
THEORETICAL EVALUATION OF ACTINIDE FISSION AND CAPTURE CROSS SECTIONS

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Requirements for data on fission and capture cross-sections of the shorter-lived actinides have become of increasing importance recently, with needs arising from fields such as nuclear non-proliferation, nuclear criticality safety, nuclear waste transmutation and nuclear astrophysics. Many of the nuclides of interest have such short half-lives that it is very difficult to obtain adequate direct experimental data on their neutron cross-sections. For some of them some very limited neutron cross-section data are available. For others, data from reactions such as (t,pf) give valuable information on aspects of the compound nucleus such as fission barrier parameters that can be used in calculations of the neutron cross-sections. In this paper we survey the theory and methods for calculating neutron cross-sections of the actinides of most practical interest up to a few MeV. We show how direct and indirect experimental data can be exploited to determine model parameters for the calculations and we present recommended values for barrier heights, level densities and other parameters required by the theory.