the equation of Bohr and Wheeler,[2] is about 0.2 Mev. This is concordant with the fact that no energetic radiations are observed.

Possible mass assignments[4] other than 125 may be tentatively ruled out. On the basis of the Bohr-Wheeler[2] picture, I^{123} and isomeric states of the nuclei of mass 124, 126, 128, and 130 would be expected to have high decay energies (>1 Mev). A radioactive isomer of stable I^{127} would decay by isomeric transition, and thus would yield no Te x-rays. Iodine isotopes of mass number greater than 130 have been conclusively characterized as energetic β^- emitters.[3]

The yield of the 56*d* I in deuteron-bombarded Te targets at the M.I.T. cyclotron is about $15\mu c/\mu$ amp. hr. of 14-Mev deuterons, calculated on an assumption of one *K* x-ray per disintegration, and an experimentally determined counting efficiency of about 1 percent in the usual argon-filled Geiger counter. The corresponding yield of 12h I^{130} is 750 $\mu c/\mu$ amp. hr. (for short bombardments). The yield ratio of 12h I to 56d I at saturation is 4.5. The abundance ratio of Te^{130} to Te^{125}, from which I^{130} and I^{125} are formed by the $(d, 2n)$ reaction, is 5.5. Assuming the (d, n) reaction on Te^{124} to be less probable than $(d, 2n)$ on Te^{125}, the proposed mass assignment of 125 for the long-lived I is consistent with the observed yield.

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55-Hour Element 61 Formed in Fission*

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A CHEMICAL separation of element 61 from fission products was made to verify the mass assignment and to study the activity of 49-hr. 61^{149}, as summarized in fission tables.[1] This activity has been assumed to have a mass of 149 from fission yield data.

An aliquot of the element 61 sample was placed on the filament of a mass spectrograph, and normal neodymium was added to serve as a mass standard. By operation of the spectrograph the isotopes were separated according to mass and deposited on a photographic plate. A second "transfer" photographic plate was placed face to face with the first plate, and four developable images were obtained from its radioactive isotopes which by comparison with the normal neodymium spectrum on the first plate were shown to have masses 147, 149, 163, and 165. The metal lines at 147 and 149 were very weak in comparison with the metal oxide lines at 163 and 165 but appeared in approximately the same ratio. Since the ratios of metal to metal oxide are different for the different elements which might have given these masses, this indicates that all lines are due to the same element.

To verify that the activity at the mass 149 position was 49-hr. 61^{149} the following technique was used. The photographic plate containing the active isotopes was placed successively against various parts of a larger photographic plate for times calculated to give equal intensity at the mass 149 position if the half-life were 49 hours. Five exposures were taken for successive times of 13.4 hours, 16.5 hours, 21.6 hours, 31.0 hours, and 57.3 hours. These transfers showed the 61^{149} to be decaying with a half-life of slightly more than 49 hours, while the 147 showed no detectable decay. A decay curve taken simultaneously on another aliquot of the element 61 sample showed it to contain a 55-hour activity and a long-lived activity. Thus the 147 and 163 lines are due to the metal and metal oxide ions of 3.7-year 61^{147} as shown previously by Hayden,[2] and the lines at 149 and 165 are due to the metal and metal oxide ions of 55-hr. 61^{149}.

The samarium-europium fraction of the original fission sample was also analyzed by this method. It showed activities at masses 151, 153, 155, 156, 167, and 169. The active lines at mass numbers 153 and 169 were found to decay with a half-life of 47 hours. Since the ratio of intensities of the 153 to 169 is that characteristic of Sm^+ and SmO^+ this activity is 47-hr. Sm^{153} as was shown previously by neutron irradiation of samarium.[3] The lines at 151 and 167 were also ascribed to samarium since the ratio of the intensities was the same as the 153 and 169. This is the activity first found in fission by Lewis and Hayden. From intensity considerations the half-life of this activity has been estimated at roughly 20 years. The lines at 155 and 156 were assigned to europium since only the metal ion lines appeared. The 156 decayed with a half-life of about 15.4 days and the 155 showed no detectable decay. Thus these activities are due to 2 to 3 year Eu^{155} and 15.4-day Eu^{156}.

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