COBALT FAST NEUTRON CROSS SECTIONS - MEASUREMENT AND EVALUATION

by


ABSTRACT

Elastic and inelastic scattering cross sections of cobalt are measured from incident energies of 1.8 to 4.0 MeV including those for the excitation of states at 1.10 ± 0.01, 1.20 ± 0.01, 1.30 ± 0.01, 1.43 ± 0.01, 1.46 ± 0.02, 1.72 ± 0.02, 2.06 ± 0.02, 2.09 ± 0.02, 2.16 ± 0.03, 2.35 ± 0.05 and 2.50 ± 0.05 MeV. Total neutron cross sections are measured from ≈ 2.0 to 4.5 MeV. From the experimental results, and previously reported values, an optical-statistical model is deduced providing a quantitative description of measured values to 20.0 MeV. The observed excited structures and cross sections are shown consistent with a nuclear structure model based upon a proton hole in the f_{7/2} shell strongly coupled to a spherical core and a solution of previous ambiguities in J^π assignments is suggested. The available experimental information and the computational model are utilized to provide a comprehensive evaluated data file in the ENDF format suitable for use in fission reactor, fusion reactor and other applied neutronic calculations. This evaluated file is explicitly presented in the Appendix.

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