

お知らせ IV

N N D E N 3 3 への投稿

Contribution to Neutron Nuclear Data Evaluation Newsletter-33

Japanese Nuclear Data Committee
(Nuclear Data Center, JAERI)

Work Recently Completed and Publications:

- (i) Clustering Effects on Neutron Elastic Scattering from Lithium Isotopes
Seiichi KOMODA and Tamotsu SEKIYA

Atomkernenergie/Kerntechnik, vol. 40, no. 2, (1982) pp. 119 - 124

In our model we take into account the two-cluster configuration of lithium nuclides. Its validity is tested by analyzing the differential cross section data for neutron elastic scattering from ${}^6\text{Li}$ and ${}^7\text{Li}$ at bombarding energies between 7 and 14 MeV. It is found that the model gives an adequate description of neutron elastic scattering at forward scattering angles. It is concluded that quasi-free neutron-cluster scattering contributions are significant even at the low energies investigated.

- (ii) Clustering Effects on Neutron Elastic Scattering from Boron Isotopes
Seiichi KOMODA and Tamotsu SEKIYA

(To be submitted in Atomkernenergie/Kerntechnik)

The model developed in earlier papers is applied to boron isotopes and the differential cross section data for neutron elastic scattering from ${}^{10}\text{B}$ and ${}^{11}\text{B}$ are reproduced at forward scattering angles at bombarding energies between 7 and 14 MeV. The magnitude of the discrepancy between the theoretical and experimental angular distributions at backward scattering angles decreases smoothly with the bombarding energy as it did in the previous analyses on lithium isotopes.

- (iii) Evaluation of Neutron Cross Sections for Vanadium
Shigeya TANAKA

(JAERI-M 82-151 (1982))

Comprehensive neutron nuclear data for vanadium have been evaluated from thermal region to 20 MeV, and the results are to be filed in the ENDF/B format as an elemental component in Japanese Evaluated Nuclear Data Library-Version 2 (JENDL-2). The data base, the evaluation procedure and judgement, and the final results are described. The results include the neutron total cross sections, all significant partial cross sections of neutron induced reactions and the resonance parameters of vanadium. Particular attention has been paid to higher energy processes having an impact on FBR and CTR.

Work in Progress:

- (i) Systematics of the optical potential parameters, level density parameters and radiative widths of FP nuclides have been studied. A report of this study was submitted to the Journal of Nucl. Sci. Tech. Evaluations of the resonance parameters for Kr, Rb, Y, Nb, Mo, Pd, Ag, Cd, Sb, Xe, Cs, Ba, La, Pr and Nd isotopes have been finished, but for the other nuclides of 80 FPs, evaluation work is now in progress. Smooth cross sections of Nb, Mo, Pd, La, Pr and Nd isotopes were calculated using optical and statistical models.

(from M. Kawai, NAIG)

(ii) Evaluation of neutron nuclear data for ^2H is in final stage. The angular distributions for the elastic scattering and the double differential cross sections for the (n,2n) reaction have been calculated on the basis of the Faddeev equation with s-wave separable potentials.

(from K. Shibata, JAERI)

(iii) Evaluation of neutron nuclear data for ^{246}Cm and ^{247}Cm is in progress below 20 MeV.

(from Y. Kikuchi, JAERI)

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Work Recently Completed and Publications:

- (i) Calculation of Gamma-Ray Production Cross Sections at the Neutron Energies of 1-20 MeV

Hideo KITAZAWA, Yoshiko HARIMA, Masayoshi KAWAI, Hisao YAMAKOSHI,
Yuji SANNO, and Tsuguyuki KOBAYASHI

J. Nucl. Sci. Technol., Vol. 20, No. 4, pp. 273-285 (1983)

Gamma-ray production cross sections and spectra of Al, Si, Ca, Fe, Ni, Cu, Nb, Ta, Au, and Pb have been obtained at the neutron energies of 1-20 MeV, using a spin-dependent multi-step evaporation model. Calculations include dipole and quadrupole transition without the distinction between electric and magnetic process, and take explicit account of the role of yrast levels. The effects of the yrast levels and gamma-ray strength function upon gamma-ray production are also investigated in relation to particle emission. At the incident neutron energies where $(n, n'\gamma)$ and/or $(n, 2n\gamma)$ reactions are dominant, the present model is shown to be able to predict the production of secondary gamma-rays (<9.0 MeV) from medium-heavy to heavy nuclei with reasonable accuracy.

- (ii) Evaluation of Neutron Nuclear Data for Uranium-233

Norio ASANO, Hiroyuki MATSUNOBU and Yasuyuki KIKUCHI

J. Nucl. Sci. Technol., Vol. 19, No. 12, pp. 1037-1053 (1982)

Evaluation has been made for the neutron nuclear data of ^{233}U in the energy range from 10^{-5} eV to 20 MeV. Evaluated quantities are the total, fission, capture, elastic and inelastic scattering, $(n, 2n)$ and $(n, 3n)$ reaction cross sections as well as the resonance parameters. The average numbers of prompt and delayed neutrons per fission have also been evaluated. The presently evaluated fission cross section is considerably lower than that of ENDF/B-IV between 10 and 50 keV.

- (iii) Evaluation of Neutron Nuclear Data for ^{241}Am and ^{243}Am

Yasuyuki KIKUCHI

(JAERI-M 82-096 (1982))

Neutron nuclear data of ^{241}Am and ^{243}Am were evaluated for JENDL-2. Evaluated quantities are the total, elastic and inelastic scattering, fission, capture, $(n, 2n)$, $(n, 3n)$ and $(n, 4n)$ reaction cross sections, the resolved and unresolved resonance parameters, the angular or energy distribution of the emitted neutrons, and the average number of neutrons emitted per fission. The fission cross section was evaluated on the basis of newly measured data, and lower values than JENDL-1 were given in the subthreshold energy region. The reliability of the calculation parameters are also much improved, because experimental data became available for the total and capture cross sections of ^{241}Am in the high energy region.

(iv) Evaluation of Neutron Nuclear Data for Deuterium
Keiichi SHIBATA, Tsutomu NARITA and Sin-iti IGARASI

(JAERI-M 83-006 (1983))

Evaluation of neutron nuclear data for ^2H has been performed in the neutron energy region from 10^{-5} eV to 20 MeV. The evaluated quantities are the total, elastic scattering, capture and (n,2n) reaction cross sections, the angular distribution for the elastic scattering and the double-differential cross section for the (n,2n) reaction. Theoretical calculations were done of the elastic angular distribution and the neutron spectrum from the (n,2n) reaction on the basis of the Faddeev equation.

Work in Progress:

(i) Evaluation of neutron nuclear data for ^{12}C is in progress in the energy region from 10^{-5} eV to 20 MeV. The total cross section below the threshold energy of the inelastic scattering is calculated on the basis of the R-matrix theory. Three discrete levels are taken into consideration for the inelastic scattering.

(from K. Shibata, JAERI)

(ii) The inelastic scattering cross section of structural materials are calculated with the coupled channel optical model and DWBA.

(from Y. Kikuchi, JAERI)

(iii) Neutron nuclear data of ^{246}Cm and ^{247}Cm are evaluated. Evaluated quantities are the total, elastic and inelastic scattering, fission, capture, (n,2n), (n,3n) and (n,4n) reaction cross sections, the resolved and unresolved resonance parameters, the angular and energy distributions of the emitted neutrons, and the average number of neutrons emitted per fission.

(from Y. Kikuchi, JAERI)

Work Planned for the Near Future:

(i) Evaluation of ^{248}Cm and ^{249}Cm nuclear data is planned below 20 MeV.

(from Y. Kikuchi, JAERI)

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