a second separation was made in which the results were the same as in the first. The 2.0-day half-life of Np^{238} is evidently short compared to that of the long-lived Am^{242} and the equilibrium value of the Np^{238} activity is a measure of the alpha activity in Am^{242}. If it is assumed, entirely for the sake of discussion with no thought that this need be true, that the cross-section for the formation of the long-lived Am^{242} is the same as that for the 17-hour isomer, the half-life for alpha-particle emission is calculated to be ca. 3×10^5 years on the basis of the observed Np^{238} activity.

An aluminum absorption curve of the radiations from the activated americium sample reveals the presence of beta particles of ca. 0.5 Mev maximum energy (Figure 9). The other radiations in the sample < Fig. 9 are essentially those due to Am^{241}. In view of the beta instability of the 17-hour isomer of Am^{242}, beta particle emission in the long-lived isomer is not surprising. Again arbitrarily assuming equal cross-sections for the formation of both isomers the half-life of the long-lived Am^{242} for the emission of beta particles is ca. 600 years. This half-life and that calculated for the emission of alpha particles are directly proportional to the assumed cross-section and a reduction of the latter would decrease the calculated half-lives.

IV. Other Isotopes of Americium

Americium isotopes of mass number equal to or less than 239 are expected to decay by the capture of orbital electrons, since their nuclei are deficient in neutrons. Am^{240}, by virtue of its position close to the region of maximum stability might decay either by the emission of negative beta-particles or by orbital electron capture, or by both processes. Branching decay with alpha-particle emission is possible in any of the isotopes and may be found if the half-lives of the competing processes are appropriate.