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THE NEW ELEMENT CALIFORNIUM (ATOMIC NUMBER 98)

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ABSTRACT

Definite identification has been made of an isotope of the element with atomic number 98 through the irradiation of Cm^{242} with about 35-Mev helium ions in the Berkeley Crocker Laboratory 60-inch cyclotron. The isotope which has been identified has an observed half-life of about 45 minutes and is thought to have the mass number 244. The observed mode of decay of 98^{244} is through the emission of alpha-particles, with energy of about 7.1 Mev, which agrees with predictions. Other considerations involving the systematics of radioactivity in this region indicate that it should also be unstable toward decay by electron capture.

The chemical separation and identification of the new element was accomplished through the use of ion exchange adsorption methods employing the resin Dowex-50. The element 98 isotope appears in the eka-dysprosium position on elution curves containing berkelium and curium as reference points--that is, it precedes berkelium and curium off the column in like manner that dysprosium precedes terbium and gadolinium. The experiments so far have revealed only the tripositive oxidation state of eka-dysprosium character and suggest either that higher oxidation states are not stable in aqueous solutions or that the rates of oxidation are slow.

The successful identification of so small an amount of an isotope of element 98 was possible only through having made accurate predictions of the chemical and radioactive properties.