RESULTS

The results are shown graphically in Figs. 1 and 2. The relative error between points (indicated by the vertical bars) is about 2 or 3 percent. The horizontal bars on the figures are not errors but indicate the energy spread due to target thickness. The values of the absolute cross section are only good to about 20 percent due to the difficulty of obtaining a reliable absolute measurement. Because of this difficulty the vertical scale should be considered only as a rough indication of the absolute value.

The knee in the curve at about 1.8 Mev was verified by a second run and is consistent with data on the known levels of F^{19}, the intermediate nucleus involved.[3] (See Fig. 1.) The lower energy levels are probably overwhelmed by the effect of barrier penetration. The roughly exponential form of barrier penetration at low bombarding energies is apparent in Fig. 2, where the curve is approximately a straight line up to about 1.2 Mev.

Data from this experiment gave a half-life for the F^{18} beta decay of 111 ± 1 min, in good agreement with published values.[4]

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Half-Life of Rb^{86}†

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A number of very pure samples of Rb^{86} obtained by a new radiochemical procedure were found to have a half-life of 18.64 ± 0.04 days.

THE accepted value[1] of 19.5 days for the half-life of Rb^{86} was determined by Helmholz *et al.*,[2] on a somewhat impure sample. It has been possible to redetermine the half-life of this nuclide in connection with the separation of a number of very pure samples of Rb^{86} from an intense source of fission-product radioactivities by an improved radiochemical procedure.

The chemical procedure used was based primarily on alternate $Fe(OH)_3$ scavengings from NH_4OH and $NaOH$-Na_2CO_3 solutions, an Sb_2S_3 scavenging from $0.2N$ HCl solution, and several precipitations of the alkali metal perchlorates from ethyl acetate solution. The Rb was separated from Cs by elution with $0.3N$ HCl from the cation exchange resin, Duolite C-3. A column 0.85 $cm^2\times6$ cm of 200–325 mesh resin operated at room temperature gave a very satisfactory separation.

The activities of eight samples of Rb^{86} were followed for from 7 to 9 half-lives by counting through an absorber (110.7 mg/cm^2 of Al) which removed the natural activity of Rb^{87}. The apparent half-life of each sample was constant with time, and the final counts, with no absorber, indicated that only the natural Rb^{87} activity remained. The lack of residual activity indicates a decontamination factor for Cs of at least 5×10^4, based on the Cs^{137} content of cesium fractions isolated from the same samples.

The data obtained by counting through the absorber were analyzed for λ by a least-squares technique. The statistical reliability of counts taken during the last few half-lives was lower because of uncertainty with regard to the background counts. Rejection of all counts with a probable error greater than 1.4 percent left 20 to 24 counts (obtained over 6 or 7 half-lives) for each sample. The following values for the half-life (in days) were obtained: 18.700, 18.565, 18.628, 18.690, 18.547, 18.660, 18.639, and 18.682.

This leads to a mean value for the half-life of Rb^{86} of 18.64 days with a probable error of ±0.04 day.

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