A third antimony isotope with 16 to 18 minutes half-life, emitting positrons, is known to be due to Sb^{120}, since it is formed by fast neutrons[2–5] or gamma-rays[6] on antimony, as well as by deuterons[2] on tin, and is not formed by neutrons or deuterons on antimony.

We have been following for two years the complex activities found in the antimony precipitated from several samples of tin which had been bombarded with five-Mev deuterons. The longest half-life appears to be about two years; on this basis the shorter periods are 45 days (approximately), 2.5 days, 3 hours, and 17 minutes. (These figures supersede our earlier estimates that were quoted by Livingston and Bethe.[7] The periods of 13 hours and 112 days previously reported[8] as due to antimony from Sn+D are now known to be due to impurities.)

Of these five activities only two can be immediately identified: the 17-minute period is due to $Sn^{119}(d,n)Sn^{120}$, as previously reported,[2] while the 2.5-day period must be due to $Sn^{122}(d,2n)Sb^{122}$ or to $Sn^{120}(d,\gamma)Sb^{122}$.

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Gamma-Rays from B+D

In a recent issue of *The Physical Review* Gaerttner, Fowler and Lauritsen[1] presented the results of a measurement on the gamma-ray energy spectrum emitted from boron bombarded with deuterons. We have made some independent observations on the same spectrum, and our results are essentially in agreement with the values they have given. We think it is worth while to add our data to that already published, for the sake of confirmation.

Amorphous boron (Eimer and Amend) was bombarded with deuterons of 700-kev maximum energy, by means of the high voltage accelerating tube.[2] A beam of the resulting gamma-rays, limited by a channel in a lead block, was allowed to strike a slab of carbon (graphite) 1.5 mm thick, in the center of a cloud chamber.[3] The negative electrons which originated in the carbon and whose initial directions were within 15 degrees of the direction of the gamma-ray beam were counted and plotted in an energy diagram, shown in Fig. 1, curve A. A remeasurement of the lower end of the spectrum, from the same photographs, is shown as curve B. Curve C represents the results of a separate experiment, in which a lower magnetic field was used, for the purpose of extending the measurements to lower electron energy and of increasing the resolving power at the low energies.

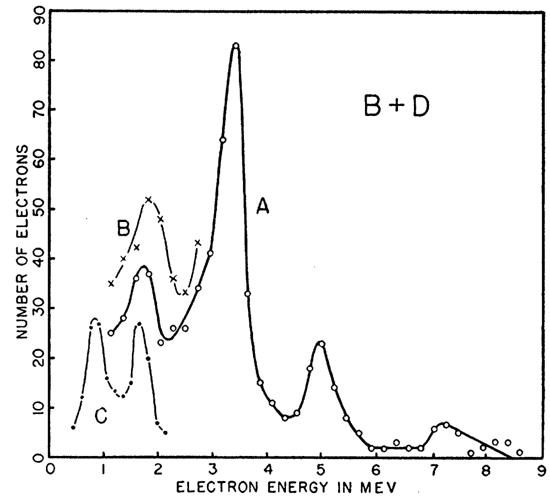

Fig. 1. Negative electrons ejected from 1.5-mm carbon by the gamma-rays from B+D. Curves A and B, 1600 gauss magnetic field; curve C, 530 gauss.

The energies of the gamma-ray lines indicated by our measurements are given in Table I, together with the values given by Gaerttner, Fowler and Lauritsen, and the values taken from the earlier work of Crane, Delsasso, Fowler and Lauritsen.[4] In the last-mentioned work only the electron energies were given, so we have added 0.25 Mev to these to obtain the gamma-ray energies. It is seen that four prominent lines have appeared in all measurements. In addition, it now seems that there is a line at about 1.5 Mev.

Table I.

H. & C.	1.4	2.4	4.2	6.0	8.6
G., F. & L.	1.5	2.2	4.4	6.9	9.1
C., D., F. & L.	—	2.7	4.5	5.9	7.0
	—	2.6	4.2	5.9	7.5

We find relative intensitives of 1, 1, 6, 2 and 1 for the 1.4, 2.4, 4.2, 6.0 and 8.6-Mev lines, respectively. The relative intensities of the 4.2, 6.0 and 8.6-Mev lines are roughly in agreement with previous data, but the 1.4 and 2.4-Mev lines are much weaker, relative to the other three. This is not alarming, because the gamma-rays probably arise from several different reactions involving the two boron isotopes, and the relative probabilities of the various reactions depend upon the energy spectrum of the deuteron beam. The relative intensities of the gamma-ray lines will have to be investigated with monochromatic beams of deuterons of several different energies.

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