# Relative $Ru^{105}$: $Ba^{104}$ Yield, in Fission Caused by Deuterons of Different Energies

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Uranium was irradiated with deuterons of various energies produced by the 32 Mev synchrocyclotron. The fission yield: $Ru^{105}/Ba^{140}$ was then determined.

The target was obtained by deposition of uranium oxide on aluminium by the following method.[1] An aluminium sheet was degreased with organic solvents, then immersed successively in 25% sulfuric acid and in a saturated solution of sodium zincate. Thus treated, the sheet was used as the cathode of an electrolysis bath containing a saturated solution of uranyl nitrate in ammonium oxalate, 0.2 *N*. The work was done with a current density of 40 $\mu a/cm^2$ and the time of electrolysis varied according to the deposit thickness sought.

Under these conditions, one obtains a very thin and uniform layer of uranium oxide. One side of the sheet was cleaned with nitric acid, so that the uranium remained only on the other.

After this treatment, the aluminium sheets were used as targets, and arranged in such a way that the deuteron beam passed through them before reaching the uranium. The rate of energy loss of the deuterons causing fission varied with the thickness of the film (Fig. 1).

The uranium was dissolved in nitric acid 1½ hours after irradiation in the synchrocyclotron and the Ru and Ba were separated from the fission products.

The Ru was distilled as tetroxide and the Ba was precipitated as chloride in concentrated hydrochloric acid and ether, and the yields of the runs were determined using $Ru^{106}$ as a tracer in the case of Ru, and by weighing as sulfate in the case of Ba.

Measurements were done with identical geometry and were corrected to zero absorption thickness; $Ba^{140}$ was measured by the growth of its daughter $La^{140}$.

The measured preparations contained several milligrams of carrier. No self-absorption corrections were made.

Activities were computed at the end of irradiation and, from them, the relative fission yield.

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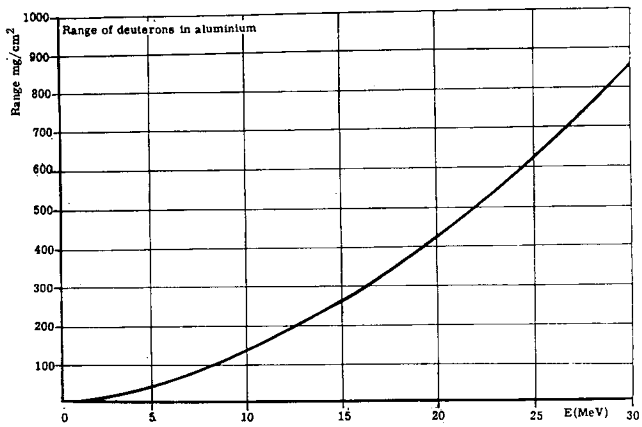


Figure 1. Range of deuterons in aluminum

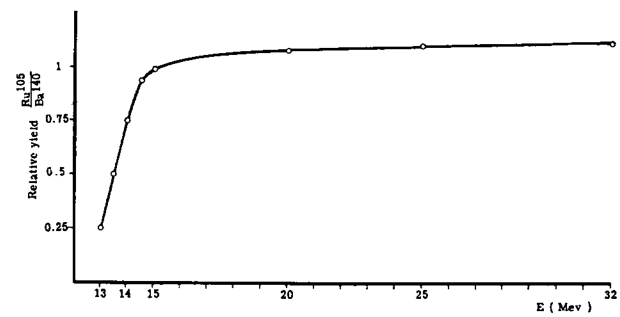


Figure 2

It was observed that, with deuteron beams of over 15 Mev, the relative yield is very close to 1; being slightly higher (1.12) for $Ru^{105}$ at energies above 25 Mev.

The relative yield rises considerably with the energy for deuterons of under 15 Mev (Fig. 2).

The findings for 15 Mev are in satisfactory agreement with those of other authors.

## REFERENCES

1. Wilson, C. and Langer, A., *Electrodeposition of uranium oxide on aluminum,* Nucleonics, *11*: 48 (1953).
2. Wiles, D. R. and Coryell, Ch. D., *Fission yield fine structure in the mass region 99-106,* Phys. Rev., *96*: 696 (1954).