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Evaluated Database for Prompt Gamma Rays from Radiative Capture of Thermal Neutrons by Elements from Hydrogen to Zinc

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Summary description by
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Abstract

A brief review is given of the contents of the Evaluated Database for Prompt Gamma Rays from Radiative Capture of Thermal Neutrons by Elements from Hydrogen to Zinc; this version also contains data for ^{32}Ge, ^{73}Ta, ^{74}W, ^{62}Sm, and ^{64}Gd. The evaluated data as well as the documentation were provided by R. S. Reedy and S. C Frankle (LANL, USA) and the software for retrieval was developed by V. Zerkin (IAEA-NDS). This database is available from the NDS Web site and on CD ROM that can be requested cost free from the IAEA-Nuclear Data Section.

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- to give first the print reference in which the author(s) describe(s) the generation of the data,
- to give thereafter the database reference which contains the numerical data, including the version of the database,
- and then to mention the data center or the online service from which the data were received.

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EVALUATED DATABASE FOR PROMPT GAMMA RAYS FROM RADIATIVE CAPTURE OF THERMAL NEUTRONS BY ELEMENTS FROM HYDROGEN THROUGH ZINC

The display software for the database was developed within the framework of the Coordinated Research Project "Development of a Database for Prompt Gamma-ray Neutron Activation Analysis" sponsored by the International Atomic Energy Agency (IAEA). The data were evaluated and provided to the IAEA by R. S. Reedy and S. C Frankle (LANL, Los Alamos, USA), while V. Zerkin (IAEA-NDS) developed the data retrieval system.

The above mentioned evaluated data have already been published in a compact format in Atomic Data and Nuclear Data Tables, Volume 80, Number 1, January 2002 (Prompt Gamma Rays From Radiative Capture of Thermal Neutrons by Elements From Hydrogen Through Zinc, Robert C. Reedy and Stephanie Frankle). Cutoff date for these evaluations of data was August 2000; data were first compiled and evaluated for isotopes, and then converted for the natural elements. The version in this document also contains data for ^{32}Ge, ^{73}Ta, ^{74}W, ^{62}Sm, and ^{64}Gd.

Prompt gamma-ray spectroscopy is used to determine material compositions for a wide variety of applications, for example elemental abundances in:

- borehole analysis,
- planetary surfaces using cosmic-rays- produced sources,
- samples irradiated in nuclear reactors.

The motivation behind this evaluation work was to provide the best prompt gamma-ray data for the ENDF evaluations used to produce data libraries for transport codes such as MCNP.

Contents of the CD-ROM

Click on “PromptGamma-LANL.html”, software displays a list of three titles:

- “Elemental and Isotopic Data Tables”,
- “Description of the Tables”,
- “Documents (LANL)”.

Under the first title, the retrieval system will display a chart of isotopes and those with active links have data to display : ^{1}H, ^{3}Li, ^{4}Be, ^{5}B, ^{6}C, ^{7}N, ^{8}O, ^{9}F, ^{10}Ne, ^{11}Na, ^{12}Mg, ^{13}Al, ^{14}Si, ^{15}P, ^{16}S, ^{17}Cl, ^{18}Ar, ^{19}K, ^{10}Ca, ^{21}Sc, ^{22}Ti, ^{23}V, ^{24}Cr, ^{25}Mn, ^{26}Fe, ^{27}Co, ^{29}Cu, ^{30}Zn, ^{32}Ge, ^{73}Ta, ^{74}W, ^{62}Sm, and ^{64}Gd. The system is self-explanatory and the user is encouraged to proceed.

Under the second title, a detailed description of the tables is displayed.

The third link (“Documents”) displays a list of documents, which provides a detailed description of methods and procedures,as applied in the evaluation:

- Assessment of Photon Production Data for Thermal Neutron Capture in Chromium Isotopes (La98-543).

- Assessment of Photon Production Data for Thermal Neutron Capture in Nickel Isotopes (La98-550).
- A Recommended Photon Production Spectrum for Thermal Neutron Capture in Chlorine (La-ur-98-551).
- Recommended Photon Production Data from Thermal Neutron Capture Reactions in Iron Isotopes (La98-552).
- Recommended Photon Production Data for Thermal Neutron Capture in Copper Isotopes (La98-867).
- Archive of Evaluated Data for Prompt Gamma-rays from Radiative Capture of Thermal Neutrons (La-ur-01-4984).

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