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THE NEW ELEMENT CURIUM (ATOMIC NUMBER 96)

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ABSTRACT

Two isotopes of the element with atomic number 96 have been produced by the helium-ion bombardment of plutonium. These isotopes are: (1) 96^{242} which emits alpha particles with a range 4.75 ± 0.1 cm in air (energy 6.1 Mev) and decays with a half-life of 5.0 ± 0.1 months; and (2) 96^{240} which emits alpha particles with a range of 4.95 ± 0.1 cm in air (energy 6.3 Mev) and decays with a half-life of 26.8 ± 0.3 days. 96^{242} has also been produced by neutron irradiation of 95^{241}. The mass assignments of these isotopes have been verified by isolation of their daughters, Pu^{238} and Pu^{236}. Some evidence for the isotope 96^{241}, decaying by orbital electron capture, is presented. The name curium, symbol Cm, is proposed for element 96. The chemical experiments indicate that the most stable oxidation state of curium is the III state.

A series of experiments has been carried out which has resulted in the first production and identification of isotopes of the element with atomic number 96. A brief description of these experiments and the radioactive and chemical properties of this element which have been deduced therefrom is given here.

A consideration of the methods by which isotopes of element 96 might be produced led to the use of two methods. The bombardment of plutonium with high energy helium ions should produce isotopes of this element. The neutron irradiation of Am^{241} (1) should lead to capture of neutrons and formation of Am^{242} which would decay by negative beta-particle emission to 96^{242}. Both of these methods were used in the present investigation and both led to the production of element 96.

It was of course expected that only minute (tracer) amounts of the new element would be formed and that identification would be possible