



International Atomic Energy Agency

Nuclear Data Newsletter

ISSUE No. 16
ISSN 0257-6376

November 1991

Note: Unless indicated otherwise, the quoted data, documents or codes are available costfree upon request. - When requesting data on magnetic tape, kindly specify the acceptable density (1600 or 6250 bpi), maximum block size, and whether the data should be in EBCDIC or ASCII code. Only 9 track tapes are used. Data files or computer codes that are not too large can also be sent on DOS standard diskettes (either 5.25 inch, 1.2 Mb or 3.5 inch, 1.44 Mb).

Data indexes and bibliographies

CINDA-91, the 1991 edition of the bibliography and data index for microscopic neutron data is now available for a sales price of 460.- Austrian Schillings. It covers the period from 1988 to 1991 and supplements the "archival" issue CINDA-A (1990), which was announced in the previous issue of this newsletter.

IAEA-NDS-7 (Rev. 91/10): Index of nuclear data libraries available on magnetic tape or PC diskettes from the IAEA Nuclear Data Section. H.D. Lemmel (ed.).

IAEA-NDS-0 (Rev. 91/10): Index to the IAEA-NDS-Dokumentation Series for available nuclear data libraries.

Nuclear data computer codes

The new version 6.7 of the ENDF utility codes has been released by C.L. Dunford, US National Nuclear Data Center. The codes are needed for processing evaluated nuclear data in the formats ENDF-6 or ENDF-5. The codes, which are available on magnetic tape for the mainframe computer,

Nuclear Data Section (NDS)
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna
Austria

e-mail: RNDS@IAEA1
fax: (43-1)234564
cable: INATOM VIENNA
telex: 1-12645 atom a
telephone: (43-1)2360-1709

retrieve ENDF data, produce interpreted listings, check format and physics of the data files, produce graphical plots, calculate specific data such as thermal cross-sections, resonance integrals or 14 MeV cross-sections. Included are the codes SETMDC, GETMAT, STANEF, CHECKR, FLZCON, PSYCHE, INTER, LISTEF, PLOTEF, GRALIB, INTLIB. More detailed information is provided in the document IAEA-NDS-29 Rev. 3 by P.K. McLaughlin.

INDEXENDF, a PC-code for cataloging data in ENDF-6 format, by R. Paviotti Corcuera et al., Brazil. This is a PC code which indexes ENDF-6 formatted data that are on the hard disk, in either of two ways: (a) list of materials with information on author, date of evaluation, etc.; (b) information on MF and MT numbers for each material.

GANAAAS version 2.1 (Jan. 1992). A PC software for gamma spectrum analysis, activity calculations and neutron activation analysis, by the IAEA Physics Section. A set of four HD diskettes and a software handbook IAEA/GMS-3. The package uses the thermal neutron cross-section data by E. Gryntakis et al. (Handbook of Nuclear Activation Data, IAEA Technical Report 273, 1987, p. 199) and fast neutron cross-sections by R. Pepelnik (unpublished).

The nuclear model codes GNASH, ALICE, ABAREX were announced by the US authorities for free release through the NEA Data Bank. These codes are not distributed by the IAEA Nuclear Data Section; kindly contact Dr. Enrico Sartori, NEA Data Bank, B.P. N° 9 (Bât. 45), F-91190 Gif-sur-Yvette, France. Above codes are documented in the book "Applied Nuclear Theory and Nuclear Model Calculations for Nuclear Technology Applications", World Scientific Publishing Co., Singapore 1989 (see Nuclear Data Newsletter No. 13), in the following papers: S. Ganesan, Use of ABAREX, the optical statistical model code (p. 361-416); M. Blann, Preequilibrium theories and computer code ALICE (p. 627-675); E.D. Arthur, The GNASH preequilibrium-statistical nuclear model code (p. 676-725).

New data libraries received

ACTIV-FUS/INT, the international library of neutron activation cross-section data for fusion reactor applications. It contains evaluated data for 372 neutron activation reactions for 150 target isotopes for neutron energies up to 20 MeV. Best data were selected from a variety of available data libraries. The library which has a size of 254233 records or about 20 Mb, is available on magnetic tape. Summary documentation: IAEA-NDS-148 by A.B. Pashchenko.

CENDL-2, the Chinese Evaluated Nuclear Data Library as described in paper IP-15 of the 1991 Jülich Nuclear Data Conference, is being checked and finalized for distribution. It includes evaluations for 50 nuclides, partly in ENDF-5, partly in ENDF-6 formats.

"XG Standards", a PC diskette with X-ray and gamma-ray standards for detector efficiency calibration, including half-lives, energies and emission probabilities of X-rays, and energies and emission probabilities of gamma-rays for selected radionuclides. Description of the diskette is given in the document IAEA-NDS-112. The recommended data are the result of the work of an IAEA Coordinated Research Project 1986 to 1990 with the following participants: W. Bambynek, T. Barta, P. Christmas, N. Coursol, K. Debertin, R.G. Helmer, R. Jedlovsky, A.L. Nichols, F.J. Schima, Y. Yoshizawa, and with A. Lorenz and H.D. Lemmel as IAEA Scientific Secretaries. The work has been published in IAEA-TECDOC-619 (1991).

Nuclear Masses, a data file by P. Möller (LANL) including calculated nuclear masses (P. Möller et al.) compared with the 1988 version of the nuclear mass tables by A.H. Wapstra et al. Summary documentation: IAEA NDS-147.

POTASUS, a PC code for calculating stopping power and range data of various beams in various materials, by F.E. Chukreev (Kurchatov Inst., Moscow).

Photonuclear data

New Photonuclear Data in EXFOR. The EXFOR file for (mostly experimental) photonuclear data has been extended substantially by recent contributions from V. Varlamov (Moscow) and V. McLane (Brookhaven). The number of entries compiled in Moscow has increased from 45 to 338, now containing 2072 data sets (98867 records). From BNL, 23 new entries (312 data sets) were received, representing the second part of the Berman library of photonuclear data converted to EXFOR format (now containing 59 entries). All new data were included in the EXFOR master library of experimental nuclear reaction data from which selective retrievals are available costfree from NDS.

An atlas of selected experimental and evaluated photoneutron and photofission cross-sections has been prepared by A.I. Blokhin and S.M. Nasyrova (Obninsk). Available as report INDC(CCP)-337.

Selected new publications on nuclear data

Handbooks

Nuclear Physics Constants for Thermonuclear Fusion, a reference handbook by S.N. Abramovich, B.Ja. Guzhovskij, V.A. Zherebcov, A.G. Zvenigorodskij, Atominform Moscow (1989). The book contains tables and graphs of recommended cross-section data for the interactions of p, d, t, He3 and α particles with the isotopes of H, He, Li, Be. The data evaluation methodology is described and many references are given. English translation by A. Lorenz, report INDC(CCP)-326 (1991). Costfree.

Handbook of nuclear data for safeguards. Preliminary issue. M. Lammer, O. Schwerer. Report INDC(NDS)-248, costfree.

Handbook of radiation and decay characteristics of long-lived radionuclides. V.P. Chechev, F.E. Chukreev. Report INDC(CCP)-338, costfree.

Probability, Statistics and Data Uncertainties in Nuclear Science and Technology, a monograph by Donald L. Smith (Argonne National Laboratory) sponsored by the Nuclear Data Committee of the OECD Nuclear Energy Agency. This is a comprehensive textbook on the mathematical principles of uncertainty analysis of experimental data with a large number of practical examples mostly taken from cross-section measurements or other nuclear physics experiments. The chapter headings include topics such as random variables, probability functions, Monte-Carlo simulation, error propagation, Chi-Square test, covariances in the ENDF system, applications of the least-squares method, and many other items of importance to nuclear data measurement and evaluation. Each chapter is followed by a "reading list" with numerous references for more detailed studies of mathematical statistics and nuclear data evaluation procedures. The book can be purchased for 25.- US\$ (plus shipment costs) from the American Nuclear Society, P.O. Box 97781, Chicago, IL, USA-60678. (ANS Order Number: 300025).

Meeting proceedings

Nuclear data for fusion reactors. A meeting on this topic, JAERI, 20-21 Dec. 1990. Proceedings edited by Y. Nakajima and H. Maekawa. Report JAERI-M-91-062. Limited number of copies costfree.

Methods for the calculation of neutron nuclear data for structural materials of fast and fusion reactors. Final meeting of an IAEA co-ordinated research programme, Vienna, 20-22 June 1990. Proceedings edited by D.W. Muir. Report INDC(NDS)-247, free of charge.

Intermediate energy nuclear data for applications. IAEA meeting, Vienna, 9-12 Oct. 1990. Proceedings edited by N.P. Kocherov. Report INDC(NDS)-245. Costfree.

Neutron cross-section standards for the energy region above 20 MeV. Uppsala, Sweden, 21-23 May 1991. Proceedings report NEANDC-305, to be requested from the NEA Data Bank.

Nuclear data for neutron emission in the fission process. IAEA meeting, Vienna, 22-24 Oct. 1990. Proceedings edited by S. Ganesan. Report INDC(NDS)-251. Costfree.

Japanese Symposium on Nuclear Data, JAERI, 29-30 Nov. 1990. Proceedings edited by M. Igashira and T. Nakagawa. Report JAERI-M-91-032 (March 1991). Limited number of copies available free of charge.

Nuclear spectroscopy and structure of atomic nuclei. 41st USSR conference, Minsk, 16-19 April 1991. Book of abstracts, in Russian. Limited number of copies available costfree.

Solid State Physics Symposium, Chandigarh, India, 27-30 Dec. 1990. Proceedings (vol. 33c) by the Bhabha Atomic Research Centre, Bombay, Jan. 1991. Not available from IAEA.

Selected reports and documents on nuclear data

- * = documents available costfree from IAEA/NDS upon request.
- = available from originator or from the INIS Microfiche Service (IAEA, P.O. Box 100, A-1400 Vienna, Austria).

Progress reports

- BNL-NCS-46173. Reports to the US/DOE Nuclear Data Committee 1990/91.
- * CNIC-530. Chinese Nuclear Data Center: Communication of nuclear data progress.
- * NEANDC(E)-322 vol. 5. Progress report on nuclear data research in Germany 1990/91.
- BARC-1516 (1990). Bhabha Atomic Research Centre, Fuel Chemistry Division progress report for 1987.
- * NEANDC(E)-322. Central Bureau for Nuclear Measurements, Geel, progress report on nuclear data 1990. A.J. Deruytter (ed).
- * AEEW-R-2664. UK Chemical Nuclear Data Committee, progress report, data studies 1990. A.L. Nichols (ed).

- Unnumbered report. Institut für Radiumforschung und Kernphysik, Vienna, Austria, progress report 1990.

Neutron data measurements

- ANL/NDM-119. Fast-neutron interaction with Zr. S. Chiba et al.
- ANL/NDM-120. Fast-neutron total and scattering cross-sections of Ni-58. A.B. Smith et al.
- * INDC(EGY)-6. A low background pulsed neutron polyenergetic beam at the ET-RR-1 reactor. M. Adib et al.

Evaluated nuclear data

- * INDC(CCP)-316. Evaluated neutron nuclear data for Cm-244. A.B. Klepatskij et al.
- * INDC(CPR)-23. Evaluation of neutron nuclear data of Np-237 for CENDL-2. Tang Guoyou et al.
- * JAERI-M-91-011. Evaluation of neutron nuclear data of natural silver and its isotopes. Liu Tingjin et al.
- * INDC(CPR)-24. Evaluation of cross-sections for dosimetry reactions. Cai Dunjiu.
- * INDC(AUS)-14. Update of the evaluation of the cross-sections for the neutron dosimetry reactions $F-19(n,2n)F-18$ and $Nb-93(n,2n)Nb-92m$. M. Wagner.
- * INDC(CCP)-325. Comparative analysis of (n,p) reaction cross-section systematics for 14-15 MeV neutrons. S.A. Badikov, A.B. Pashchenko. English translation of the Russian report FEI-2055.
- JAERI-M-91-034. Recommended values of decay heat power and method to utilize the data. K. Tasaka et al.

Thorium cycle nuclear data

- * INDC(NDS)-256. S. Ganesan, P.K. McLaughlin, Status of thorium cycle nuclear data evaluations: comparisons of cross-section line shapes of JENDL-3 and ENDF/B-6 files for Th-230,232, Pa-231,233, U-232,233,234.
- BARC-1532 (1990). T.K. Basu, M. Srinivasan, Thorium fuel cycle development activities in India.
- Unnumbered report (1990). Indo-Japan Seminar on Thorium Utilization. Abstracts.

Fission-product nuclear data

- * NEACRP-L-323. J. Blachot et al., Status of delayed fission neutron yield data 1990.
- NEANDC-300. R.W. Mills, Review of fission product yields and delayed neutron data for Np-237, Pu-242, Am-242m, Am-243, Cm-243, Cm-245. To be requested from the NEA Data Bank.

- * INDC(CCP)-341. The gross and fine structure of the mass distributions of the fragments in the binary fission of activities. A.A. Goverdovsky et al.

Data processing

- * KFKI-1991-10. Calculation of transmission and other functionals from evaluated data in ENDF format on personal computers with the program package FDMXPC. P. Vértés.
- NEACRP-L-330. 3-D neutron transport benchmarks. T. Takeda, H. Ikeda.
- Proceedings of the BARC-IGCAR discussion meeting on developments in reactor physics calculational methods for neutronic design and analysis and physics related safety evaluations of power reactors. Bombay, 10-14 Sept. 1990. Edited by B.P. Rastogi.
- * INDC(BZL)-34. Extension of the Th-232 burnup chain in the WIMS D/4 program library. A.D. Caldeira.
- * INDC(HUN)-30. Processing of evaluated neutron data files in ENDF format on personal computers. P. Vértés.

Nuclear theory

- * JAEKI-1321. Program CASTHY -- Statistical model calculation for neutron cross-sections and gamma-ray spectra. S. Igarasi, T. Fukahori.
- * INDC(BAN)-4. Global alpha-particle optical potential. N. Ferdous.

Charged-particle induced reactions

- * INDC(CCP)-330. Evaluated cross-sections used as proton beam monitors. V.A. Vukolov, F.E. Chukreev.
- * INDC(CCP)-331. Neutron yields from alpha-particle induced reactions on Li, Be, B, C, O, F up to 10 MeV. Including tables of recommended reference data. V.A. Vukolov, F.E. Chukreev.
- * JAEKI-M-91-009. Polarized proton induced reactions on Li isotopes around 14 MeV. N. Koori et al.

Intermediate energy data

- * INDC(CPR)-20. Systematics of intermediate energy proton nonelastic and neutron total cross-sections. Shen Qing-biao.

Photonuclear data

- * INDC(CPR)-21. X-ray attenuation coefficients and photoelectric cross-sections of Cu, Fe, Sn in the energy range 3-29 keV. Wang Dachun et al.

Nuclear structure and decay data

- * JAEKI-M-91-037. Catalog of gamma-rays unplaced in radioactive decay schemes. A compilation extracted from ENSDF, by T. Narita and K. Kitao.

Jadernye Konstanty

- * INDC(CCP)-336. Translation of selected papers published in Jad. Konst. 1985(4). Contains 11 papers by different USSR authors on the evaluation of neutron cross-sections, resonance parameters and fission neutron data of U-238. In addition: Fast neutron scattering cross-sections of even Ni isotopes (Korzh). Neutron absorption of fission products represented by a single pseudo-fragment (Tsibulya et al.).
- * INDC(CCP)-342. B.V. Devkin et al., The spectra of neutrons from the n+Bi-209 reaction at 14 MeV. - Translation from Jad. Konst. 1989(2).
- * INDC(CCP)-343. Ju.F. Jaborov, Method for evaluating non-consistent data using two statistical criteria. - Translation from Jad. Konst. 1989(2).
- * INDC(CCP)-329. Translation of selected papers published in Jad. Konst. 1989(3). Contents: U-238 strength-function uncertainty in resonance structure calculations in unresolved regions (Koshcheev). Evaluation of excitation functions and γ -spectra in Nb-93(n,n' γ) (Pronjaev). Isotopic dependence of capture cross-sections for medium and heavy nuclei for 0.5 - 2 MeV neutrons (Trofimov). Measurement of Al-27(n, α) at 14.8 MeV (Moisseev). Analysis of Pu-239 prompt fission neutron spectra (Sukhikh, Maerten). Measurement of Zn-64(n,p), Zr-90(n,2n), Cd-111(n,n')m in U-235 fission neutron spectrum (Grigorjev).
- * INDC(CCP)-327. Translation of selected papers published in Jad. Konst. 1989(4). Contents: Neutron data for thermal reactor calculations; including tables of thermal cross-sections and resonance integrals of elements and isotopes up to 82-Bi-209 from the KORT-88 library (Abagjan). Evaluation of N-14 neutron data (Blokhin). Neutron spectra and level densities from (p,n) reactions on Ho-165, Pb-204, 206, 207, 208, Bi-209 (Zhuravlev).
- * INDC(CCP)-332. Translations of selected papers published in Jad. Konst. 1990(1). Contents: Isotonic and isotopic dependence of the radiative neutron capture cross-section on the neutron excess (Trofimov). B-10(n,t) reaction in the subthreshold energy region (Kornilov). Transmission of fission spectrum neutrons through Cr and Ni spheres (Baranov).
- * Jadernye Konstanty 1990(3). In Russian with abstracts in English. Contents: Fission channel of samarium (Lisii). Resonance cross-sections statistic modeling (Kojumdzhieva). Delayed neutrons from Pu-239 thermal fission (Maksjutenko). ∇ Measurement of total neutron cross-sections and resonance parameters of Ni-58, 60, 62, 64 from 2 eV to 8 keV (Litvinskij). ∇ Thermal cross-section of Fe-54 (n, α) (Makarov). ∇ Isotopic systematics of neutron capture cross-sections at 30 keV (Trofimov). ∇ Evaluation of particle emission spectra of isotopes of Fe, Cr, Ni for the BROND library (Zeleneckij, Pashchenko). ∇ Average cross-section ratios for many nuclei in the Br-1 field (Zvonarev). Multipoles in γ -transitions of Te-122 (n,n' γ) (Berendakov). Evaluation of the U-238 spontaneous fission half-life (Shurshikov).
- * Note: The papers marked with ∇ are available in English translation by A. Lorenz in the report INDC(CCP)-335.
- * Jadernye Konstanty 1990(4). In Russian with abstracts in English. Contents: Measurement of inelastic neutron scattering on Zr-90 (Kramorovskij). Measurement of thermal neutron fission cross-section and fission resonance integral of Pu-238 (Zenkevich). Evaluation of

Th-232(n,2n) (Kornilov). Delayed fission neutron data for U-235 (Ignatjev). Measurement of Sn-116(n,n' γ); including long data tables (Demidov). The main thermonuclear reactions; including evaluated data tables (Abramovich). Calculations of fast reactors (Seleznev). Group constants for Pu-241 (Kojumdzhieva). Sodium void reactivity on fast reactors (Belov). Capture cross-sections testing of Pr-141, Nd-143, 145 (Bednjakov).

Numeric Databases

Directory of Numeric Databases, issued by ICSTI, the International Council for Scientific and Technical Information. The directory covers all fields of natural sciences, so that nuclear data have been included only marginally. Additional contributions for making the next issue of this directory more complete, are welcome. Requests for copies should be addressed to Martha Orfus, ICSTI Executive Secretary, 51 Boulevard de Montmorency, 75016 Paris, France.

Seminar/Workshop on database applications in physical sciences, 10-12 Oct. 1990 Bhabha Atomic Research Center (BARC), Bombay, India. Proceedings edited by T.K. Ghosh and K. Guruvayurappan. Copies to be requested from the editors, BARC Computer Division.

Electronic addresses

We maintain a list of electronic ("e-mail") addresses of scientists in the field of nuclear data. Copies of this list are available upon request. Notifications of additions and changes to this list are welcome.

Nuclear Data Section
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna, Austria

Printed by the IAEA in Austria
January 1992

92-00309