geochemistry programmes aim at source rock evaluation, source rock-crude oil correlation, etc. These are tied into predictive models to considerably reduce the risk in petroleum exploration.

STATUS OF GROUND WATER IN THE NORTHERN REGION OF GHANA

by

PHILIP DWAMENA-BOATENG *and* ***RAPHAEL KLAKE***
Ghana Water & Sewerage Corporation *Department of Chemistry*
Tamale *University for Development Studies*
P O Box 1350, Tamale

ABSTRACT

Groundwater is a very reliable source of potable water compared to surface water. The Northern Region of Ghana which has limited rivers and low rainfall will therefore depend heavily on groundwater.

Boreholes were sampled from twelve districts of the Northern Region and physico-chemical parameters analysed. Generally, the quality of the boreholes were found to be good. A few parameters were found to be above the WHO guideline value.

Some boreholes in the Savelugu - Nanton, East Mamprusi and Salaga Districts showed high nitrate levels. High iron values were recorded at the Salaga, Zabzugu/Tatale, Saboba/Chereponi, Gushiegu/Karaga and Yendi Districts and finally high chloride levels in the Yendi and Bole/Tinga districts.

In all the districts, there was a high correlation between pH and alkalinity.

There was also correlation between conductivity and chloride for conductivities above 1,000 uS/cm.

STABILITY CONSTANTS AND TRANSPORT RATES OF SELENIUM-DIAMINE COMPLEXES AND WATER-METHANOL MIXTURE

by

J KAMBO-DORSA & V P Y GADZEKPO
Department of Chemistry
University of Cape Coast
Cape Coast

ABSTRACT

Complexes of selenium with diamine and related ionophores, formed in water-methanol solution, are studied in terms of their stabilities and the transport of selenium across a chloroform membrane. The stability constants varied from 11.35 to 3.11. The transport of selenium across a chloroform membrane in 2 hours varied from 2.41 to 0.66 x 10^{-6} mol.

DESCRIBING AND MEASURING THE PERFORMANCE OF ULTRA VIOLET AND VISIBLE SPECTROPHOTOMETERS

by

K ANKOMA KWAKYE & PETER B TINDANA
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Tema Lube Oil Company Limited
Private Mail Bag, Tema

ABSTRACT

This Paper describes ways and means by which a Laboratory Analyst can assure himself or herself that the Spectrophotometer being used in the Laboratory is churning out accurate results through a Performance Evaluation and Calibration Procedure.

The Paper outlines the factors that control the performance of these instruments: Instrument Operating condition, Wavelength Accuracy and Precision Check, Spectral Slit Width, Photometric Precision, Stray Light effect and so on.

The choice of standard reference materials for wavelength reproducibility check are discussed.

HEAVY METAL POLLUTION IN THE INTERSTITIAL SEDIMENTS OF ACCRA-TEMA BEACHES

by

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University of Ghana
Legon

and

F E ASUQUO
Chemical/Geochemical Unit
Institute of Oceanography
University of Calabar, Nigeria

ABSTRACT

Sediments sampled at six (6) different depths at four (4) different beaches; Owene, Riviera, Sakumono and Kpone were subjected to aggregate distribution and trace metal analyses for possible heavy metal pollution with relation to depth and particle size distribution of the intertidal sediments along the Accra-Tema coastal area. Open digestion commonly employed in the laboratory and closed digestion with Teflon bomb were used and the metals in the sediments were determined by Atomic Absorption Spectrophotometer (AAS). Results indicate that sediments from the same beach taken from different depths follow the same particle size distribution pattern which is different from distribution patterns shown by the other beaches. Eastwards along the coast from Owene, particle size of sediments, irrespective of depth, moves from more coarse particles to very fine grains at Riviera, then to broader distribution of particles at Sakumono and to medium grains at Kpone. Digestion with Teflon bomb was found to be more efficient and better than the open digestion method. Fine grains of sediments with particle sizes of 0.40mm and below were found to contain higher levels of the metals than the coarser sediments with particle size greater than 0.40mm, however, no direct relation between metal content and depth of sample has been found. all the sediments were found to contain on average, high amounts of metals especially manganese and the concentrations were all higher then the standard values for sediments from coastal Waters of Western and Central Africa.

B-SITOSTEROLS FROM THE STEM-BARK OF CELTIS MILDBRAEDII

by

HARRY OWODO-TETTEH
Department of Chemistry
University of Cape Coast, Cape Coast

ABSTRACT

The stem-bark of the celtis mildbraedii was dried and ground into a fine powder and treated with a mixture of methanol and dichloromethane (MeOH/CH2Cl2 1:1). The crude extract was suspended in aqueous MeOH (90%) and extracted with hexane.

The resulting solution was concentrated and the residue was partitioned between $CHCl_3$ and H_2O (1:2). The combined organic extracts were dried over anhydrous $NaSO_4$ and concentrated under the reduced pressure using a rotatory evaporator to give a dark-brown residue.

The residue was subjected to normal phase column chromatography on silica gel. Five (5) components were isolated and the major components were further purified by reverse HPLC from which a white crystalline compound was obtained together with two (2) other minor components. Mass spectral and NMR spectroscopic analyses of the white-crystalline substance revealed that the compound is a steroid.

THE USE OF PAPER AND ITS EFFECT ON THE ENVIRONMENT

by

NICHOLAS A DARKWA
Forestry Research Institute of Ghana
CSIR, P O Box 63, Kumasi

ABSTRACT

Paper as a commodity vital for the development of a country is assessed. The volumes imported into the country over a twenty-year period are given. The total volume increased from 2,515,655kg in 1973 to 153,234,316kg in 1993 with the cultural papers making up 80% of these totals.

The waste generated at the printing houses has been assessed to be about 11.61% of the total inputs. This therefore translates into about 10,674 tons of such waste with 1993 imports. This together with other waste generated from the primary usage of paper releases large quantities of paper and paper products into the environment.

Because of the low nitrogen content of paper and its products and the hydrophobicity of the filters, the waste products tend to accumulate creating environmental hazard. Where such materials are burnt, the energy and carbon dioxide released into the atmosphere also help to increase environmental pollution.

THE CALIBRATION OF THE CALCIUM ION SELECTIVE ELECTRODE AND THE DETERMINATION OF ITS SELECTIVITY CO-EFFICIENT IN THE PRESENCE OF DIFFERENT CONCENTRATIONS OF Sn^{2+} ION

by

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ABSTRACT

A brief review of the potential of the ion-selective electrode and operation of the Ca^{2+} ISE was undertaken in this study.

The experimental part involved the calibration of the Ca^{2+} ISE (Model 92 - 20) and the determination of its selectivity co-efficient in the presence of Sn^{2+} ion. The result showed that the selectivity for Ca^{2+} ion decreases with increasing concentration of the interfering Sn^{2+} ion. The selectivity of the electrode for Ca^{2+} ion over Sn^{2+} is 1.44×10^{6} at Sn^{2+} ion concentration of 10^{-3} M, while the value decreases to 3.0 at Sn^{2+} ion concentration of 0.1M. This indicates that this electrode can be used for indirect determination of Sn^{2+} ion concentration if the selectivity co-efficients at different concentrations are previously determined.

VOLATILE ORGANIC MATTER CONTENT OF LOCALLY MANUFACTURED SOLVENT-BASED PAINTS

by

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ABSTRACT

The basis for the selection of solvents for prints and coatings since the 1960's has been influenced by the recognition that the evaporation of solvents from these products to the atmosphere contributes to the problem of "smog", a weather condition which caused eye and nose irritation.

$$HC + NO \xrightarrow[\text{UV radiation}]{\text{sunshine}} \text{"Smog"}\ (O_3)$$

In Ghana, and for that matter in some parts of Africa, the relative environmental impart of paints and coatings are not taken into account during their formulation.

The Volatile Organic Matter Content (VOC) of some locally manufactured solvent-based paints have been investigated. The studies indicate that only 20% of these paints and coatings have acceptable limit of VOC as specified by the USA Environmental Protection Agency.

THE METAL SPECTRUM OF RIVER SEDIMENT FROM THE DENSU RESERVOIR

by

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ABSTRACT

The heavy metals in the sediment of the Densu reservoir was determined using Instrumental Neutron Activation Analysis. In all, about twenty-seven elements were identified to be present in the river sediment. Of all the metals determined, iron was found to have the highest concentration with a maximum value of 17.208g/kg and a minimum of 10.815g/kg dry weight, other macro elements identified were Na, K, Ca and Cl. The concentration of most of the metals were higher before the major rains than [illegible] the rains. Though baseline data for heavy metals in sediment is not available the values obtained were higher then normal suggesting some form of heavy metal pollution in the reservoir.

LIMESTONE DEPOSITS IN GHANA FOR CEMENT PRODUCTION - A PARADOX

by

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ABSTRACT

Prospects for utilisation of limestone deposits in Ghana for commercial production of Portland cement and Lime dates back to the 1920's.
Since the evaluation of the Nauli limestone deposits by Sir Albert Kitson in 1921 and subsequent work by others,the commercial exploitation of limestone has aroused heightened and waned intersts in the last seven decades. In this presentation,a synopsis of work carried out by individual experts and companies will be outlined. The principal limestone deposits in Ghana and their reserves will be pointed out. Problems perceived by experts on cement production will be outlined and discussed. The cost and operation of a modern cement plant and typical production rates will be mentioned. Cement production in Ghana,export potential and statistics for annual consumption for the last five years are presented. Alternate uses of limestone deposits will be highlighted.

PROFICIENCY IN ENGLISH LANGUAGE AND ITS EFFECT ON COGNITIVE ACHIEVEMENT IN SCIENCE

by

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ABSTRACT

This study investigated the relationship between the level of proficiency in English Language attained by J.S.S. pupils and their performance in science. The subjects for the study comprised one hundred J.S.S. 3 pupils from four Junior Secondary Schools in the Eastern Region. The instruments utilized for data collection included tests, questionnaires and interviews.

The subjects were categorised, on the basis of their proficiency in English Language, as highly proficient, averagely proficient and below average. It was observed that the pupils who were highly proficient in English Language also excelled in the science test. Although the boys performed slightly better compared to the girls, a test of significance (using the sampling distribution of the means) at the 95% level of confidence, showed no difference between the performance of the boys and that of the girls. A review of the data showed that a few of the pupils who were averagely proficient in English Language performed better in the test than some of their colleagues who were highly proficient in English Language. On the whole, the results confirmed the observation by the Basic Eduction Certificate Examination (B.E.C.E) Science Chief Examiner that J.S.S. pupils who had a good command of the English Language generally performed better in science than their colleagues who were deficient in spoken and written English.

THE CHEMICAL BASIS FOR NUCLEAR WASTE MANAGEMENT

by

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ABSTRACT

The current electricity crisis in Ghana has belatedly engaged the attention of scientists to seriously consider the numerous options available and also to consider their own contribution to the solutions of the crisis. Even though the nuclear option ranks least in the country's priorities, certain circles of the society are advocating its inclusion into a comprehensive energy mix which must be vividly spelt out in an energy policy for the country. One of the thorny issues with the nuclear option is the management of the waste after the generation of the electricity. This paper reviews the chemical basis for proper management of radioactive waste and outlines some of the basic research that needs to be performed. Near and Far field scenarios are presented and the fate of the radioactive wastes in both scenarios are predicted. Possible interactions of the constituents of spent fuel geologic solids and natural organic acids under highly alkaline conditions are additionally presented. Examples of how the developed countries expect to manage their waste, i.e., ultimate storage are given and the concept underlining the construction of the anticipated repositories is discussed.

SELECTED INDUSTRIAL PROCESSES

Four Papers shall be discussed under this Section. They present brief insight into four (4) selected industrial processes:

1) Lubricating Oil Production

2) Petroleum Products Production

3) Cocoa Processing

4) Aluminium Smelting

The objective of these presentations are to appreciate the industrial application of various chemical principles that govern the conversion of basic raw materials to finished products.