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A NOTE ON PROMETHIUM 143

Geoffrey Wilkinson and Harry G. Hicks

June 12, 1950

Berkeley, California

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A NOTE ON PROMETHIUM 143

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June 12, 1950

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The long lived activity produced by α-particle bombardment of praseodymium,[1]

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(1) C. S. Wu, E. Segrè, Phys. Rev. 61 203 (1942).

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has been re-studied. Very pure praseodymium oxide, prepared by ion exchange resin column separation, was bombarded with α particles of 15-38 Mev energy using the 60 inch Crocker Laboratory cyclotron. The long lived activity formed was conclusively shown to be due to a promethium isotope by ion exchange column separation; the activity was eluted in the correct position for promethium, between neodymium and samarium which were added for comparison and determined spectroscopically. The decay has been followed through four periods to give a half life of 285 ± 3 days. A study of the radiations by aluminum, beryllium, copper and lead absorbers, and a simple magnetic spectrometer, showed the radiations to consist of L and K x-radiation with a gamma ray of 0.95 Mev. Assuming counting efficiencies of 20%, 0.5% and 1% respectively for these radiations in the standard mica window argon-alcohol filled counters used, with fluorescence yields of 0.5 and 0.8 for L and K x-radiation respectively, the approximate ratios of the radiations are: L x-ray: K x-ray: 0.95 Mev γ ray = ∼ 0.4: 1: 0.3. The yields at various bombarding energies based on the measured K x radiation are in agreement with formation by α,2n reaction and allocation to mass 143; the abnormally long half life for an isotope in this position

is probably due to the fact that Pm^{143} has a closed shell of eighty-two neutrons.

Samples of praseodymium were studied within fifteen minutes after α-particle bombardment; no activities of half lives greater than ∿ 5 minutes, other than the long lived promethium were observed. No α-particle emission has been found in any samples.

This work was sponsored by the Atomic Energy Commission.