

Systematical Analysis of (n,2n) Reaction Cross Sections for 14-15 MeV Neutrons

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Fast neutron induced nuclear reaction cross section data are necessary for both nuclear energy technology and the understanding of fundamental nuclear physics problems. The information of (n,2n) cross sections is quite essential in nuclear technology as a significant portion of the fission neutron spectrum lies above the threshold of (n,2n) reaction for most of the reactor materials. These cross section data are required in radiation shielding and nuclear fuel breeding calculations. On the other hand, systematics of fast neutron induced reaction cross sections is useful to clarify nuclear reaction mechanisms. In addition, it is often necessary, in practice, to use the systematical analysis for evaluation of the neutron cross sections of the nuclides, for which no experimental data are available.

In this work, in the framework of the statistical model we deduced some theoretical formulae for the (n,2n) cross section using the evaporation model, constant nuclear temperature approximation and Weizsäcker's formula for binding energy. The model formulae were utilized for systematical analysis of known experimental data of the (n,2n) cross sections at 14–15 MeV neutrons.