

MEASURED AND EVALUATED NEUTRON CROSS SECTIONS OF
ELEMENTAL BISMUTH*

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ABSTRACT

Neutron total cross sections of elemental bismuth are measured with broad resolution from 1.2 to 4.5 MeV to accuracies of $\approx 1\%$. Neutron-differential-elastic-scattering cross sections of bismuth are measured from 1.5 to 4.0 MeV at incident neutron energy intervals of $\lesssim 0.2$ MeV over the scattered-neutron angular range ≈ 20 - 160 deg. Differential neutron cross sections for the excitation of observed states in bismuth at 895 ± 12 , 1606 ± 14 , 2590 ± 15 , 2762 ± 29 , 3022 ± 21 and 3144 ± 15 keV are determined at incident neutron energies up to 4.0 MeV. An optical-statistical model is deduced from the measured values. This model, the present experimental results and information available elsewhere in the literature are used to construct a comprehensive evaluated nuclear data file for elemental bismuth in the ENDF format. The evaluated file is particularly suited to the neutronic needs of the fusion-fission hybrid designer.

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