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A NOTE ON 11.5 DAY Tl^{202}

Geoffrey Wilkinson

June 22, 1950

Berkeley, California

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A NOTE ON 11.5 DAY Tl^{202}

Geoffrey Wilkinson

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June 22, 1950

This well known[1] isotope has been re-examined to check on the possibility of negative beta particle decay. The activity was produced by deuteron bombardment of mercury. The target consisted of dental amalgam (five parts commercial alloy to nine parts of mercury by weight) pounded into a channel in a water cooled copper plate; no loss was apparent during several hours bombardment with a 10 μ amp deuteron beam. After dissolving the target in nitric acid, the solution was made > 6N in hydrochloric acid and the thallium extracted by ether. The ether was evaporated, holdback carriers added and the thallium re-extracted. No carrier was added. After four extraction cycles additional chemistry on a portion of the sample showed this to be pure thallium.

(1) G. T. Seaborg, I. Perlman. Rev. Mod. Phys. 20 585 (1948).

The aluminum and lead absorption curves taken on carrierless samples mounted on very thin backing showed electrons range 100 mg/cm^2 aluminum (0.35 Mev), L and K x radiation and a gamma ray of half thickness 3.7 g/cm^2 lead (0.43 Mev). The ratios of the radiations corrected for absorption in counter windows, fluorescence yield, counting efficiency, etc. were 0.35 Mev e^-: L x-ray: K x-ray: 0.43 Mev γ = $\sim$ 0.1: $\sim$ 1.7: 1: 0.6. Assuming that both L and K x-radiations are produced from conversion, then $\sim$ 0.9 of the measured K x radiation represents one disintegration by K electron capture. Since only 0.7 L rays are to be expected for each K shell electron removed it appears that the isotope decays almost equally by L and K orbital electron capture.

From a study on a 257° mirror focusing spectrometer, the γ ray energy was determined as 0.427 Mev. No evidence for a continuous beta spectrum could be determined either in absorptions or on the spectrometer.

The decay of electrons and electromagnetic radiations followed separately through over eight periods gave a value of 11.50 ± 0.05 days for the half life after subtraction of background due to the 2.7 year Tl^{204}.

This work was performed under the auspices of the Atomic Energy Commission.