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N N D E N への投稿

Contribution to Neutron Nuclear Data Evaluation Newsletter-29

Japanese Nuclear Data Committee
(Nuclear Data Center, JAERI)

Work Recently Completed and Publications:

(i) Neutron Nuclear Data Evaluation of Rare Isotopes of Thorium: ^{228}Th, ^{230}Th, ^{233}Th and ^{234}Th
T. Ohsawa and M. Ohta
Memoirs of the Faculty of Engineering,
Kyushu University,
Vol. 40, No. 3, 149 (1980)

Consistent set of neutron cross sections and $\bar{\nu}$p-values have been obtained for minor thorium isotopes ^{228}Th, ^{230}Th, ^{233}Th and ^{234}Th. Because no or very incomplete experimental information is available for these nuclei, evaluations based on semi-empirical systematic and model calculations are the only way to assess the nuclear data. In this work an attempt has been made to make use of the presently available newer information as much as possible. This paper describes the methods and results of evaluation of neutron nuclear data for ^{228}Th, ^{230}Th, ^{233}Th and ^{234}Th.

(ii) Evaluation of Neutron Nuclear Data for ^{242m}Am and ^{242g}Am
T. Nakagawa and S. Igarasi
JAERI - M 8903 (1980) (in Japanese)

Evaluation of neutron nuclear data for ^{242m}Am and ^{242g}Am was performed in the energy range of 10^{-5} eV to 20 MeV. For ^{242m}Am, resonance parameters were used up to 3.5 eV to represent the cross sections. Experimental data for the fission cross section were reproduced by spline functions up to 1.5 keV, and by a semi-empirical formula up to 20 MeV. Other cross sections were estimated by taking account of structure of the fission cross section below 1.5 keV, and were calculated with the optical and statistical models from 1.5 keV to 20 MeV. Cross sections for the (n,2n) and (n,3n) reactions were obtained with Pearlstein's method. Optical potential parameters were determined so that they might reproduce the neutron strength function and the compound nucleus formation cross sections suitable for the fission cross section calculation. For ^{242g}Am, there are no experimental data except thermal energy. The fission and capture cross sections were assumed to be 1/v form below 0.225 eV, and the elastic scattering cross section to be a constant. Above 0.225 eV, the fission cross section was estimated from that of ^{242m}Am, and the (n,2n) and (n,3n) reaction cross sections were assumed to be the same as those of ^{242m}Am. Other cross sections were calculated with the optical and statistical models. Angular distributions of elastically scattered neutrons were calculated with the optical model for both ^{242m}Am and ^{242g}Am. Those of the inelastic scattering, (n,2n) and (n,3n) reactions were assumed to be isotropic in the center-of-mass system. Furthermore, $\bar{\nu}$ was given for both states. Present results were compiled in the ENDF/B format.

Work in Progress:

(i) The thermal and resonance cross sections of ^{233}U were evaluated for JENDL-2. The cross sections below 1 eV are given as point-wise data and were evaluated by the use of the measured fission and capture cross sections. The resolved resonance parameters are given up to 100 eV. The cross sections from 100 eV to 30 keV are represented by the unresolved resonance parameters. (from Y. Kikuchi, JAERI)

(ii) Level density parameters are being determined for more than 100 nuclides, which are important from the viewpoint of the reactor application. These include the fertile and fissile materials, structure materials, and the fission products. The level density formula adopted is the Gilbert-Cameron type composite formula. The systematics of the determined parameters is examined, and is used to extrapolate the results to the nuclides with no experimental information. (from T. Yoshida, NAIG)

(iii) Analyses of gamma-ray production cross section for Al, Si, Ca, Cr, Fe, Ni, Cu, Nb, Pb and Ta have been carried out in the energy range from 1 MeV to 20 MeV with the multi-step evaporation model taking yrast level into consideration. The effects of yrast levels, level density parameters and gamma-ray strength functions were also examined. The preliminary results were published in JAERI-M 8163 and presented at Knoxville Conference GB-6 in October, 1979. (from M. Kawai, NAIG)

Work Planed for the Near Future:

(i) Reevaluation of neutron cross sections for about 80 FP nuclides is planned in the energy region from thermal to 15 MeV. (from M. Kawai,NAIG)

(ii) Evaluation of neutron nuclear data for deuterium is planned in the energy region up to 20 MeV. (from K. Shibata, Rikkyo University)

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