Title

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Publication Date

1951-03-01

UCRL- 1161

UNIVERSITY OF CALIFORNIA — BERKELEY

RADIATION LABORATORY

UCRL-1161
Unclassified-Chemistry Division

UNIVERSITY OF CALIFORNIA

Radiation Laboratory

Contract No. W-7405-eng-48

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The half-life of U^{235} has been the subject of several recent experimental investigations. Clark, Spencer-Palmer, and Woodward[1] reported a value of 8.91×10^8 years, derived from their alpha pulse analyses of natural and enriched mixtures of U^{238}, U^{235}, and U^{234}. Kienberger,[2] after remeasuring the specific activity and U^{234} content of normal uranium, computed the specific activity of U^{235} by difference and obtained a half-life of $(8.8 \pm 1.1) \times 10^8$ years. All of these values are substantially higher than Nier's[3,4] figure of 7.13×10^8 years.

Because of the rather wide divergence among these various values, and also because of the general interest in the exact value of the U^{235} half-life, which enters into the computation of geological time, we have carried out several measurements of the specific alpha activity of U^{235} in this laboratory.

The uranium used for this purpose was highly purified (99.9 percent) U^{235}, supplied to us as U_3O_8 from Dr. C. E. Larson, Y-12 Plant, Carbide and Carbon Chemicals Division, Oak Ridge National Laboratory. Careful spectrographic analysis established that the chemical purity of this material was better than 99.95 percent.

Differential pulse analysis showed that (65.3 ± 0.7) percent of the alpha activity was due to U^{235}, and (34.7 ± 0.3) percent to U^{234}. The details of this measurement are contained in another publication by Ghiorso[5].

Samples of the oxide were weighed to ± 0.1 percent, and were then dissolved in concentrated nitric acid and diluted to volume. Accurate volume aliquots of these solutions were taken and the uranium electrodeposited quantitatively onto platinum disks. Thin, uniform films resulted, of the order of 100-200 micrograms per sq cm. The highly enriched U^{235} depositions were counted in a specially constructed, helium filled, medium geometry counter [counting yield (8.313 ± 0.016) percent], which was calibrated with mixtures of U^{238} and U^{234} against a low geometry counter of accurately known counting yield. We believe that use of the medium geometry counter for the U^{235} samples reduced to negligible magnitude any errors arising from backscattering or self-absorption, since analysis of the pulses from this chamber showed an extremely flat plateau.

The specific activity of U^{235}, as determined from five separate U^{235} depositions, was found to be 4774 ± 72 disintegrations per minute per milligram, with a corresponding decay constant of $(9.80 \pm 0.15) \times 10^{-10}$ per year, and a corresponding half-life of $(7.07 \pm 0.11) \times 10^{8}$ years.

Our value for the half-life agrees closely with the 7.13×10^{8} year value reported by Nier. The value reported by Clark and co-workers, 8.91×10^{8} years, differs from ours by about 25 percent. A partial explanation lies in the fact that these workers were unable to detect the high and low energy alpha groups,[5] comprising about 15 percent of the total disintegrations from U^{235}, in their pulse analysis of slightly enriched U^{235} samples. However, it is difficult to account for the other 10 percent discrepancy.

A more precise value and a detailed description of this work is to be reported at a later date. This work was performed under the auspices of the U. S. Atomic Energy Commission.

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