shift of 0.15 percent exists between the H_2Se and H_2SeO_3 selenium resonance fields. Additional measurements of higher precision are planned after modification of the present equipment to increase sensitivity and stability.

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The Decay Scheme of Natural Lutetium 176

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THE nuclide lutetium 176 is of particular interest for two related reasons; first, that it is the central member of one of the four known triads of naturally occurring adjacent isobars, and second, that its spin of at least 7 units[1] is the highest known. Flammersfeld has reported a decay scheme for this nuclide,[2] in which both K capture and β-decay appear, the ratio of the branches being $K/\beta^-=2$. The observed gamma-ray was placed in the K branch, and its energy fixed at 0.260 Mev.

Suttle has recently redetermined the absolute beta-decay rate of this species.[3] The availability of a sample of 0.18 gram of lutetium (as the oxalate) led us to undertake a study of its gamma- and x-radiation with our low level spectrometer, with a view to redetermining its decay scheme.

We first determined roughly its absolute emission rate for electromagnetic radiation, and found 12.0 ± 1.8 disintegrations per minute per mg lutetium, or about twice the value of 5.5 disintegrations per minute per mg found for β-emission by Suttle.

Using two NaI crystals in coincidence, we have shown that there are two gamma-rays of about 0.25 Mev in cascade, and that these comprise the great bulk of the radiation observed.

Using one crystal in coincidence with an end-window counter, we find that these gamma-rays are in coincidence with the 0.4-Mev β-ray (verified by absorption).

An energy scan of the electromagnetic radiation, using a 1-inch aluminum canned NaI crystal, and RCA 5819 phototube cooled to -20°C, and calibrating by means of the 0.28-Mev gamma-ray of Hg^{203}, showed to peaks at 200 ± 20 kev and 320 ± 20 kev of approximately equal intensity. A peak at 50 ± 10 kev, presumably the K x-ray of hafnium, was 0.35 ± 0.15 as intense as the two large peaks. No other peak of intensity above 10 percent was seen, and in particular no crossover at 520 kev.

The isomeric state of Lu^{176} decays by way of an 89-kev excited state of Hf^{176}.[4] No K capture branch or decay to the ground state of Lu^{176} has been seen. Goldhaber and Hill,[5] on the basis of unpublished work of Scharff-Goldhaber, have constructed a new decay scheme for Lu^{176}. This scheme agrees with our work as to the absence of a K capture branch, although our energies are higher than theirs. We fail to find the 90-kev gamma-ray, but because of its high L and M conversion we might well have missed it, and all other radiations below 100 kev.

The x-ray peak is well accounted for by the conversion of the 200- and 320-kev lines; the K conversion of the 90-kev line might be included, assuming as we must that all are $E2$. L x-rays would not have been seen in our arrangement.

We thus generally confirm Goldhaber and Hill's decay scheme, as far as our evidence extends, although we have not seen the 90-kev transition.

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