Range Distribution of the Uranium Fission Fragments*

The range distribution of the uranium fission fragments in air has been further studied[1, 2] by means of a differential ion chamber. The source was a deposit of uranium oxide of one mm air equivalent. The fission fragments were collimated by rectangular channels 17 mm long, and eight mm square. The parallel plate type detecting chamber, 2.1 cm distant from the source, consisted of a thin grill six cm in diameter, spaced three mm from the disk electrode connected to the amplifier grid.

The number of fragments traversing the distance between the uranium and the detection chamber was measured as a function of the pressure of the air in the chamber. The results are shown in Fig. 1. Two major groups are

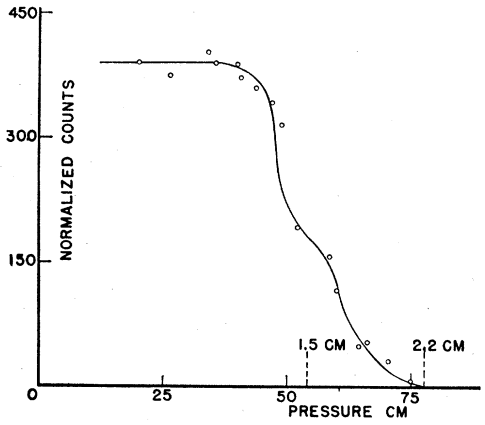

FIG. 1. Range of uranium fission particles in air.

indicated, one with a range of 2.2 ± 0.1 cm and the other with a range of approximately 1.5 cm. The two groups have approximately equal intensity.

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E. T. BOOTH
J. R. DUNNING
G. N. GLASOE

Pupin Physics Laboratories,
Columbia University,
New York, New York,
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[1] Anderson, Booth, Dunning, Fermi, Glasoe and Slack, Phys. Rev. 55, 511 (1939).

[2] Booth, Dunning and Slack, Bull. Am. Phys. Soc. April 27, 1939.

Fission Products from Uranium*

Further experiments[1, 2] have been performed to study the radioactivity of the fission products from uranium irradiated with slow neutrons. The experiments have been of two types (1) using solid uranium oxide and collecting the products in Cellophane and (2) removing and collecting the gaseous products from uranium in solution. In the first case the uranium oxide, electrolytically deposited on thin copper sheets, was mounted in an evacuated aluminum

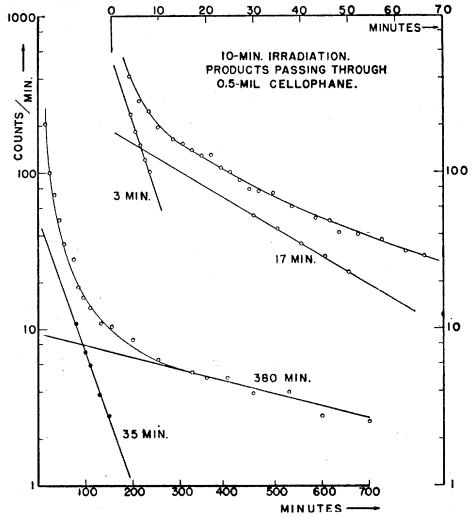

FIG. 1. Decay curves of products which pass through a 0.5-mil Cellophane sheet.

cylinder together with the collecting Cellophane. This cylinder was placed in paraffin near the cyclotron for an irradiation after which the Cellophane was removed and wrapped around a G-M counter for measurement of the radioactivity. With an irradiation of ten minutes the initial activity four minutes later was about 1500 counts/minute and the decay was followed for 24 hours. An analysis of the decay curves is consistent with periods of ~9 hr., 80 min., 32 min., 17 min., and 10 min. (shorter periods unresolved) in agreement with periods reported by others previously.[3, 4]

In order to eliminate one major group of fission products with a range of about 1.5 cm[5] the collecting foil was covered with a 0.5-mil Cellophane sheet which had an air equivalent of 1.4 cm as calculated from its mass and chemical composition. The products which passed through this thin foil showed periods of ~6 hr., 35 min., 17 min., and 3 min., as indicated in Fig. 1. The 10-min. and 80-min. periods are quite definitely absent.

The gaseous products were collected by passing nitrogen through an irradiated uranyl nitrate solution into a glass vessel designed to fit over the G–M counter and having a thin inner wall. Three different procedures were followed: (1) Nitrogen was passed through the solution during an eight-second irradiation and the activity of the products collected in the vessel measured immediately thereafter. Periods of 35 sec. and three min. were observed. (2) Nitrogen was passed through the solution into the collecting vessel during a 45-second irradiation. Two minutes later a stream of air was flushed through the vessel to remove any residual radioactive gas. The remaining activity showed periods of three min. and 20 min. which are attributed, therefore, to solid decay products from the short period gas. (3) The nitrogen was not passed through the solution until five minutes after a one-minute irradiation. The collection of any appreciable amount of the 35-sec. gas was avoided in this manner. This procedure yielded a radio-