

followed by rapid negative beta-particle decay of Am^{242} . In a later irradiation, carried out in the Argonne heavy water pile, Manning and Asprey⁽¹⁰⁾ detected the beta-particles from Am^{242} and found the half-life to be ca. 17 hours. They also demonstrated the growth of Cm^{242} alpha-activity with the same 17-hour half-life. A further discussion of Am^{242} is given in the next section.

All of the experiments with the 5.45 Mev alpha-activity are consistent with its assignment to Am^{241} . The isotope results from the beta-decay of Pu^{241} ; thermal neutron irradiation of the material results in the formation of a beta-active isotope which decays to Cm^{242} , which in turn decays to Pu^{238} , a well known isotope of plutonium⁽⁸⁾.

Samples of plutonium analogous to those in which Am^{241} growth was observed were processed to yield radiochemically pure uranium fractions by an oxidation-reduction method employing nitric acid oxidation of uranium in sulfuric acid solution, precipitation of PuF_4 and carrier LaF_3 , then titanous chloride reduction and LaF_3 precipitation to remove uranium from the solution. The uranium fractions were found to contain a beta-activity of 6.8-day half-life, corresponding to U^{237} , which could be formed as a result of alpha-decay of Pu^{241} . The yield of the activity (which was present in the plutonium at its equilibrium value) was compared with the yield of Am^{241} from the same plutonium sample to give a value for the branching ratio of Pu^{241} (alpha disintegrations per beta disintegration) of ca. 2×10^{-5} .

B. Chemical Properties of Americium.

A large number of tracer chemical experiments were carried out with the 5.45 Mev alpha activity and are described in detail in another paper.⁽⁷⁾ It is of considerable interest, however, that the unique chemical nature of americium may be shown by a consideration of a relatively few