ABSTRACT

Alpha Activity in Bi^{203} as Detected with Nuclear Emulsions.

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Alpha emission of particle energy about 4.85 Mev has been observed in the bismuth fraction produced by the bombardment of lead with 60-Mev protons in the 184-inch cyclotron. The observed alpha decay has a half-life approximating 12 hours. Correlation with the accompanying decay of the other radiation as measured with a Geiger counter and with the alpha systematics indicates the emitting isotope to be Bi^{203} with a partial alpha half-life of 2×10^{4} years. Following chemical separation, the carrier-free bismuth was placed in a solution of pH about 4 and, for time intervals appropriately spaced following bombardment, impregnated into freshly eradicated Ilford C-2 nuclear emulsion plates. The associated gamma-conversion electron activity determined the maximum concentration of bismuth which could be tolerated by the emulsion without producing excessive fogging. Aliquots equal to those placed in the emulsion were counted in a windowless proportional counter to enable association of the alpha abundance found in the emulsion with the number of known over-all disintegrations. The alpha/K branching ratio was found effectively constant and reproducible at about 10^{-7} over a series of experiments.

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[1] H. M. Neumann and I. Perlman, Phys. Rev. 78, 191 (1950).