

FAST-NEUTRON INTERACTION WITH THE FISSION PRODUCT ^{103}Rh

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ABSTRACT

Neutron total and differential elastic- and inelastic-scattering cross sections of ^{103}Rh are measured from ≈ 0.7 to 4.5 MeV (totals) and from ≈ 1.5 to 10 MeV (scattering) with sufficient detail to define the energy-averaged behavior of the neutron processes. Neutrons corresponding to excitations of groups of levels at 334 ± 13 , 536 ± 10 , 648 ± 25 , 796 ± 20 , 864 ± 22 , 1120 ± 22 , 1279 ± 60 , 1481 ± 27 and 1683 ± 39 keV were observed. Additional groups at 1840 ± 79 and 1991 ± 71 keV were tentatively identified. Assuming the target is a collective nucleus reasonably approximated by a simple one-phonon vibrator, spherical-optical, dispersive-optical, and coupled-channels models were developed from the data base with attention to the parameterization of the large inelastic-scattering cross sections. The physical properties of these models are compared with theoretical predictions and the systematics of similar model parameterizations in this mass region. In particular, it is shown that the inelastic-scattering cross section of the ^{103}Rh fission product is large at the relatively low energies of applied interest.