

お知らせ(そのⅠ)

N N D E N への投稿

Contribution to Neutron Nuclear Data Evaluation Newsletter-30

Japanese Nuclear Data Committee
(Nuclear Data Center, JAERI)

Work Recently Completed and Publications:

- (i) Neutron Cross Sections of 28 Fission Product Nuclides
Adopted in JENDL-1

Yasuyuki Kikuchi, Tsuneo Nakagawa, Hiroyuki Matsunobu,
Masayoshi Kawai, Sin-iti Igarasi and Shungo Iijima

JAERI 1268 (1981)

This is the final report concerning the evaluated neutron cross sections of 28 fission product nuclides adopted in the first version of Japanese Evaluated Nuclear Data Library (JENDL-1). These 28 nuclides were selected as being most important for fast reactor calculations, and are ^{90}Sr , ^{93}Zr , ^{95}Mo , ^{97}Mo , ^{99}Tc , ^{101}Ru , ^{102}Ru , ^{103}Rh , ^{104}Ru , ^{105}Pd , ^{106}Ru , ^{107}Pd , ^{109}Ag , ^{129}I , ^{131}Xe , ^{133}Cs , ^{135}Cs , ^{137}Cs , ^{143}Nd , ^{144}Ce , ^{144}Nd , ^{145}Nd , ^{147}Pm , ^{147}Sm , ^{149}Sm , ^{151}Sm , ^{153}Eu and ^{155}Eu . The status of the experimental data was reviewed over the whole energy range. The present evaluation was performed on the basis of the measured data with the aid of theoretical calculations. The optical and statistical models were used for evaluation of the smooth cross sections. An improved method was developed in treating the multilevel Breit-Wigner formula for the resonance region.

- (ii) Evaluation of Neutron Nuclear Data for ^{233}U
in Thermal and Resonance Regions

Yasuyuki Kikuchi

JAERI-M 9318 (1981)

The thermal and resonance cross sections of ^{233}U were evaluated for JENDL-2. The cross sections below 1 eV were evaluated by the use of the measured fission and capture cross sections. The resolved resonance parameters were obtained so as to reproduce the measured total and fission cross sections. The cross sections from 100 eV to 30 keV are represented by the unresolved resonance parameters.

- (iii) Decay Heat Calculations Based on Theoretical Estimation of
Average Beta- and Gamma-Energies Released
from Short-Lived Fission Products

Tadashi Yoshida and Ryuzo Nakasima

(To be published in J. Nucl. Sci. Tech. Vol. 18, No. 5)

Fission product decay heat of ^{235}U was calculated for short cooling-time on the basis of a preliminary version of a new decay data library recently completed by the Japanese Nuclear Data Committee. It was shown that a full adoption of recent publications of decay schemes to derive the average energies of beta- and gamma-rays, \bar{E}_β and \bar{E}_γ , leads to a large underestimation of the gamma-ray component of the decay heat and to an overestimation of the beta-ray component. In order to remedy this, theoretical values of \bar{E}_β and \bar{E}_γ were introduced for high Q-value decays, which were obtained with a gross theory of beta-decay. It improved remarkably the agreement between calculation and experiment not only for the ^{235}U decay heat but for ^{239}Pu and ^{241}Pu as well.

(iv) Evaluation of Neutron Nuclear Data for ^{243}Cm

Tsuneo Nakagawa and Sin-iti Igarasi

(To be submitted to JAERI-M report)

The neutron nuclear data of ^{243}Cm were evaluated in the energy region of 10^{-5} eV to 20 MeV. The evaluated quantities are resonance parameters up to 27 eV, the total, fission, capture, elastic and inelastic scattering, (n,2n), (n,3n) and (n,4n) reaction cross sections, angular distributions of emitted neutrons and the number of neutrons per fission.

(v) Evaluation of ^{238}U resolved resonance parameters

Tsuneo Nakagawa

(To be submitted to JAERI report)

Evaluation of ^{238}U resonance parameters has been made for JENDL-2. All the available resonance parameters were compiled in a table. The systematic discrepancies among resonance energies were investigated. The neutron and capture widths were evaluated by the simultaneous evaluation similar to the area method.

Work in Progress:

- (i) Reevaluation of neutron cross sections for about 80 FP nuclides is in progress in the energy region from thermal to 15 MeV.
(from M. Kawai, NAIG)
- (ii) The gamma-ray production cross sections associated with neutron induced reactions for natural molybdenum are evaluated in the energy region from thermal to 20 MeV. The gamma-ray spectrum in the low energy neutron capture is calculated on the basis of statistical model taking into account the discrete levels and E1, M1, E2 transitions.
(from M. Mizumoto, JAERI)
- (iii) As reported by M. Kawai in the NNEN-29, gamma-ray production cross section for Al, Si, Ca, Fe, Ni, Cu, Nb, Ta, Au and Pb have been analysed in the energy range from 1 to 20 MeV with the spin-dependent and multi-step evaporation model. The present model was useful for calculations of average energies and production cross sections of secondary gamma-rays from medium weight nuclei in the neutron energy region where the (n,n') reactions are dominant.
(from Y. Harima, TIT)

Work about codes and data files:

- (i) A computer code GROGI-IV was developed in order to calculate gamma-ray production cross section and nucleon spectra with the multi-step evaporation model taking yrast level into consideration. This is a revised version of GROGI-3 developed by Takahashi, BNL.
(from M. Kawai, NAIG)

- (ii) The decay data file for fission product nuclides (FP DECAY DATA FILE) has been prepared for summation calculation of the decay heat of fission products. The average energies released in β - and γ -transitions and necessary information have been arranged in tabular form together with the estimated results for 470 nuclides of which decay data are not available experimentally. This has been published in JAERI-M 9357. (from Z. Matumoto, JAERI)

Work Planned for the Near Future:

- (i) Reevaluations of neutron nuclear data for ^{241}Am and ^{243}Am are planned below 20 MeV. (from S. Igarasi, JAERI)
- (ii) Reevaluation work will be made on the inelastic scattering cross sections of Cr, Fe and Ni by taking account of the direct process with the coupled channel optical model and DWBA. (from Y. Kikuchi, JAERI)

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