

THE (p,xn) REACTION FROM PROTONS ON BISMUTH AT INTERMEDIATE ENERGIES

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The $^{209}\text{Bi}(p,xn)$ Po excitation function for the production of Po isotopes $A = 202, 204, 206, 208$ and 209 were measured in the proton energy range of 60-200 MeV. This work extends previous data^{1,2,3} to intermediate energies with new yield information for the more deficient isotopes. This data is being used to compare existing pre-equilibrium and cascade codes for direct interaction mechanisms in the intermediate energy region.

The cross sections were determined by measuring the residual α -activity in the radiochemically separated Po sample. Samples were counted for a period of 6 months to one year. In Table 1 are listed the total reaction cross sections for the production of the Po nuclei. Data at additional energies of 174, 183, and 200 MeV have been obtained but the samples require additional counting and further analyses.

Data for ^{200}Po and ^{202}Po production will have a large

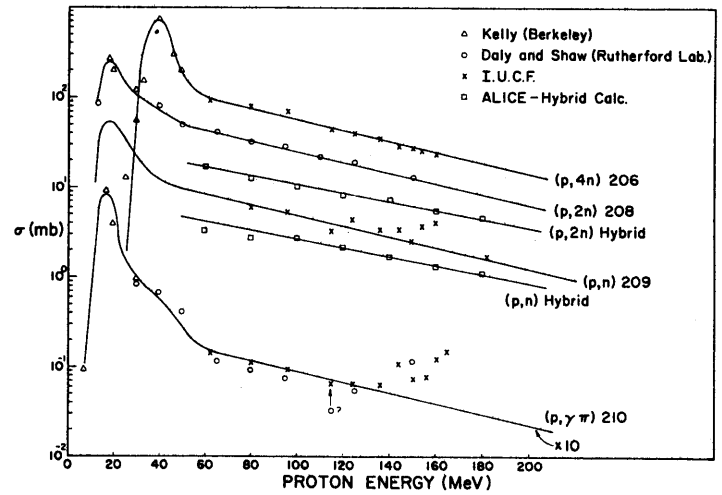


Figure 1.

uncertainty due to the decay factors of these short lived α -activities. In Figure 1 are shown the excitation functions for the production of Polonium isotopes 210, 209, 208, and 206. The data on $A = 210$ have been used in the study of pion production near threshold and are shown in this figure for comparison. Included with the experimental data are results of an Alice-Hybrid⁴⁾ calculation with no spin dependence taken into account.

The interest to date has been on the near-exponential decrease of the intermediate energy tail. The Alice-hybrid calculations are in good general agreement with the experimental data; however, the precise slope and magnitudes are not determined well. A more sophisticated calculation with the Alice-hybrid code will be made for final comparison with data.

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- 1) P.J. Daly and P.F.D. Shaw, Nucl. Phys. 56, 322 (1964).
- 2) Y. LeBeyle and M. Lefort, Nucl. Phys. A99, 131 (1967).
- 3) M. Miyano, M. Sekikawa, T. Kaneko, and M. Nomoto, Nucl. Phys. A230, 98 (1974).
- 4) Code ALICE; M. Blann, University of Rochester, rep. no. C003494-9; Ann. Rev. Nucl. Sci. 25, 123 (1975); Phys. Rev. Lett. 27, 337 (1971); 28, 757 (1972)

Table 1. Cross sections measured in the recent study of the $^{209}\text{Bi}(p,xn)$ Po Reaction at Intermediate Energies

E_p (MeV)	Cross Section for Po Mass No. (in mb)			
	209	208	206	204
62	-	41.9	121	189
80	5.9	32.9	74	169
96	5.6	26.9	66	114
115	4.2	20.6	48	76
124	3.6	18.0	37	57
132	3.1	16.0	38	69
136	3.5	15.5	32	52
144	3.8	13.9	31	42
150	2.7	12.9	24	31
154	2.9	12.2	25	40
160	3.7	11.3	24	-