

Li⁶ and Li⁷(*n,2n*) Cross Sections*

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Absolute measurements of the 10.2- and 14.1-MeV (*n,2n*) cross sections of Li⁶ and Li⁷ have been made using the large scintillator technique. The cross sections in barns obtained for Li⁶ are: 0.033±0.015 at 10.2 MeV and 0.070±0.006 at 14.1 MeV. The Li⁷ cross sections are: 0.027±0.015 at 10.2 MeV and 0.056±0.005 at 14.1 MeV.

THE energy dependence of the Li⁶ and Li⁷(*n,2n*) cross sections was measured using large liquid-scintillator techniques previously described.^{1,2}

Separated metallic Li⁶ and Li⁷ were obtained from Oak Ridge in the form of disks $\frac{1}{4}$ in. thick and 5 in. in diam. A typical target assembly consisted of eight disks, each contained in a thin-walled aluminum can, spaced $\frac{1}{2}$ in. apart. The total amount of lithium used was 292.9 g of Li⁶ and 337.6 g of Li⁷. The Li⁶ material was

99.67% lithium, of which 95.42% was Li⁶. The Li⁷ material was 99.63% lithium, of which 97.65% was Li⁷.

The 14.1-MeV cross sections were obtained using neutrons from the Livermore Cockcroft-Walton. In addition to the corrections for time resolution, accidental doubles, background, and self-absorption described in reference 1, a correction was made for the relative amounts of Li⁶ and Li⁷ in the two targets.

The 10.2-MeV cross sections were obtained using neutrons from the Livermore cyclotron. Corrections were made for time resolution, accidental doubles, and self-absorption. The combination of the large backgrounds encountered while using the cyclotron and the

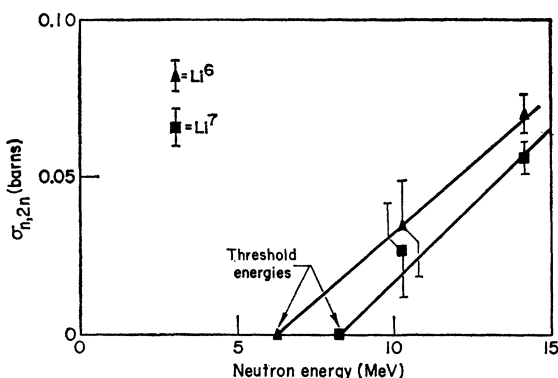


FIG. 1. Energy variation of measured (*n,2n*) cross sections for Li⁶ and Li⁷.

TABLE I. Measured (*n,2n*) cross sections of Li⁶ and Li⁷.

	$\sigma_{(n,2n)}$ (barns)		E_{th} (MeV) ^a
	10.2 MeV	14.1 MeV	
Li ⁶	0.033±0.015	0.070±0.006	6.2
Li ⁷	0.027±0.015	0.056±0.005	8.2

^a E_{th} is the threshold energy for the reaction given by B. T. Feld, in *Experimental Nuclear Physics* edited by E. Segrè, (John Wiley & Sons, Inc., New York, 1953), Vol. II, p. 350.

small observed counting rates produced a large fluctuation in the cross sections obtained from different runs. Since this fluctuation was of the order of ±30%, it was not considered worth while to do an accurate calculation of the self-absorption correction at 10.2 MeV. Corrections of approximately 7% previously calculated by Monte Carlo methods for the energy of 14.1 MeV were used.

The measured cross sections are given in Table I. A graph of the data given in Fig. 1 shows that the cross sections are consistent with a linear variation with energy between threshold and 14 MeV, in a manner similar to that found for deuterium.²

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