# U-238 Evaluation

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A data file in ENDF/BVI format is in final stages of assembly. Below 10 keV this is based on a new set of resolved resonance parameters obtained from the analysis performed at Harwell and the NEA Data Bank[1]. The final set of parameters is now being obtained by applying corrections for errors in background and normalisation recently established for the high resolution capture yield data of Macklin et al[2] above 4 keV. Below 4 keV these errors are not significant. It is hoped that these corrections will bring the average cross-sections into agreement with the average capture cross-section data evaluated by Poenitz[3] as part of the effort to obtain the Standard Cross-sections of ENDF/BVI[4]. If significant discrepancies remain agreement will be achieved by modifying $\langle\Gamma_\gamma\rangle$. The number of resonances included in the analysis are shown in Table 1. The resonances in the s-wave category have been chosen so that they fit the known level spacing statistics and neutron width distributions without distorting the equivalent distributions for the p-waves. Between 10 and 308.502 keV the evaluation is based on the unresolved resonance region evaluation of Fröhner[5] though above 200 keV some alterations have been made in the recommended cross-sections in File 3 to enable a smooth join to be made with the higher energy cross-sections. Above 308.502 keV the evaluation is based upon a preliminary evaluation obtained from Japan[6] with the following alterations:

(1) The fission and capture cross-sections are taken from Poenitz[3].

(2) The total cross-section is obtained from Smith[7].

(3) Some alterations to the inelastic scattering cross-section are made above 308.502 keV to obtain a smooth join with those recommended by Fröhner[5].

(4) The fission gamma-ray production data below 933.941 keV have been calculated using the method of Fort et al[8]. (At higher energies the gamma-ray production cross-section data for all reaction channels are added together.)

Table 1

Number of resonances included in analysis

| Energy range (keV) | Transmission analysis | | Present analysis transmission and capture | | | | ENDF/B-V |
|---|---|---|---|---|---|---|---|
| | Olsen et al | Olsen | s | $p_{1/2}$ | $p_{3/2}$ | Total | |
| 0 - 1 | 107 | | 48 | 38 | 79 | 165 | 146 |
| 1 - 2 | | 91 | 48 | 36 | 81 | 165 | 120 |
| 2 - 3 | | 83 | 45 | 34 | 64 | 143 | 91 |
| 3 - 4 | | 79 | 49 | 30 | 60 | 139 | 85 |
| 4 - 5 | | 73 | 46 | 55 | 89 | 190 | |
| 5 - 6 | | 81 | 48 | 40 | 75 | 163 | |
| 6 - 7 | | 73 | 48 | 47 | 71 | 166 | |
| 7 - 8 | | 70 | 46 | 41 | 65 | 152 | |
| 8 - 9 | | 55 | 47 | 42 | 62 | 151 | |
| 9 - 10 | | 60 | 48 | 40 | 80 | 168 | |

References

(1) Moxon M. C., Sowerby M. G., Nakajima Y. and Nordborg C., Proc. 1988 International Reactor Physics Conference, Jackson Hole, USA, September 18-22, 1988, Vol. 1, p.281.

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(3) Poenitz W. P., IAEA-TECDOC-335, p.426 (1985) and private communication (1987).

(4) Carlson A. D., Poenitz W. P., Hale G. M. and Peelle R. W., Nuclear Data for Science and Technology, Vol. 2, Gordon and Breach, New York (1986) p.1429.

(5) Fröhner F. H., Proc. 1988 International Reactor Physics Conference, Jackson Hole, USA, September 18-22, 1988, Vol. 3, p.171.

(6) Igarasi S., Private Communication (1987).

(7) Smith A. B., Private Communication (1988).

(8) Fort E., Frehaut J. and Long P., JEF/DOC 253 (1988).