B. A. R. C.-892

B. A. R. C.-892

सत्यमेव जयते

GOVERNMENT OF INDIA
ATOMIC ENERGY COMMISSION

A 27 GROUP CROSS SECTION SET DERIVED FROM ENDF/B LIBRARY

by

S. B. Garg
Experimental Reactor Physics Section
Reactor Group

BHABHA ATOMIC RESEARCH CENTRE
BOMBAY, INDIA
1976

B.A.R.C.-892

GOVERNMENT OF INDIA
ATOMIC ENERGY COMMISSION

B.A.R.C.-892

A 27 GROUP CROSS SECTION SET DERIVED FROM ENDF/B LIBRARY

by

S.B. Garg
Experimental Reactor Physics Section
Reactor Group

BHABHA ATOMIC RESEARCH CENTRE
BOMBAY, INDIA
1976

A B S T R A C T

A new 27 group cross-section set covering the energy range thermal to 15 Mev has been generated using the basic cross-section data from ENDF/B library. The elements included in this new set are H, D, T, He^3, He^4, Li^6, Li^7, Be^9, B^{10}, B^{11}, C, N, O, Na, Cr, Fe, Ni, Th, Pa, U^{233}, U^{234}, U^{235}, U^{238}, Pu^{239}, Pu^{240}, Pu^{241} and Pu^{242}. In the resolved and unresolved resonance regions of these elements scattering, fission, capture and total energy-point cross-sections were evaluated with the Breit-Wigner, Adler-Adler or Lane and Lynn resonance theories. They were then modified with the background corrections listed in ENDF/B library. Discrete level and evaporation models with appropriate nuclear temperatures were used to evaluate the group-to-group scattering matrices of inelastic and (n,2n) reactions. This set is particularly suited to study the (n,2n), (n,p) and (n,α) reactions because of their higher energy thresholds. (n,p) and (n,α) reactions lead to the production of hydrogen and helium gases and therefore are of significance in radiation damage studies of structural elements. In short, this set based on recent basic cross-section data would be more appropriate to study the physics of the fission and fusion reactor systems.

A brief account is also given of the computer code system and the mathematical formulations used in the evaluation and generation of this cross-section set.

CONTENTS

A 27 GROUP CROSS-SECTION SET DERIVED FROM ENDF/B LIBRARY

S.B. GARG
Experimental Reactor Physics Section
Bhabha Atomic Research Centre

1. INTRODUCTION

Multigroup cross-sections are needed to predict the nuclear behaviour of the nuclear reactors. The energy range over which the neutron spectrum is spread generally varies from thermal to about 15 Mev. In this energy range a variety of neutron interactions takes place and the cross-sections representing these reactions vary as a function of the incident neutron energy and the mass number of the target nucleus. The multigroup cross-section set is to be suitably derived from these basic energy point cross-sections so that the physical phenomenon taking place in the reactor can be accurately described. This is the most involved task and can be accomplished with the integrated knowledge of reactor physics and nuclear physics. In the past, two published cross-sections sets, namely, YGM[1] and ABBN[2] were available to the community of reactor designers; but both these sets were evaluated more than a decade ago. These sets, thus, do not incorporate the latest changes in the basic cross-sections which have taken place as a result of new measurements and evaluations. Moreover, these sets covered the energy range from thermal to about 10 Mev and therefore did not adequately represent the (n,2n), (n,p) and (n,α)reactions which have higher energy thresholds in several nuclides of interest. (n,p) and (n,α) reactions lead to the production of hydro-

gen and helium and therefore are significant in radiation damage studies of structural elements. To account for all these phenomena a new cross-section set was generated from the basic evaluated data contained in ENDF/B[3] library.

2. 27 GROUP CROSS-SECTION SET

The ABEN cross-section set has often been used in fast reactor physics studies. In order to bring out the impact of the modified cross-sections reported here and to facilitate the intercomparison of the various reactor parameters evaluated with the ABEN set and this set the energy structure of 26 groups has been kept the same. The 27th group has been added between 10.5 Mev and 15 Mev. Because of this increased energy range this set can be used both in fission and fusion reactor studies. In fact, the main objective of generating this new set was to provide multigroup cross-sections based on the latest basic cross-section data to those engaged in fast reactor physics studies at this Centre. This new set includes total, elastic scattering, inelastic scattering, capture, fission, transport, elastic removal, (n,2n), (n,p), (n,α) and slowing down cross-sections for H, D, T, He^3, He^4, Li^6, Li^7, Be, B^{10}, B^{11}, C, N, O, Na, Cr, Fe, Ni, Th, Pa, U^{233}, U^{234}, U^{235}, U^{236}, U^{238}, Pu^{239}, Pu^{240}, Pu^{241} and Pu^{242}. Entities like ν and μ have also been derived for these elements.

The group-to-group slowing down cross-sections of the (n,2n) reaction and (n,p) and (n,α) reaction cross-sections have been

explicitly given in this set while they have not been included in the ABBN set. Thus this set is more suited to estimate the production of hydrogen and helium gases in the structural element and thereby to infer the extent of radiation damage under various operating conditions of the reactor. A brief report on this set was presented in the Reactor Physics Symposium[4].

3. FORMULATIONS AND CODES

The ENDF/B library does not list the energy point total, elastic scattering, capture and fission cross-sections in the resonance energy regions of the various elements. Instead, it gives the floor corrections which are to be combined with the cross-sections evaluated with the recommended resonance parameters in one of the following theories[5], [6], [7], [8].

3.1 Breit-Wigner Theory

$$\sigma_{n\gamma}^{\ell} = \pi \lambda\!\!\!^{-2} \sum_J g_J \sum_{r=1}^{N_{res}} \frac{\Gamma_{nr}\Gamma_{\gamma r}}{(E-E_r')^2 + \left(\frac{\Gamma_r}{2}\right)^2}$$

$$\sigma_{nf}^{\ell} = \pi \lambda\!\!\!^{-2} \sum_J g_J \sum_{r=1}^{N_{res}} \frac{\Gamma_{nr}\Gamma_{fr}}{(E-E_r')^2 + \left(\frac{\Gamma_r}{2}\right)^2}$$

$$\sigma_{nn}^{\ell} = 4\pi \lambda\!\!\!^{-2}(2\ell+1)\sin^2\varphi_\ell$$
$$+ \pi \lambda\!\!\!^{-2} \sum g_J \sum_{r=1}^{N_{res}} \frac{\Gamma_{nr}^2 \cos 2\varphi_\ell - 2\Gamma_{nr}(\Gamma_{\gamma r}+\Gamma_{fr})\sin^2\varphi_\ell}{(E-E_r')^2 + (\Gamma_r/2)^2}$$
$$+ \frac{2(E-E_r')\Gamma_{nr}\sin 2\varphi_\ell}{(E-E_r')^2 + (\Gamma_r/2)^2}$$
$$+ \pi \lambda\!\!\!^{-2} \sum_J g_J \sum_{r=2}^{N_{res}} \sum_{s=1}^{r-1} \frac{2\Gamma_{nr}\Gamma_{ns}\left[(E-E_r')(E-E_s') + \frac{\Gamma_r\Gamma_s}{4}\right]}{\left[(E-E_r')^2 + \left(\frac{\Gamma_r}{2}\right)^2\right]\left[(E-E_s')^2 + \left(\frac{\Gamma_s}{2}\right)^2\right]}$$

where $E_r' = E_r + \left[\frac{S_\ell(|E_r|) - S_\ell(E)}{2P_\ell(|E_r|)}\right]\Gamma_{nr}(|E_r|)$

S_ℓ and P_ℓ are shift and penetration functions and the other symbols have their usual meanings -

3.2 Reich-Moore Theory

$$\sigma_{nt} = 2\pi \lambda\!\!\!^{-2} \sum_J g_J \left[\left(1-\cos 2\varphi_\ell\right) + 2\,\mathrm{Re}\left(e^{-2i\varphi_\ell} \rho^J_{nn}\right)\right]$$

$$\sigma_{nf} = 4\pi \lambda\!\!\!^{-2} \sum_J g_J \left(\left| \rho^J_{nf1} \right|^2 + \left| \rho^J_{nf2} \right|^2 \right)$$

$$\sigma_{nn} = \pi \lambda\!\!\!^{-2} \sum_J g_J \left[2\left(1-\cos 2\varphi_\ell\right) + 4\,\mathrm{Re}\left(e^{-2i\varphi_\ell} \rho^J_{nn}\right) - 4\,\mathrm{Re}\left(\rho^J_{nn}\right) + 4\left|\rho^J_{nn}\right|^2 \right]$$

$$\sigma_{n\gamma} = 4\pi \lambda\!\!\!^{-2} \sum_J g_J \sum_{a,b} (I-K)^{-1}_{na} (I-K)^{-1}_{nb}\, \mathrm{Re}\left[(I-K)_{ab} - \delta_{ab} \right]$$

where a, b = 1, 2, 3 and 1 = neutron channel and 2, 3 are fission channels

$$\rho_{nc} = \delta_{nc} - (I-K)^{-1}_{nc}$$

$$(I-K)_{cc'} = \delta_{cc'} - \frac{i}{2} \sum \frac{\Gamma^{1/2}_{\lambda c}\, \Gamma^{1/2}_{\lambda c'}}{E_\lambda - E - \frac{i}{2}\Gamma_{\lambda\lambda}}$$

3.3 Adler-Adler Theory

$$\sigma^{x}(E) = \frac{2c}{E}\left(1-\cos\omega\right) + \frac{c}{\sqrt{E}}\sum_{K}\nu_K\left(G_K^{x}\cos\omega + H_K^{x}\sin\omega\right)$$
$$+ \frac{(\mu_K - E)\left(H_K^{x}\cos\omega - G_K^{x}\sin\omega\right)}{(\mu_K - E)^2 + \nu_K^2}$$
$$+ \frac{c}{\sqrt{E}}\left(A_1^{x} + \frac{A_2^{x}}{E} + \frac{A_3^{x}}{E^2} + \frac{A_4^{x}}{E^3} + B_1^{x}E + B_2^{x}E^2\right)$$

where $\frac{c}{E} = \pi \lambda\!\!\!^{-2}$

G_k, H_k, ν_k and μ_k are Adler and Adler parameters characterizing the Kth resonance.

3.4 Lane-Lynn Theory

$$\langle \sigma_{el} \rangle = 2\pi^2 \lambda\!\!\!^{-2} \sum \frac{g_J}{\langle D_J \rangle}\left[\frac{\Gamma_n \Gamma_n}{\langle \Gamma_n + \Gamma_f + \Gamma_\gamma + \Gamma_x \rangle} - 2\Gamma_n \sin^2\varphi_\ell\right] + \sigma_p$$

$$\langle \sigma_f \rangle = 2\pi^2 \lambda\!\!\!^{-2} \sum \frac{g_J}{\langle D_J \rangle}\left\langle \frac{\Gamma_n \Gamma_f}{\Gamma_n + \Gamma_f + \Gamma_\gamma + \Gamma_x} \right\rangle$$

$$\langle \sigma_\gamma \rangle = 2\pi^2 \lambda\!\!\!^{-2} \sum \frac{g_J}{\langle D_J \rangle}\left\langle \frac{\Gamma_n \Gamma_\gamma}{\Gamma_n + \Gamma_f + \Gamma_\gamma + \Gamma_x} \right\rangle$$

3.5 Computer Codes

a) A computer programme RESEND[9] based on the above mentioned theories has been modified and used on CDC-3600 computer. The total, elastic scattering, capture and fission cross-sections of all the elements reported here were then evaluated and combined with the floor corrections in the resolved and unresolved resonance energy regions using the resonance parameters from ENDF/B library versions III and IV.

b) A code package[10] based on the MC^2 - Code[11] has been developed to obtain the group cross-sections and group-to-group scattering cross-sections from the energy-point data. Some of the mathematical formulations on which this code package is based are given in this report for the sake of completeness.

c) Three interpolation schemes, namely, lnE vs ln σ , lnE vs σ and E vs σ have been used to obtain the cross-section at any unknown point. These schemes have proved useful in the analytical integration of the various cross-sections over an arbitrary group width with 1/E, constant or E flux weighting factors.

(i) lnE vs ln σ Interpolation Scheme

$$\sigma(E) = \left(\frac{E}{E_n}\right)^{A_n} \sigma_n$$

$$A_n = \frac{\ln \sigma_{n+1} - \ln \sigma_n}{\ln E_{n+1} - \ln E_n}$$

$$\langle \sigma_x \rangle_i = \frac{\sigma_n}{(E_n)^{A_n}} \frac{1}{\Delta u} \left[\frac{1}{A_n} \left(E_{i+1}^{A_n} - E_i^{A_n} \right) \right] \quad \text{— } \frac{1}{E} \text{ Weighting}$$

$$= \frac{\sigma_n}{(E_n)^{A_n}} \frac{1}{E_{i+1} - E_i} \left[\frac{1}{A_n + 1} \left(E_{i+1}^{A_n+1} - E_i^{A_n+1} \right) \right] \quad \text{— Const. Weighting}$$

$$= \frac{\sigma_n}{(E_n)^{A_n}} \frac{2}{E_{i+1}^2 - E_i^2} \left[\frac{1}{A_n + 2} \left(E_{i+1}^{A_n+2} - E_i^{A_n+2} \right) \right] \quad \text{— E Weighting}$$

$$\left\langle \frac{1}{\sigma_x} \right\rangle_i = \frac{(E_n)^{A_n}}{\sigma_n} \frac{1}{\Delta u} \left[-\frac{1}{A_n} \left(E_{i+1}^{-A_n} - E_i^{-A_n} \right) \right] \quad \text{— } \frac{1}{E} \text{ Weighting}$$

$$= \frac{(E_n)^{A_n}}{\sigma_n} \frac{1}{E_{i+1} - E_i} \left[\frac{1}{-A_n + 1} \left(E_{i+1}^{-A_n+1} - E_i^{-A_n+1} \right) \right] \quad \text{— Const. Weighting}$$

$$= \frac{(E_n)^{A_n}}{\sigma_n} \frac{2}{E_{i+1}^2 - E_i^2} \left[\frac{1}{-A_n + 2} \left(E_{i+1}^{-A_n+2} - E_i^{-A_n+2} \right) \right] \quad \text{— E Weighting}$$

When $A_n = \pm 1$ or ± 2, the constant and E weighting forms of these

equations become indeterminate. Such cases are evaluated by replacing the quantity in the braces [ ] with the limiting value $\ln \frac{E_i + 1}{E_i}$ and setting A_n to the appropriate values.

(ii) <u>lnE vs σ Interpolation Scheme</u>

$$\sigma(E) = A_n \ln \frac{E}{E_n} + \sigma_n$$

$$A_n = \frac{\sigma_{n+1} - \sigma_n}{\ln E_{n+1} - \ln E_n}$$

$$\langle \sigma_x \rangle_i = \frac{1}{\Delta u} \left[\frac{A_n}{2} \left\{ (\ln E_{i+1})^2 - (\ln E_i)^2 \right\} + (\sigma_n - A_n \ln E_n) \Delta u \right] - \frac{1}{E} Wtg$$

$$= \frac{1}{E_{i+1} - E_i} \left[A_n \left\{ E_{i+1} \ln E_{i+1} - E_i \ln E_i - E_{i+1} + E_i \right\} + (\sigma_n - A_n \ln E_n)(E_{i+1} - E_i) \right] - \text{const} \cdot Wtg$$

$$= \frac{2}{E_{i+1}^2 - E_i^2} \left[\frac{A_n}{2} \left\{ E_{i+1}^2 \ln E_{i+1} - E_i^2 \ln E_i - \frac{E_{i+1}^2 - E_i^2}{2} \right\} + (\sigma_n - A_n \ln E_n) \left(\frac{E_{i+1}^2 - E_i^2}{2} \right) \right] - E\ Wtg.$$

(iii) E vs σ Interpolation Scheme

$$\sigma(E) = A_n (E - E_n) + \sigma_n$$

$$A_n = \frac{\sigma_{n+1} - \sigma_n}{E_{n+1} - E_n}$$

$$\langle \sigma_x \rangle_i = \frac{1}{\Delta u}\left[A_n (E_{i+1} - E_i) + (\sigma_n - A_n E_n)\Delta u\right] - \frac{1}{E}\, Wtg.$$

$$= \frac{1}{E_{i+1} - E_i}\left[A_n\left(\frac{E_{i+1}^2 - E_i^2}{2}\right) + (\sigma_n - A_n E_n)(E_{i+1} - E_i)\right] - \text{Const. } Wtg$$

$$= \frac{2}{E_{i+1}^2 - E_i^2}\left[A_n\left(\frac{E_{i+1}^3 - E_i^3}{3}\right) + (\sigma_n - A_n E_n)\left(\frac{E_{i+1}^2 - E_i^2}{2}\right)\right] - E\, Wtg$$

(d) The fine group elastic transfer and elastic transport cross-sections are evaluated as:

$$\langle \sigma_{el} \rangle_{i \to i+1} = \frac{\langle \sigma_s \rangle_i \left(1 - \langle \mu \rangle_i\right)}{1 - \frac{2}{3A}} \cdot \frac{\xi}{\Delta u} - \frac{1}{E}\, Wtg.$$

$$\langle \sigma_{el} \rangle_{i \to i+1} = \frac{\langle \sigma_s \rangle_i \left(1 - \langle \mu \rangle_i\right)}{1 - \frac{2}{3A}} \cdot \frac{\xi E_i}{E_{i+1} - E_i} \quad \text{— Const. Wtg}$$

$$= \frac{\langle \sigma_s \rangle_i \left(1 - \langle \mu \rangle_i\right)}{1 - \frac{2}{3A}} \cdot \frac{\xi E_i}{(E_{i+1} - E_i)} \frac{2 + \xi}{\left(2 + \frac{E_{i+1} - E_i}{E_i}\right)} \quad \text{— E Wtg}$$

$$\langle \sigma_{el\,tr} \rangle_i = \frac{1}{\left\langle \frac{1}{\sigma_s} \right\rangle_i} \left(1 - \langle \mu \rangle_i\right)$$

(e) The discrete energy level model and the evaporation model have been used to obtain the down scattering matrices of the inelastic and (n,2n) cross-sections. The nuclear temperatures for the unresolved inelastic and (n,2n) reactions are either taken from ENDF/B library or evaluated using Fermi gas model[12].

(i) <u>Discrete Level Model</u>

Assuming isotropy in the laboratory system:

$$E' = E\left(\frac{A-1}{A+1}\right) - E^i_{level}\left(\frac{A}{A+1}\right)$$

$$\sigma^i_{in}(E \to E') = \sigma^i_{in}(E)\, \delta\left(E' - E\,\frac{A-1}{A+1} + E^i_{level}\,\frac{A}{A+1}\right)$$

$$\sigma^i_{in}(g \to g') = \frac{\int_g dE \int_{g'} dE'\, \sigma^i_{in}(E \to E')\, \phi(E)}{\int_g dE\, \phi(E)}$$

$$\sigma_{in}(g \to g') = \sum_i \sigma^i_{in}(g \to g')$$

Where δ is the Dirac-delta function

(ii) Evaporation Model

$$P_{g\to g'} = \frac{\int_{g'} dE\, E\, e^{-E/\langle T\rangle_g}}{\sum \int_{g'} dE\, E\, e^{-E/\langle T\rangle_g}}$$

$$\sigma_{in}(g\to g') = \sigma_{in}(g)\, P_{g\to g'}$$

The sum in the denominator is over all groups of energy less than or equal to that of group g

(f) The fission source in each group has been evaluated using the generalized fission spectrum with appropriate nuclear temperatures. Three different fission sources due to U^{233}, U^{235} and Pu^{239} have been evaluated.

Generalized Fission Spectrum

$$\chi(E) = \frac{\alpha E}{T^2}\exp\left(-\frac{E}{T}\right) + (1-\alpha)\frac{2}{\sqrt{\pi}}B^{-3/2}\sqrt{E}\exp(-E/B)$$

where $B = a + b(\bar{\nu}+1)^{1/2}$

$\alpha = (\sigma_{nn'f} + \sigma_{n2nf})/\bar{\nu}(\sigma_{nf} + \sigma_{nn'f} + \sigma_{n2nf})$

$T = c(E_0 - E_f)/(14 - E_f)$

E_f is the threshold for the (n,n′ f) reaction and E_0 is the initial energy. a, b and c are constants.

(g) Since the neutrons slow down both by elastic and inelastic collisions the 1/E weighting spectrum has been used to collapse the group cross-sections.

4. CONCLUSIONS

In the last decade the basic energy point cross-sections have undergone major modifications as a result of improved experimental techniques and more rigorous theoretical evaluations. On comparison with the old data it can be immediately seen that resolved and unresolved resonance parameters have been considerably modified and also the energy range of the resolved resonances has gone up. The inelastic scattering and threshold reaction cross-sections have also been updated. It is well known that the alpha values of Pu-239, which is major fissile element in fast reactors, have been recently revised. In fact the cross-sections of fissile, fertile and structural elements have undergone significant changes. It was, therefore, imperative that the new multigroup cross-section set should have been derived from the basic data library which accounts for all the modified data. ENDF/B library is one such data bank which is complete and most updated and it has been used in the generation of this set.

It is, therefore, no wonder if significant differences are noticed in the multigroup cross-sections listed in the following tables in the resonance energy regions and also in the down scatter-

ing matrices. Thus the neutron spectrum calculated with this set is expected to be different from that calculated with the ABBN set and this may have important bearings on reactor parameters. Some representative critical experiments are now being calculated with this set and a detailed analysis would be reported in due course.

It may be noted that the down scattering matrices of some of the elements are comprised of two tables - one includes slowing down cross-sections due to inelastic scattering phenomenon plus two times the slowing down cross-sections due to (n,2n) phenomenon and the second table contains the scattering matrices due to (n,2n) phenomenon only.

5. REFERENCES

5.1 S. Yiftah, D. Okrent & P.A. Moldauer; Fast Reactor Cross-Sections, Pergamon Press (1960)

5.2 I.I. Bondarenko et al; Group Constants for Nuclear Calculations, Consultants Bureau, New York (1964)

5.3 M.K. Drake; Data Formats and Procedures for ENDF Neutron Cross-Section Library, Brookhaven National Laboratory (1970)

5.4 S.B. Garg; A New Multigroup Cross-Section Set Based on ENDF/B Library, Reactor Physics Symposium, Bombay (1976)

5.5 G. Breit & E.P. Wigner; Phys. Rev.48, 918 (1935)

5.6 C. Reich & M. Moore; Phys. Rev.111, 929 (1958)

5.7 D.B. Adler & F.T. Adler; COO-1546-3 (1966)

5.8 A.M. Lane and J.E. Lynn; Proc. Phys. Soc. A70, 557 (1957)

5.9 Odelli Ozer; RESEND: A Programme to Preprocess ENDF/B Materials with Resonance Files into a Pointwise Form, BNL17134 (1973)

5.10 S.B. Garg & Ashok Kumar; A Code System to Generate Multigroup Cross-Sections Using Basic Data, Reactor Physics Symp; Bombay (1976)

5.11 B.J. Toppel, A.L. Rago & D.M. O'Shea; MC^2: A Code to Calculate Multigroup Cross-Sections, ANL-7318 (1967)

5.12 E. Fermi; Nuclear Physics, The University of Chicago Press, (1958)

6. ACKNOWLEDGEMENTS

The author is thankful to Dr.P.R. Dastidar, Director, Reactor Group; Dr.R. Chidambaram, Head, Neutron Physics Section; Dr.V.C. Deniz, Head, Experimental Reactor Physics Section and Shri M. Srinivasan for taking a very keen interest in this work.

Thanks are due to Shri M. Sivadasan for the pains he has taken in typing this report neatly. The enormous number of numerical tables really made his task a tedious one.

Energy Structure of 27-Group Cross-Section Set

Group	Energy Range	Lethargy Width
1	10.5 Mev - 15.0 Mev	0.3567
2	6.5 " - 10.5 "	0.4776
3	4.0 " - 6.5 "	0.4855
4	2.5 " - 4.0 "	0.4700
5	1.4 " - 2.5 "	0.5798
6	0.8 " - 1.4 "	0.5596
7	0.4 " - 0.8 "	0.6931
8	0.2 " - 0.4 "	0.6931
9	0.1 " - 0.2 "	0.6931
10	46.5 Kev - 0.1 "	0.7657
11	21.5 " - 46.5 Kev	0.7714
12	10.0 " - 21.5 "	0.7655
13	4.65 " - 10.0 "	0.7657
14	2.15 " - 4.65 "	0.7714
15	1.0 " - 2.15 "	0.7655
16	465 ev - 1.0 "	0.7657
17	215 " - 465 ev	0.7714
18	100 " - 215 "	0.7655
19	46.5 " - 100 "	0.7657
20	21.5 " - 46.5 "	0.7714
21	10.0 " - 21.5 "	0.7655
22	4.65 " - 10.0 "	0.7657
23	2.15 " - 4.65 "	0.7714
24	1.0 " - 2.15 "	0.7655
25	0.465 " - 1.0 "	0.7657
26	0.215 " - 0.465 "	0.7714
27	0.025 "	

Fission Spectra

Group	Pu-239	U-235	U-233
1	0.0018	0.0010	0.0014
2	0.0246	0.0175	0.0212
3	0.1021	0.0858	0.0948
4	0.1862	0.1742	0.1811
5	0.2605	0.2625	0.2617
6	0.1934	0.2045	0.1984
7	0.1352	0.1473	0.1405
8	0.0592	0.0657	0.0620
9	0.0233	0.0261	0.0245
10	0.0092	0.0103	0.0097
11	0.0030	0.0034	0.0032
12	0.0010	0.0011	0.0010
13	0.0003	0.0003	0.0003
14	0.0002	0.0003	0.0003
15	-	-	-

H

Group	σ_e	σ_c	σ_{tr}	σ_t	σ_{er}	μ
1	0.7709	0	0.25894	0.7709	0.65411	0.66081
2	1.1142	0	0.37181	1.1142	0.89559	0.66108
3	1.6172	0	0.53919	1.6172	1.2895	0.66035
4	2.2238	0	0.74267	2.2238	1.7835	0.66362
5	3.0402	0	1.0114	3.0402	2.3326	0.66418
6	4.1505	0	1.3815	4.1505	3.2189	0.66457
7	5.7894	0	1.9186	5.7894	4.2733	0.66484
8	8.2423	0	2.7341	8.2423	6.0755	0.66501
9	11.2268	0	3.7330	11.2268	8.2397	0.66524
10	14.3632	0.000144	4.7904	14.3633	10.168	0.66521
11	16.9810	0.000242	5.6777	16.9812	11.902	0.66521
12	18.6453	0.000396	6.2388	18.6457	13.035	0.66521
13	19.5686	0.000623	6.5514	19.5692	13.633	0.66521
14	20.0342	0.000948	6.7080	20.0351	13.901	0.66521
15	20.2588	0.001390	6.7820	20.2602	14.083	0.66521
16	20.3489	0.002073	6.8146	20.3509	14.150	0.66521
17	20.3889	0.002978	6.8290	20.3919	14.146	0.66521
18	20.4317	0.004381	6.8429	20.4361	14.197	0.66521
19	20.4490	0.006430	6.8525	20.4554	14.201	0.66521
20	20.4490	0.009444	6.8555	20.4584	14.167	0.66521
21	20.4490	0.013868	6.8600	20.4629	14.202	0.66521
22	20.4490	0.020336	6.8664	20.4693	14.196	0.66521
23	20.4490	0.029870	6.8760	20.4789	14.155	0.66521
24	20.4490	0.043862	6.8900	20.4929	14.182	0.66521
25	20.4490	0.064322	6.9104	20.5133	14.165	0.66521
26	20.4490	0.094476	6.9406	20.5435	14.109	0.66521
T	20.4490	-	-	-	-	0.66521

D

Group	σ_e	σ_c	σ_t	σ_{tr}	μ	$\sigma_{n,2n}$
1	0.7053	-	0.8707	0.4799	0.5476	0.1654
2	1.0806	-	1.1876	0.6071	0.5299	0.1070
3	1.5789	-	1.6181	0.8942	0.4532	0.0392
4	2.0686	-	2.0695	1.4211	0.3105	0.0009
5	2.5086	-	2.5086	2.0708	0.1726	-
6	2.8512	-	2.8516	2.6119	0.0830	-
7	3.0165	-	3.0163	2.8490	0.0551	-
8	3.1388	-	3.1388	2.7156	0.1345	-
9	3.2297	-	3.2297	2.4020	0.2560	-
10	3.2810	-	3.2810	2.3441	0.2855	-
11	3.3088	-	3.3088	2.3030	0.3040	-
12	3.3263	-	3.3263	2.2492	0.3237	-
13	3.3373	-	3.3373	2.2233	0.3338	-
14	3.3437	-	3.3437	2.2276	0.3338	-
15	3.3488	-	3.3488	2.2304	0.3338	-
16	3.3500	-	3.3500	2.2318	0.3338	-
17	3.3500	-	3.3500	2.2318	0.3338	-
18	3.3500	-	3.3500	2.2318	0.3338	-
19	3.3500	-	3.3500	2.2318	0.3338	-
20	3.3500	-	3.3500	2.2318	0.3338	-
21	3.3500	-	3.3500	2.2318	0.3338	-
22	3.3500	-	3.3500	2.2318	0.3338	-
23	3.3500	-	3.3500	2.2318	0.3338	-
24	3.3500	-	3.3500	2.2318	0.3338	-
25	3.3500	0.0001	3.3501	2.2319	0.3338	-
26	3.3500	0.00015	3.3501	2.2319	0.3338	-
T					0.3338	

$$\sigma_{1 \to i+k}^{D}$$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.0016	0.0170	0.0560	0.0814	0.0884	0.0496	0.0258	0.0080	0.0030
2	0.0020	0.0160	0.0406	0.0652	0.0474	0.0288	0.0098	0.0028	0.0012
3	0.0006	0.0052	0.0186	0.0230	0.0192	0.0080	0.0026	0.0008	0.0002
4	-	-	-	0.0004	0.0008	0.0004	0.0002	-	-

$$\sigma_{n,2n}^{D}{}_{1 \to i+k}$$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.0008	0.0085	0.0280	0.0407	0.0442	0.0248	0.0129	0.0040	0.0015
2	0.0010	0.0080	0.0203	0.0326	0.0237	0.0144	0.0049	0.0014	0.0006
3	0.0003	0.0026	0.0093	0.0115	0.0096	0.0040	0.0013	0.0004	0.0001
4	-	-	-	0.0002	0.0004	0.0002	0.0001	-	-

Group	σ_f	$\sigma_{n,2n}$	σ_{tr}	σ_t	σ_e	β
				H-3		
1	1.0319	0.05167	0.4989	1.0039	0.8612	0.8115
2	1.5964	0.01448	0.8015	1.5829	1.1590	0.4952
3	2.2925	-	1.3973	2.2024	2.009	0.3152
4	2.3753	-	2.0035	2.3955	2.9688	0.1558
5	2.0678	-	2.1543	2.0673	2.5642	-0.0552
6	1.7455	-	1.8515	1.7250	2.3016	-0.0755
7	1.4738	-	1.4343	1.4938	1.4390	0.0783
8	1.3462	-	1.1494	1.3462	1.1592	0.1767
9	1.3933	-	1.0352	1.3033	1.0375	0.2050
10	1.30	-	1.0102	1.30	0.9129	0.2279
11	1.30	-	1.0102	1.30	0.9089	0.2279
12	1.30	-	1.0102	1.30	0.9159	0.22795
13	1.30	-	1.0102	1.30	0.9156	0.22795
14	1.30	-	1.0102	1.30	0.9089	0.22795
15	1.30	-	1.0102	1.30	0.9159	0.22795
16	1.30	-	1.0102	1.30	0.9156	0.22795
17	1.30	-	1.0102	1.30	0.9089	0.22795
18	1.30	-	1.0102	1.30	0.9160	0.22795
19	1.30	-	1.0102	1.30	0.9156	0.22795
20	1.30	-	1.0102	1.30	0.9089	0.22795
21	1.30	-	1.0102	1.30	0.9159	0.22795
22	1.30	-	1.0102	1.30	0.9156	0.22795
23	1.30	-	1.0102	1.30	0.9089	0.22795
24	1.30	-	1.0102	1.30	0.9159	0.22795
25	1.30	-	1.0102	1.30	0.9156	0.22795
26	1.30	-	1.0102	1.30	0.9089	0.22795
T	1.30	-	1.0102	1.30	-	0.22795

He-3

Group	σ_e	$\sigma_{n,p}$	σ_t	σ_{tr}	σ_{er}	μ
1	1.0786	0.1374	1.1160	0.5256	0.7617	0.6371
2	1.4984	0.2170	1.7154	0.8397	0.9098	0.5804
3	1.9823	0.3671	2.3494	1.3617	1.4282	0.4960
4	2.2670	0.6179	2.8849	2.0710	2.1476	0.3385
5	2.3490	0.8285	3.1775	2.7349	2.2833	0.1880
6	2.0362	0.8854	2.9216	2.7907	2.3701	0.0615
7	1.8791	0.9276	2.8067	2.4572	1.5324	-0.1856
8	1.9157	1.1410	3.0567	2.6292	1.4906	0.2230
9	1.7613	1.6586	3.4199	3.0237	1.3704	0.4230
10	1.4246	2.5254	3.9500	3.6275	1.0034	0.2230
11	1.1967	3.9212	5.1179	4.8498	0.8366	0.2230
12	1.0673	6.1003	7.1676	6.9283	0.7520	0.2230
13	1.0003	9.4447	10.4450	10.2215	0.7048	0.2230
14	1.00	14.6180	15.618	15.3884	0.6991	0.2230
15	1.00	22.126	23.126	22.8964	0.7046	0.2230
16	1.00	32.425	33.425	33.1954	0.7043	0.2230
17	1.00	47.647	48.647	48.4174	0.6991	0.2230
18	1.00	70.205	71.205	70.9754	0.7045	0.2230
19	1.00	102.98	103.98	103.7504	0.7043	0.2230
20	1.00	151.29	152.29	152.0604	0.6991	0.2230
21	1.00	222.19	223.19	222.9604	0.7045	0.2230
22	1.00	325.89	326.89	326.6604	0.7043	0.2230
23	1.00	478.75	479.75	479.5204	0.6991	0.2230
24	1.00	703.13	704.13	703.9004	0.7045	0.2230
25	1.00	1031.3	1032.3	1032.0704	0.7043	0.2230
26	1.00	1515.0	1516.0	1515.7704	0.6991	0.2230
T	1.00	5327.0	5328.0	5327.777		0.2230

He^4

Group	σ_e	$\sigma_{n,p}$	σ_t	σ_{tr}	σ_{er}	μ
1	1.179	-	1.179	0.490	0.713	0.582
2	1.632	-	1.632	0.726	0.787	0.551
3	2.168	-	2.168	1.076	1.146	0.501
4	2.733	-	2.733	1.472	1.623	0.458
5	4.476	-	4.476	2.622	2.435	0.387
6	6.297	-	6.297	5.326	5.109	0.118
7	1.887	-	1.887	2.035	1.721	- 0.229
8	0.876	-	0.876	1.007	0.756	- 0.161
9	0.743	-	0.743	0.7464	0.554	- 0.0045
10	0.726	-	0.726	0.663	0.445	0.087
11	0.724	-	0.724	0.629	0.420	0.131
12	0.724	-	0.724	0.614	0.413	0.151
13	0.724	-	0.724	0.608	0.408	0.160
14	0.724	-	0.724	0.605	0.403	0.164
15	0.724	-	0.724	0.603	0.406	0.166
16	0.724	-	0.724	0.603	0.405	0.167
17	0.724	-	0.724	0.602	0.402	0.168
18	0.724	-	0.724	0.602	0.405	0.168
19	0.724	0.00013	0.724	0.602	0.405	0.168
20	0.724	0.00020	0.724	0.602	0.402	0.168
21	0.724	0.00029	0.724	0.602	0.405	0.168
22	0.724	0.00042	0.724	0.603	0.405	0.168
23	0.724	0.00062	0.725	0.603	0.402	0.168
24	0.724	0.00091	0.725	0.603	0.405	0.168
25	0.724	0.00134	0.725	0.604	0.405	0.168
26	0.724	0.00197	0.726	0.604	0.402	0.168
T	0.724	0.0069	0.731	0.609	-	0.168

Li^6

Group	σ_e	σ_{in}	σ_c	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	0.933	0.482	-	0.0084	0.030	1.453	0.721	0.191	0.784
2	1.121	0.624	-	0.014	0.048	1.807	1.051	0.259	0.673
3	1.308	0.646	-	0.027	0.083	2.064	1.402	0.451	0.505
4	1.409	0.384	-	0.0074	0.141	1.941	1.540	0.727	0.284
5	1.136	0.031	-	-	0.217	1.384	1.137	0.522	0.213
6	1.062	-	-	-	0.261	1.323	1.056	0.461	0.251
7	1.446	-	-	-	0.337	1.783	1.419	0.545	0.229
8	4.709	-	-	-	1.970	6.679	5.479	2.303	0.129
9	1.452	-	-	-	1.002	3.454	2.178	0.682	0.036
10	0.752	-	-	-	0.671	1.423	1.378	0.311	0.065
11	0.724	-	-	-	0.873	1.597	1.528	0.287	0.095
12	0.723	-	-	-	1.248	1.971	1.892	0.285	0.109
13	0.722	-	-	-	1.818	2.540	2.458	0.283	0.113
14	0.721	-	0.00013	-	2.665	3.386	3.304	0.280	0.113
15	0.720	-	0.00014	-	3.916	4.636	4.554	0.282	0.113
16	0.720	-	0.00027	-	5.745	6.465	6.384	0.282	0.113
17	0.720	-	0.00040	-	8.444	9.164	9.083	0.280	0.113
18	0.720	-	0.00059	-	12.409	13.130	13.047	0.282	0.113
19	0.720	-	0.00086	-	18.201	18.922	18.841	0.282	0.113
20	0.720	-	0.00126	-	26.738	27.459	27.378	0.280	0.113
21	0.720	-	0.00183	-	39.278	40.000	39.918	0.282	0.113
22	0.720	-	0.00269	-	57.598	58.321	58.240	0.282	0.113
23	0.720	-	0.00398	-	84.605	85.329	85.248	0.280	0.113
24	0.720	-	0.00588	-	124.26	124.986	124.904	0.282	0.113
25	0.720	-	0.00865	-	182.30	182.929	182.848	0.282	0.113
26	0.720	-	0.01272	-	267.60	268.333	268.252	0.280	0.113
T	0.721	-	0.0385	-	940.0	940.76	940.68	-	0.113

$\underline{Li^{6}}$

$\sigma_{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.1048	0.1502	0.1097	0.0617	0.0355	0.0131	0.0053	0.0014	0.0005
2	0.1489	0.1812	0.1364	0.0941	0.0394	0.0172	0.0048	0.0013	0.0004
3	0.0917	0.1572	0.1921	0.1161	0.0620	0.0198	0.0056	0.0016	0.0004
4	0.0125	0.0693	0.1125	0.1123	0.0524	0.0180	0.0055	0.0013	0.0003
5	-	0.0001	0.0029	0.0098	0.0100	0.0055	0.0018	0.0005	0.0001

Li^7

Group	σ_e	σ_{in}	σ_c	σ_t	σ_{tv}	σ_{er}	μ	σ_{n}
1	1.0277	0.459	-	1.507	0.7796	0.245	0.707	0.0[illegible]
2	1.210	0.605	-	1.817	1.036	0.260	0.644	0.00[illegible]
3	1.812	0.494	-	2.306	1.616	0.688	0.363	-
4	1.851	0.242	-	2.093	1.743	0.927	0.187	-
5	1.569	0.197	-	1.766	1.596	0.700	0.107	-
6	1.421	0.155	-	1.576	1.563	0.736	-0.0017	-
7	1.078	0.026	-	1.099	1.1634	0.479	-0.063	-
8	3.771	-	-	3.771	2.0760	1.368	0.132	-
9	1.098	-	-	1.098	0.719	0.309	0.327	-
10	0.970	-	-	0.970	0.760	0.294	0.199	-
11	1.020	-	-	1.020	0.854	0.331	0.135	-
12	1.043	-	-	1.043	0.920	0.353	0.105	-
13	1.050	-	0.00011	1.050	0.9481	0.358	0.097	-
14	1.050	-	0.00014	1.050	0.9481	0.356	0.097	-
15	1.050	-	0.00018	1.050	0.9482	0.359	0.097	-
16	1.050	-	0.00024	1.050	0.9482	0.358	0.097	-
17	1.050	-	0.00035	1.050	0.9483	0.356	0.097	-
18	1.050	-	0.00050	1.050	0.9482	0.358	0.097	-
19	1.050	-	0.00072	1.050	0.9485	0.358	0.097	-
20	1.050	-	0.00105	1.050	0.9487	0.356	0.097	-
21	1.050	-	0.00151	1.050	0.9490	0.358	0.097	-
22	1.050	-	0.0022	1.050	0.9498	0.358	0.097	-
23	1.050	-	0.00325	1.050	0.9509	0.356	0.097	-
24	1.050	-	0.00481	1.050	0.9523	0.358	0.097	-
25	1.050	-	0.00706	1.057	0.955	0.358	0.097	-
26	1.050	-	0.01034	1.060	0.958	0.356	0.097	-
T	1.05	-	0.036	1.086	0.984	-	0.097	-

^{14}N

$\sigma_{1 \to 1+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.1517	0.1244	0.0876	0.0550	0.0407	0.0216	0.0119	0.0040	0.0014
2	0.2485	0.1549	0.0921	0.0652	0.0285	0.0138	0.0046	0.0013	0.0005
3	0.2125	0.0842	0.0556	0.0628	0.0499	0.0202	0.0064	0.0019	0.0005
4	0.1616	0.0746	0.0002	0.0013	0.0020	0.0013	0.0005	0.0002	-
5	0.0961	0.1008	-	-	-	-	-	-	-
6	0.0321	0.1073	0.0153	-	-	-	-	-	-
7	-	0.0144	0.0060	0.0004	-	-	-	-	-

^{14}N

$\sigma_{n,2n}\ 1 \to 1+k$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	-	-	0.0006	0.0024	0.0056	0.0053	0.0037	0.0014	0.0005
2	-	-	-	0.0001	0.0005	0.0009	0.0006	0.0002	0.0001

Be

Group	σ_e	σ_c	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ	$\sigma_{n,2n}$
1	0.981	-	0.0139	1.535	0.8235	0.1702	0.724	0.5401
2	1.132	-	0.0276	1.732	0.9804	0.1788	0.663	0.5723
3	1.245	-	0.0640	1.864	1.220	0.2788	0.516	0.5554
4	2.446	-	0.0972	2.865	1.738	0.6956	0.405	0.3222
5	1.904	-	0.0415	1.950	1.560	0.5969	0.191	0.0042
6	3.215	-	0.0044	3.219	2.357	0.9790	0.242	-
7	3.943	-	-	3.943	3.361	1.133	0.114	-
8	4.247	-	-	4.247	3.729	1.233	0.104	-
9	5.090	-	-	5.090	4.515	1.501	0.091	-
10	5.639	-	-	5.639	5.151	1.519	0.082	-
11	5.887	-	-	5.887	5.420	1.581	0.078	-
12	5.975	-	-	5.975	5.512	1.621	0.076	-
13	6.0	-	-	6.0	5.548	1.629	0.075	-
14	6.0	-	-	6.0	5.550	1.617	0.075	-
15	6.0	-	-	6.0	5.550	1.630	0.075	-
16	6.0	0.00011	-	6.0	5.552	1.630	0.075	-
17	6.0	0.00012	-	6.0	5.552	1.618	0.075	-
18	6.0	0.00014	-	6.0	5.552	1.630	0.075	-
19	6.0	0.00018	-	6.0	5.552	1.630	0.075	-
20	6.0	0.00027	-	6.0	5.552	1.618	0.075	-
21	6.0	0.00040	-	6.0	5.552	1.630	0.075	-
22	6.0	0.00058	-	6.001	5.552	1.630	0.075	-
23	6.0	0.00086	-	6.001	5.552	1.618	0.075	-
24	6.0	0.00126	-	6.001	5.552	1.630	0.075	-
25	6.0	0.00184	-	6.002	5.552	1.630	0.075	-
26	6.0	0.00271	-	6.003	5.552	1.618	0.075	-
T	6.0	0.009	-	6.009	5.559	-	0.075	-

Be

$\sigma_{1 \to 1 + k}$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7	8
1	0.2346	0.3308	0.2484	0.1397	0.0802	0.0296	0.0120	0.0032	0.0010
2	0.2748	0.3296	0.2492	0.1742	0.0730	0.0318	0.0088	0.0024	0.0008
3	0.1590	0.2708	0.3282	0.1982	0.1072	0.0342	0.0096	0.0026	0.0008
4	0.0182	0.1096	0.1870	0.1930	0.0918	0.0318	0.0098	0.0024	0.0006
5	-	-	0.0002	0.0020	0.0030	0.0022	0.0008	0.0002	-

Be

$\sigma_{n,2n}{}^{1 \to 1 + k}$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7	8
1	0.1173	0.1654	0.1242	0.0698	0.0401	0.0148	0.0060	0.0016	0.0005
2	0.1374	0.1648	0.1246	0.0871	0.0365	0.0159	0.0044	0.0012	0.0004
3	0.0795	0.1354	0.1641	0.0991	0.0536	0.0171	0.0048	0.0013	0.0004
4	0.0091	0.0548	0.0935	0.0965	0.0459	0.0159	0.0049	0.0012	0.0003
5	0.0	0.0	0.0001	0.0010	0.0015	0.0011	0.0004	0.0001	0.0

B^{10}

Group	σ_e	σ_{in}	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1.	0.948	0.289	0.037	0.059	1.334	0.725	0.193	0.641
2	0.991	0.229	0.041	0.081	1.342	0.823	0.199	0.523
3	1.092	0.121	0.026	0.194	1.433	0.951	0.259	0.430
4	1.583	0.054	0.013	0.268	1.918	1.506	0.518	0.240
5	1.590	0.032	0.009	0.377	2.008	1.691	0.446	0.196
6	2.373	0.0007	0.002	0.217	2.593	2.275	0.753	0.121
7	3.351	-	0.0002	0.609	3.960	3.559	0.867	0.113
8	3.714	-	-	1.100	4.814	4.543	1.005	0.072
9	3.131	-	-	1.665	4.796	4.597	0.859	0.060
10	2.562	-	-	2.344	4.906	5.740	0.634	0.063
11	2.272	-	-	3.357	5.629	5.481	0.556	0.065
12	2.153	-	-	4.894	7.047	6.906	0.531	0.067
13	2.107	-	-	7.192	9.299	9.158	0.519	0.067
14	2.094	-	-	10.626	12.720	12.580	0.512	0.067
15	2.092	-	-	15.707	17.799	17.658	0.515	0.067
16	2.093	-	-	23.145	25.238	25.136	0.515	0.068
17	2.097	-	-	34.124	36.221	36.077	0.512	0.068
18	2.098	-	-	50.306	52.404	52.261	0.517	0.068
19	2.100	-	-	73.944	76.044	75.901	0.517	0.068
20	2.102	-	-	108.76	110.862	110.719	0.514	0.068
21	2.103	-	-	159.95	162.053	161.910	0.518	0.068
22	2.104	-	-	234.72	236.824	236.681	0.518	0.068
23	2.105	-	-	344.89	346.995	346.852	0.514	0.068
24	2.105	-	-	506.72	508.825	508.682	0.518	0.068
25	2.105	-	-	743.13	745.235	745.093	0.518	0.068
26	2.106	-	-	1091.6	1093.706	1093.563	0.514	0.068
T	2.106	-	-	3836.5	3838.6	3837.6	-	0.068

B-10

$\sigma_i \rightarrow i + k$

$i \downarrow$ \ $k \rightarrow$	0	1	2	3	4	5	6	7	8	9
1	0.0116	0.0879	0.1176	0.0506	0.0204	0.0010	-	-	-	-
2	0.0214	0.0660	0.0748	0.0521	0.0136	0.0010	-	-	-	-
3	0.0296	0.0478	0.0270	0.0132	0.0035	-	-	-	-	-
4	0.0151	0.0272	0.0087	0.0027	0.0002	-	-	-	-	-
5	0.0107	0.0197	0.0013	0.0004	-	-	-	-	-	-
6	-	0.0006	0.0001	-	-	-	-	-	-	-

B-11

Group	σ_e	σ_{in}	σ_c	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	0.7146	0.5547		0.00087	0.0280	1.2982	0.8298	0.1282	0.6519
2	1.1097	0.2751	-	-	0.0030	1.3878	0.8795	0.2354	0.4463
3	1.4691	0.0800	-	-	-	1.5491	1.1756	0.4198	0.2450
4	1.5589	0.0149	-	-	-	1.5738	1.3431	0.5264	0.1362
5	1.9461	-	-	-	-	1.9461	1.7072	0.5554	0.0994
6	2.6807	-	-	-	-	2.6807	2.2129	0.7487	0.1494
7	3.8548	-	-	-	-	3.8548	2.8034	0.8066	0.2107
8	3.7651	-	-	-	-	3.7651	3.2062	0.8514	0.1469
9	4.1944	-	-	-	-	4.1944	3.8498	1.0215	0.0812
10	4.5769	-	-	-	-	4.5769	4.2954	1.0312	0.0611
11	4.9195	-	0.0004	-	-	4.9199	4.6176	1.1002	0.0611
12	5.3405	-	-	-	-	5.3405	4.7957	1.2036	0.0611
13	5.0148	-	-	-	-	5.0148	4.7085	1.1299	0.0611
14	5.0262	-	-	-	-	5.0262	4.7192	1.1241	0.0611
15	5.0320	-	-	-	-	5.0320	4.7235	1.1341	0.0611
16	5.0339	-	-	-	-	5.0339	4.7265	1.1342	0.0611
17	5.0351	-	-	-	-	5.0351	4.7276	1.1261	0.0611
18	5.0363	-	-	-	-	5.0363	4.7274	1.1351	0.0611
19	5.0359	-	-	-	-	5.0359	4.7283	1.1346	0.0611
20	5.0360	-	0.00014	-	-	5.0361	4.7285	1.1263	0.0611
21	5.0367	-	0.00021	-	-	5.0369	4.7280	1.1352	0.0611
22	5.0360	-	0.00031	-	-	5.0363	4.7287	1.1346	0.0611
23	5.0360	-	0.00045	-	-	5.0365	4.7288	1.1263	0.0611
24	5.0367	-	0.00066	-	-	5.0374	4.7285	1.1352	0.0611
25	5.0360	-	0.00097	-	-	5.0370	4.7294	1.1346	0.0611
26	5.0360	-	0.00142	-	-	5.0374	4.7298	1.1263	0.0611
T	5.036	-	0.095	-	-	5.041	4.7933	-	0.0611

B-11

$\sigma_{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.1265	0.1717	0.1255	0.0694	0.0394	0.0144	0.0058	0.0015	0.0005
2	0.0967	0.0816	0.0493	0.0298	0.0113	0.0046	0.0013	0.0004	-
3	0.0059	0.0277	0.0247	0.0141	0.0061	0.0005	0.0009	-	-
4	-	0.0066	0.0062	0.0021	-	-	-	-	-

C

Group	σ_e	σ_{in}	σ_c	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	0.832	0.377	-	0.168	1.377	0.899	0.169	0.570
2	0.825	0.353	-	0.056	1.234	0.859	0.178	0.388
3	1.326	0.093	-	-	1.419	1.038	0.361	0.215
4	2.057	-	-	-	2.057	1.901	0.721	0.022
5	1.809	-	-	-	1.809	1.610	0.477	0.093
6	2.481	-	-	-	2.481	2.151	0.653	0.126
7	3.235	-	-	-	3.235	2.860	0.699	0.111
8	3.864	-	-	-	3.864	3.508	0.855	0.090
9	4.260	-	-	-	4.260	3.937	0.958	0.075
10	4.493	-	-	-	4.493	4.197	0.924	0.066
11	4.618	-	-	-	4.618	4.337	0.947	0.061
12	4.677	-	-	-	4.677	4.403	0.969	0.058
13	4.704	-	-	-	4.704	4.433	0.976	0.058
14	4.717	-	-	-	4.717	4.445	0.971	0.057
15	4.723	-	-	-	4.723	4.451	0.980	0.057
16	4.726	-	-	-	4.726	4.454	0.980	0.057
17	4.727	-	-	-	4.727	4.456	0.973	0.057
18	4.729	-	-	-	4.729	4.457	0.981	0.057
19	4.729	-	-	-	4.729	4.458	0.981	0.057
20	4.729	-	-	-	4.729	4.459	0.974	0.057
21	4.730	-	0.00014	-	4.730	4.459	0.982	0.057
22	4.729	-	0.00021	-	4.729	4.460	0.981	0.057
23	4.729	-	0.00031	-	4.729	4.460	0.974	0.057
24	4.729	-	0.00045	-	4.729	4.461	0.982	0.057
25	4.729	-	0.00066	-	4.730	4.462	0.982	0.057
26	4.729	-	0.00097	-	4.730	4.463	0.977	0.057
T	4.729	-	0.003	-	4.732	4.462	-	0.057

C-12

$\sigma_{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.0840	0.2630	0.0298	-	-	-	-	-	-
2	-	0.1657	0.1445	0.0349	0.0031	0.0031	0.0015	0.0005	0.0002
3	-	-	0.0630	0.0248	0.0056	-	-	-	-

N

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	$\sigma_{n,p}$	σ_e	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	0.899	0.369	0.003	0.040	-	0.101	1.312	0.889	0.153	0.581
2	0.956	0.206	-	0.025	-	0.118	1.305	0.949	0.181	0.370
3	1.198	0.053	-	0.035	-	0.226	1.512	1.146	0.260	0.270
4	1.305	0.002	-	0.054	-	0.245	1.606	1.570	0.394	0.167
5	1.731	-	-	0.036	-	0.060	1.827	1.537	0.373	0.135
6	1.779	-	-	0.023	-	0.005	1.807	1.492	0.408	0.110
7	2.302	-	-	0.045	-	-	2.347	2.056	0.443	0.074
8	3.196	-	-	0.0015	-	-	3.197	3.052	0.639	0.040
9	3.988	-	-	0.0015	-	-	3.989	3.784	0.790	0.048
10	5.017	-	-	0.0015	-	-	5.018	4.751	0.900	0.048
11	6.247	-	-	0.0018	-	-	6.249	5.933	1.112	0.048
12	7.151	-	-	0.0024	-	-	7.153	6.782	1.283	0.048
13	7.683	-	-	0.0035	0.00015	-	7.687	7.314	1.378	0.048
14	8.139	-	-	0.0052	0.00021	-	8.144	7.749	1.449	0.048
15	8.623	-	-	0.0076	0.00031	-	8.631	8.211	1.547	0.048
16	9.025	-	-	0.011	0.00046	-	9.036	8.600	1.619	0.048
17	9.339	-	-	0.016	0.00067	-	9.356	8.905	1.663	0.048
18	9.666	-	-	0.024	0.00099	-	9.691	9.225	1.734	0.048
19	9.851	-	-	0.035	0.0015	-	9.887	9.413	1.767	0.048
20	9.893	-	-	0.052	0.0021	-	9.947	9.470	1.761	0.048
21	9.935	-	-	0.076	0.0031	-	10.014	9.533	1.783	0.048
22	9.955	-	-	0.111	0.0046	-	10.071	9.591	1.786	0.048
23	9.956	-	-	0.164	0.0067	-	10.127	9.647	1.773	0.048
24	9.958	-	-	0.240	0.0099	-	10.208	9.225	1.787	0.048
25	9.957	-	-	0.353	0.0145	-	10.324	9.844	1.786	0.048
26	9.957	-	-	0.518	0.0213	-	10.496	10.016	1.773	0.048
T	9.957	-	-	1.819	0.075	-	11.851	11.373	-	0.048

N

$\sigma_{i \to i+k}$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7	8
1	0.0038	0.0926	0.1208	0.0860	0.0518	0.0140	0.0002	-	-
2	0.0033	0.0476	0.0859	0.0508	0.0164	0.0019	-	-	-
3	0.0006	0.0060	0.0248	0.0158	0.0057	0.0002	-	-	-
4	-	0.0006	0.0009	0.0003	-	-	-	-	-

O

Group	σ_e	σ_{in}	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	1.060	0.3525	0.0331	0.1388	1.584	1.003	0.1715	0.543
2	0.930	0.1540	-	0.1154	1.199	0.985	0.1945	0.205
3	1.361	-	-	0.0540	1.415	0.979	0.2646	0.252
4	2.088	-	-	0.0041	2.092	1.358	0.4507	0.196
5	1.689	-	-	-	1.689	1.010	0.3317	0.098
6	4.052	-	-	-	4.052	3.280	0.8334	0.068
7	5.424	-	-	-	5.424	2.890	0.7218	0.270
8	3.838	-	-	-	3.838	4.245	0.7861	- 0.124
9	3.563	-	-	-	3.563	3.613	0.6592	- 0.016
10	3.627	-	-	-	3.627	3.555	0.5890	0.015
11	3.668	-	-	-	3.668	3.534	0.5826	0.030
12	3.687	-	-	-	3.687	3.541	0.5861	0.036
13	3.696	-	-	-	3.696	3.548	0.5854	0.039
14	3.700	-	-	-	3.700	3.546	0.5810	0.041
15	3.703	-	-	-	3.703	3.547	0.5855	0.042
16	3.703	-	-	-	3.703	3.548	0.5852	0.042
17	3.704	-	-	-	3.704	3.548	0.5808	0.042
18	3.704	-	-	-	3.704	3.547	0.5854	0.042
19	3.704	-	-	-	3.704	3.548	0.5851	0.042
20	3.704	-	-	-	3.704	3.548	0.5808	0.042
21	3.704	-	-	-	3.704	3.547	0.5854	0.042
22	3.704	-	-	-	3.704	3.548	0.5851	0.042
23	3.704	-	-	-	3.704	3.548	0.5808	0.042
24	3.704	-	-	-	3.704	3.547	0.5854	0.042
25	3.704	-	-	-	3.704	3.548	0.5851	0.042
26	3.704	-	-	-	3.704	3.548	0.5808	0.042
T	3.748	-	-	-	3.748	3.591	-	0.042

$\underline{0}$

$\sigma_i \rightarrow i + k$

$i \downarrow$ $k \rightarrow$	0	1	2	3	4	5	6	7
1	-	0.0699	0.1466	0.1005	0.0311	0.0038	-	-
2	-	0.0086	0.0641	0.0565	0.0208	0.0039	-	-

Na

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_c	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	0.702	0.699	0.008	0.00019	0.058	0.145	1.612	1.115	0.0511	0.704
2	0.652	0.872	-	0.00017	0.054	0.048	1.626	1.209	0.0437	0.634
3	1.010	0.884	-	0.00016	0.011	0.0007	1.906	1.360	0.0861	0.528
4	1.556	0.743	-	0.00017	-	-	2.299	1.503	0.149	0.488
5	2.187	0.562	-	0.00020	-	-	2.749	1.787	0.203	0.387
6	3.190	0.495	-	0.00023	-	-	3.685	2.126	0.326	0.350
7	4.194	0.162	-	0.00030	-	-	4.356	3.214	0.464	0.128
8	4.017	-	-	0.00061	-	-	4.018	3.379	0.467	0.081
9	3.429	-	-	0.00147	-	-	3.430	3.321	0.421	0.030
10	5.057	-	-	0.00199	-	-	5.059	3.968	0.564	0.028
11	3.852	-	-	0.00195	-	-	3.854	3.775	0.430	0.019
12	4.462	-	-	0.00028	-	-	4.462	4.313	0.498	0.026
13	7.547	-	-	0.00179	-	-	7.549	6.772	0.840	0.029
14	98.245	-	-	0.1083	-	-	98.353	95.594	10.855	0.029
15	7.186	-	-	0.01612	-	-	7.202	5.549	0.800	0.029
16	3.392	-	-	0.00803	-	-	3.400	3.299	0.378	0.029
17	3.199	-	-	0.00807	-	-	3.207	3.113	0.353	0.029
18	3.153	-	-	0.00899	-	-	3.162	3.068	0.351	0.029
19	3.141	-	-	0.01104	-	-	3.152	3.059	0.350	0.029
20	3.137	-	-	0.0153	-	-	3.152	3.060	0.347	0.029
21	3.133	-	-	0.0224	-	-	3.155	3.062	0.349	0.029
22	3.140	-	-	0.0327	-	-	3.172	3.081	0.349	0.029
23	3.160	-	-	0.0481	-	-	3.208	3.115	0.349	0.029
24	3.180	-	-	0.0706	-	-	3.251	3.157	0.354	0.029
25	3.212	-	-	0.1035	-	-	3.315	3.221	0.358	0.029
26	3.242	-	-	0.1520	-	-	3.394	3.299	0.358	0.029
T	3.319	-	-	0.534	-	-	3.853	3.757	-	0.029

Na

$\sigma_{1 \to i + k}$

i ↓ \ k →	0	1	2	3	4	5	6	7	8
1	0.017	0.082	0.1891	0.1823	0.1300	0.062	0.0211	0.0141	0.0061
2	0.1126	0.2451	0.2490	0.1806	0.0768	0.0283	0.0073	0.0022	-
3	0.2209	0.2651	0.2642	0.0889	0.0365	0.0079	0.0004	-	-
4	0.2455	0.2449	0.1088	0.0975	0.0400	0.0064	-	-	-
5	0.3179	0.2328	0.0009	0.0073	0.0028	-	-	-	-
6	0.0932	0.3739	0.0279	-	-	-	-	-	-
7	-	0.1239	0.0350	0.0028	0.0002	-	-	-	-

Na

$\sigma_{n,2n}$ $1 \to i + k$

i ↓ \ k →	0	1	2	3	4	5	6	7	8
1	-	-	-	-	-	-	0.0011	0.0036	0.0061

Cr

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_c	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	1.249	1.008	0.1829	0.00065	0.0783	0.0303	2.549	1.512	0.0233	0.829
2	1.817	1.322	0.0164	0.00036	0.0449	0.0057	3.206	1.733	0.0282	0.808
3	2.294	1.401	-	0.00098	0.0080	0.0003	3.704	2.094	0.0550	0.700
4	2.666	1.056	-	0.00233	0.0016	-	3.726	2.366	0.1096	0.502
5	2.750	0.642	-	0.00437	-	-	3.396	2.516	0.1345	0.269
6	3.022	0.075	-	0.00733	-	-	3.104	2.175	0.1655	0.210
7	3.524	0.002	-	0.00493	-	-	3.531	2.9089	0.1626	0.176
8	3.330	-	-	0.00411	-	-	3.334	2.9345	0.1641	0.120
9	6.993	-	-	0.00800	-	-	7.001	6.6863	0.3739	0.045
10	6.589	-	-	0.0291	-	-	6.618	6.4336	0.3246	0.028
11	2.888	-	-	0.0323	-	-	2.922	2.8654	0.1425	0.019
12	4.293	-	-	0.0287	-	-	4.322	4.2573	0.2143	0.015
13	23.535	-	-	0.1075	-	-	23.642	23.3130	1.176	0.014
14	16.576	-	-	0.0392	-	-	16.615	16.3997	0.8228	0.013
15	5.680	-	-	0.1551	-	-	5.835	5.702	0.2842	0.013
16	4.710	-	-	0.0223	-	-	4.732	4.672	0.2356	0.013
17	4.478	-	-	0.0301	-	-	4.508	4.450	0.2223	0.013
18	4.398	-	-	0.0428	-	-	4.441	4.385	0.2201	0.013
19	4.367	-	-	0.0618	-	-	4.429	4.373	0.2184	0.013
20	4.353	-	-	0.0902	-	-	4.443	4.387	0.2161	0.013
21	4.347	-	-	0.1321	-	-	4.479	4.423	0.2175	0.013
22	4.344	-	-	0.1935	-	-	4.537	4.481	0.2173	0.013
23	4.343	-	-	0.2843	-	-	4.627	4.571	0.2156	0.013
24	4.342	-	-	0.4171	-	-	4.759	4.703	0.2173	0.013
25	4.342	-	-	0.6119	-	-	4.954	4.898	0.2172	0.013
26	4.342	-	-	0.8967	-	-	5.239	5.183	0.2156	0.013
T	4.342	-	-	3.106	-	-	7.448	7.392	-	0.013

Cr

$\sigma_{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7
1	0.0947	0.6185	0.1961	0.0502	0.1143	0.1281	0.1061	0.0656
2	0.1346	0.5301	0.3517	0.1720	0.0732	0.0563	0.0249	0.0117
3	0.1116	0.4421	0.4593	0.2458	0.0976	0.0344	0.0081	0.0020
4	0.0464	0.4694	0.3237	0.1375	0.0568	0.0189	0.0025	0.0002
5	0.0275	0.2108	0.2407	0.0992	0.0447	0.0168	0.0015	-
6	0.0010	0.0252	0.0273	0.0131	0.0071	0.0011	-	-
7	-	0.0006	0.0010	-	-	-	-	-

Cr

$\sigma_{n,2n}{}^{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7
1	-	0.0002	0.0040	0.0195	0.0508	0.0507	0.0373	0.0206
2	-	-	0.0001	0.0013	0.0039	0.0058	0.0035	0.0019

Fe

Group	σ_{in}	σ_e	$\sigma_{n,2n}$	σ_c	σ_{np}	$\sigma_{n,\alpha}$	σ_{er}	σ_{tr}	σ_t	μ
1	1.0569	2.2415	0.1917	0.00023	0.1206	0.0368	0.0417	1.8182	3.6477	0.8162
2	1.4266	2.2517	-	0.00032	0.0770	0.01556	0.0288	1.9007	3.7712	0.8307
3	1.5110	2.2734	-	0.00052	0.0291	0.00114	0.0475	2.1796	3.8151	0.7194
4	1.1474	2.2818	-	0.00083	0.0092	-	0.0864	2.2819	3.4392	0.5072
5	0.8002	2.2898	-	0.0015	0.0011	-	0.1003	2.4180	3.0926	0.2946
6	0.3346	2.3287	-	0.0030	-	-	0.1071	1.9963	2.6663	0.2877
7	-	3.3520	-	0.0050	-	-	0.1368	2.6299	3.3570	0.2169
8	-	3.3326	-	0.0057	-	-	0.1534	2.9484	3.3383	0.1170
9	-	4.1471	-	0.0059	-	-	0.2070	3.9777	4.1530	0.04226
10	-	5.3372	-	0.0091	-	-	0.2488	5.2885	5.3463	0.01204
11	-	13.8166	-	0.0172	-	-	0.6393	13.6850	13.8338	0.01204
12	-	2.7949	-	0.0052	-	-	0.1303	2.7664	2.8001	0.01204
13	-	10.1215	-	0.1599	-	-	0.4718	10.1595	10.2814	0.01204
14	-	6.8356	-	0.1060	-	-	0.3163	6.7856	6.9416	0.01204
15	-	8.6200	-	0.3208	-	-	0.4019	8.7758	8.9408	0.01204
16	-	9.8885	-	0.0156	-	-	0.4609	9.7648	9.8041	0.01204
17	-	10.9484	-	0.0230	-	-	0.5066	10.836	10.9714	0.01204
18	-	11.3397	-	0.0338	-	-	0.5288	11.2368	11.3735	0.01204
19	-	11.3997	-	0.0496	-	-	0.5314	11.3116	11.4493	0.01204
20	-	11.4000	-	0.0729	-	-	0.5275	11.3359	11.4729	0.01204
21	-	11.4000	-	0.1070	-	-	0.5316	11.370	11.5070	0.01204
22	-	11.4000	-	0.1569	-	-	0.5314	11.4199	11.5569	0.01204
23	-	11.4000	-	0.2304	-	-	0.5275	11.4934	11.6304	0.01204
24	-	11.4000	-	0.3384	-	-	0.5316	11.6014	11.7384	0.01204
25	-	11.4000	-	0.4961	-	-	0.5314	11.7591	11.8961	0.01204
26	-	11.4000	-	0.7287	-	-	0.5275	11.9917	12.1287	0.01204
T	-	11.4000	-	2.56	-	-	-	13.823	13.96	0.01204

Fe

$\sigma_{i \to i+k}$

i ↓ \ k →	0	1	2	3	4	5	6	7
1	0.0705	0.1437	0.1962	0.2667	0.3265	0.2254	0.1409	0.0690
2	0.1992	0.4048	0.3879	0.2460	0.1121	0.0535	0.0158	0.0058
3	0.1340	0.3294	0.5159	0.3326	0.1565	0.0340	0.0060	0.0012
4	0.1770	0.5171	0.1671	0.1842	0.0758	0.0187	0.0016	-
5	0.1544	0.4206	0.2106	0.0107	0.0030	0.0005	-	-
6	-	0.0922	0.1472	0.0591	0.0207	0.0143	0.0012	-

Fe

$\sigma_{n,2n}\ i \to i+k$

i ↓ \ k →	0	1	2	3	4	5	6	7
1	-	0.0001	0.0031	0.0179	0.0512	0.0543	0.0415	0.0235

Ni

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_c	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ
1	1.489	0.766	0.070	0.0	0.381	0.150	2.856	1.637	0.0263	0.817
2	2.007	0.871	0.0015	0.0004	0.473	0.107	3.459	1.789	0.0243	0.831
3	2.112	1.172	-	0.0012	0.337	0.032	3.654	2.127	0.0415	0.722
4	2.047	1.097	-	0.0023	1.487	0.002	4.635	3.621	0.0761	0.491
5	2.482	0.488	-	0.0051	0.028	-	3.003	2.168	0.1001	0.319
6	2.901	0.005	-	0.0075	0.002	-	2.915	2.432	0.1550	0.130
7	3.370	-	-	0.0080	-	-	3.378	2.923	0.1446	0.135
8	5.731	-	-	0.0092	-	-	5.740	5.3047	0.2625	0.076
9	5.747	-	-	0.0159	-	-	5.763	5.4870	0.2713	0.048
10	7.740	-	-	0.0223	-	-	7.762	7.5998	0.3401	0.021
11	11.150	-	-	0.0369	-	-	11.187	11.0308	0.4900	0.014
12	44.185	-	-	0.0978	-	-	44.283	43.7084	1.9592	0.013
13	15.048	-	-	0.0286	-	-	15.075	14.8960	0.6675	0.012
14	20.453	-	-	0.0446	-	-	20.498	19.095	0.9008	0.012
15	16.110	-	-	0.456	-	-	16.566	16.369	0.7151	0.012
16	16.915	-	-	0.162	-	-	17.077	16.877	0.7507	0.012
17	17.401	-	-	0.042	-	-	17.443	17.240	0.7666	0.011
18	17.646	-	-	0.062	-	-	17.708	17.504	0.7834	0.011
19	17.762	-	-	0.090	-	-	17.852	17.648	0.7883	0.011
20	17.817	-	-	0.132	-	-	17.949	17.744	0.7849	0.011
21	17.842	-	-	0.194	-	-	18.036	17.832	0.7921	0.011
22	17.854	-	-	0.284	-	-	18.138	17.934	0.7924	0.011
23	17.860	-	-	0.417	-	-	18.277	18.072	0.7868	0.011
24	17.862	-	-	0.612	-	-	18.474	18.270	0.7930	0.011
25	17.864	-	-	0.898	-	-	18.762	18.557	0.7928	0.011
26	17.864	-	-	1.319	-	-	19.183	18.978	0.7870	0.011
T	17.864	-	-	4.634	-	-	22.50	22.301	-	0.011

$\sigma_{i \to i+k}^{Ni}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	0.0363	0.0812	0.1467	0.1908	0.2100	0.1298	0.0750	0.0255	0.0099
2	0.1195	0.2696	0.2029	0.1537	0.0759	0.0369	0.0112	0.0031	0.0010
3	0.0836	0.3844	0.4220	0.1929	0.0638	0.0184	0.0054	0.0015	0.0004
4	0.0168	0.3667	0.3494	0.2188	0.0938	0.0327	0.0076	-	-
5	-	0.1401	0.1937	0.0973	0.0419	0.0138	0.0014	-	-
6	-	-	0.0005	0.0016	0.0022	0.0006	-	-	-

$\sigma_{n,2n}^{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	-	-	0.0012	0.0065	0.0187	0.0199	0.0152	0.0060	0.0025
2	-	-	-	0.0002	0.0004	0.0005	0.0003	0.0001	-

Th-232

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	σ_{er}	μ	ν	$\nu\sigma_f$
1	2.891	0.442	1.798	0.321	0.006	5.448	3.005	0.011	0.848	3.822	1.227
2	3.122	1.273	1.259	0.312	0.010	5.976	3.436	0.011	0.813	3.155	0.984
3	4.284	2.800	0.0002	0.150	0.018	7.252	3.919	0.017	0.775	2.657	0.399
4	4.695	2.804	-	0.130	0.034	7.663	4.341	0.025	0.707	2.352	0.306
5	4.042	2.566		0.099	0.072	6.777	4.490	0.026	0.566	2.150	0.213
6	4.222	2.130		0.004	0.141	6.497	4.689	0.038	0.427	2.021	0.008
7	5.315	1.699		-	0.178	7.192	5.392	0.045	0.330	-	-
8	7.511	1.156		-	0.180	8.847	7.463	0.078	0.176		
9	9.866	0.705			0.221	10.792	9.861	0.113	0.086		
10	11.627	0.262			0.340	12.229	11.741	0.127	0.040		
11	11.550	-			0.467	12.017	11.795	0.128	0.017		
12	12.338				0.698	13.028	12.831	0.139	0.006		
13	13.474				1.005	14.479	14.155	0.152	0.003		
14	14.710				1.379	16.080	16.045	0.165	0.003		
15	14.813				2.034	16.847	16.803	0.167	0.003		
16	18.202				3.300	21.502	21.447	0.206	0.003		
17	20.922				8.719	29.641	29.578	0.235	0.003		
18	23.026				14.736	37.762	37.693	0.261	0.003		
19	38.023				23.175	61.198	61.084	0.430	0.003		
20	15.081				52.322	67.403	67.358	0.169	0.003		
21	7.413				0.528	7.941	7.919	0.084	0.003		
22	10.567				0.143	10.710	10.678	0.120	0.003		
23	11.012				0.290	11.302	11.269	0.124	0.003		
24	11.354				0.624	11.978	11.941	0.129	0.003		
25	11.576				1.148	12.724	12.690	0.131	0.003		
26	11.702				1.900	13.602	13.568	0.131	0.003		
T	11.817	-	-	-	7.4	19.217	19.181	-	0.003		

Th-232

$\sigma_{1\to 1+k}$

k→ / i↓	0	1	2	3	4	5	6	7	8
1	-	0.0012	0.0432	0.3000	0.9978	1.1719	0.9549	0.3930	0.1752
2	0.0001	0.00592	0.0612	0.3024	0.6632	1.1941	0.9265	0.4293	0.2069
3	0.0076	0.0992	0.5218	0.8208	0.8032	0.3698	0.1261	0.0386	0.0115
4	0.1703	0.5542	0.6897	0.7854	0.4008	0.1442	0.0454	0.0108	0.0030
5	0.5867	0.9188	0.7047	0.2413	0.0793	0.0263	0.0064	0.0015	0.0004
6	1.1228	0.6117	0.2481	0.1104	0.0316	0.0051	0.0006	-	-
7	1.3033	0.3769	0.0108	0.0061	0.0017	0.0003	-	-	-
8	0.7666	0.3641	0.0202	0.0043	0.0003	-	-	-	-
9	0.3424	0.3607	0.0011	0.0009	0.0002	-	-	-	-
10	0.0228	0.1584	0.0586	0.0176	0.0040	0.0008	0.0001	-	-

Th-232

$\sigma_{n,2n}{}^{1\to 1+k}$

k→ / i↓	0	1	2	3	4	5	6	7	8
1	-	0.0006	0.0205	0.139	0.4516	0.5207	0.4187	0.1708	0.0757
2	-	-	0.0002	0.0173	0.1440	0.4261	0.3880	0.1896	0.0936

Pa-233

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	ν	σ_{er}	μ	$\nu\sigma_f$
1	2.725	0.0947	0.5419	1.522	0.0069	5.941	3.186	4.049	0.025	0.622	6.163
2	3.428	0.4993	0.3614	1.424	0.0099	5.722	3.312	3.427	0.019	0.693	4.880
3	4.809	1.581	-	0.842	0.0209	7.253	3.640	2.962	0.0214	0.751	2.494
4	4.621	1.934	-	0.832	0.0492	7.436	4.077	2.677	0.0233	0.726	2.227
5	3.652	2.169		0.714	0.1297	6.665	4.605	2.489	0.0238	0.563	1.777
6	3.906	2.381		0.066	0.3126	6.666	4.956	2.369	0.0340	0.437	0.116
7	4.837	2.529		0.0008	0.2904	7.758	6.172	2.297	0.0422	0.302	0.001
8	6.451	2.633		-	0.2736	9.358	8.166		0.0661	0.180	-
9	8.257	2.596		-	0.3537	11.207	10.369		0.0931	0.097	
10	9.661	1.922			0.5786	12.162	11.668		0.1037	0.050	
11	10.022	0.9378			1.196	12.156	11.683		0.1094	0.027	
12	10.079	0.032			2.202	12.313	12.187		0.1126	0.012	
13	10.603	-			3.451	14.054	13.565		0.1193	0.0046	
14	10.792	-			5.021	15.813	15.773		0.1208	0.0029	
15	10.930	-			7.487	18.417	18.379		0.1232	0.0029	
16	11.029	-			11.212	22.241	22.205		0.1243	0.0029	
17	11.100	-			16.73	27.830	27.795		0.1242	0.0029	
18	11.15	-			24.734	35.884	35.851		0.1257	0.0029	
19	11.186	-			37.292	48.478	48.444		0.1261	0.0029	
20	11.895	-			44.274	56.169	55.445		0.1331	0.0029	
21	11.948	-			71.173	83.121	80.888		0.1347	0.0029	
22	10.831	-			112.48	123.311	121.976		0.1221	0.0029	
23	10.568	-			177.07	187.638	186.620		0.1182	0.0029	
24	12.470	-			589.98	602.450	597.757		0.1406	0.0029	
25	7.511	-			20.933	28.444	28.407		0.0847	0.0029	
26	8.020	-			14.333	22.353	22.318		0.0897	0.0029	
T	8.274	-	-	-	38.400	46.674	46.65	-	-	0.0029	

Pa-233

$\sigma_{1 \to 1+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	-	0.0001	0.0049	0.0495	0.2315	0.3450	0.3284	0.1488	0.0797
2	-	0.0005	0.0117	0.1092	0.2814	0.4172	0.2539	0.1010	0.0483
3	-	0.0011	0.0452	0.2508	0.5647	0.4346	0.1941	0.0684	0.0025
4	-	0.0024	0.0673	0.4592	0.6942	0.4481	0.1922	0.0540	0.0436
5	-	0.0029	0.1349	0.6176	0.7503	0.4557	0.1542	0.0405	0.0125
6	-	0.0081	0.2219	0.7585	0.8384	0.3930	0.1209	0.0311	0.0093
7	-	0.0151	0.2991	0.9483	0.8037	0.3326	0.0934	0.0247	0.0072
8	-	0.0186	0.4037	1.0294	0.7649	0.3018	0.0871	0.0212	0.0062
9	1.0807	1.2301	0.2559	0.0257	0.0162	0.0003	-	-	-
10	0.7437	0.9473	0.1644	0.0485	0.0112	0.0022	0.0003	-	-
11	0.2568	0.4628	0.1758	0.0424	-	-	-	-	-
12	-	-	0.0118	0.0157	0.0037	0.0007	-	-	-

Pa-233

$\sigma_{n,2n}$ $1 \to 1+k$

i ↓ / k →	0	1	2	3	4	5	6	7	8
1	-	-	0.0016	0.0201	0.1029	0.1592	0.1542	0.0705	0.0335
2	-	-	0.0007	0.0177	0.0716	0.1303	0.0880	0.0367	0.0165

U-233

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	ν	σ_{er}	μ	$\nu\sigma_f$
1	2.991	0.0947	0.521	2.273	0.0082	5.828	3.412	4.130	0.0125	0.828	9.387
2	3.013	0.501	0.494	2.154	0.0117	6.174	3.638	3.574	0.0086	0.841	7.698
3	4.069	1.578	0.013	1.515	0.0172	7.192	3.925	3.159	0.0143	0.802	4.786
4	4.133	1.771	-	1.717	0.0247	7.646	4.78	2.905	0.0233	0.693	4.988
5	3.607	1.265	-	1.882	0.0364	6.790	4.560	2.737	0.0207	0.616	5.151
6	3.627	0.850	-	1.831	0.0543	6.362	4.235	2.629	0.0233	0.585	4.814
7	4.776	0.660	-	1.844	0.1154	7.395	4.926	2.565	0.0291	0.513	4.730
8	6.234	0.567	-	2.115	0.1884	9.104	6.477	2.527	0.0452	0.419	5.345
9	7.642	0.438	-	2.178	0.2121	10.470	8.243	2.509	0.0678	0.289	5.465
10	9.028	0.192	-	2.386	0.2500	11.856	10.437	2.499	0.0862	0.155	5.963
11	10.263	0.0035	-	2.976	0.3325	13.575	12.669	2.494	0.1051	0.0877	7.422
12	11.112	-	-	3.788	0.4399	15.340	14.723	2.492	0.1188	0.0549	9.440
13	11.325	-	-	4.910	0.5819	16.817	16.627	2.491	0.1259	0.0164	12.231
14	10.890	-	-	6.551	0.7841	18.225	18.182	2.49	0.1219	0.0029	16.312
15	9.834	-	-	9.407	0.9251	20.169	20.136	2.49	0.1109	0.0029	23.423
16	10.432	-	-	12.711	1.42	24.563	24.529	2.49	0.1176	0.0029	31.650
17	11.158	-	-	17.820	2.467	29.445	31.405	2.49	0.1248	0.0029	44.372
18	12.003	-	-	25.582	3.989	41.574	41.527	2.49	0.1353	0.0029	63.699
19	13.136	-	-	37.197	5.644	55.977	55.924	2.49	0.1481	0.0029	92.621
20	14.187	-	-	65.047	6.665	85.899	85.715	2.49	0.1587	0.0029	161.967
21	12.936	-	-	109.507	17.828	140.271	139.979	2.49	0.1459	0.0029	272.672
22	12.615	-	-	96.753	17.619	126.987	126.737	2.49	0.1422	0.0029	240.915
23	13.221	-	-	121.984	46.563	181.768	181.592	2.49	0.1479	0.0029	303.740
24	11.691	-	-	351.535	60.194	423.420	423.226	2.49	0.1318	0.0029	875.322
25	12.413	-	-	124.886	9.671	146.970	146.932	2.49	0.1399	0.0029	310.966
26	12.962	-	-	162.971	14.360	190.293	190.254	2.49	0.1450	0.0029	405.798
T	14.39	-	-	525.11	45.9	585.4	585.3	2.49	-	0.0029	1307.524

SBG: ms:
28.6.76

U-233

$\sigma_{1 \to 1 + k}$

1 ↓ / k →	0	1	2	3	4	5	6	7	8	9	10
1	-	0.0002	0.0030	0.0193	0.1205	0.2820	0.3795	0.2153	0.0990	0.0136	0.0042
2	0.0002	0.0056	0.0380	0.1340	0.2351	0.4340	0.3689	0.1816	0.0788	0.0094	0.0027
3	0.0038	0.0524	0.2864	0.4613	0.4521	0.2131	0.0730	0.0226	0.0206	0.0063	0.0053
4	0.0187	0.1927	0.4638	0.5975	0.3260	0.1214	0.0389	0.0094	0.0021	0.0005	0.0001
5	0.0602	0.2484	0.4573	0.3110	0.1301	0.0443	0.0110	0.0025	0.0006	0.0001	-
6	0.0944	0.3713	0.2347	0.0999	0.0371	0.0097	0.0022	0.0005	0.0001	-	-
7	0.2970	0.3202	0.0104	0.0013	0.0003	0.0001	-	-	-	-	-
8	0.3699	0.1966	-	-	-	-	-	-	-	-	-
9	0.2192	0.2138	0.0044	0.0006	-	-	-	-	-	-	-
10	0.0597	0.0978	0.0285	0.0057	-	-	-	-	-	-	-

U-233

$\sigma_{n,2n}^{1 \to 1 + k}$

1 ↓ / k →	0	1	2	3	4	5	6	7	8
1	-	-	0.0001	0.0036	0.0465	0.1284	0.1810	0.1044	0.0570
2	-	-	-	0.0042	0.0449	0.1585	0.1606	0.0832	0.0426
3	-	-	-	-	-	-	-	0.0002	0.0128

U-234

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	σ_{er}	μ	ν	$\nu\sigma_f$
1	2.819	0.295	0.377	1.848	0.012	5.351	3.601	0.026	0.620	3.947	7.294
2	3.289	0.903	0.136	1.883	0.017	5.228	3.945	0.018	0.692	3.413	6.427
3	4.362	2.184	-	1.334	0.029	7.909	4.664	0.020	0.743	3.014	4.024
4	4.576	2.186		1.389	0.049	8.200	4.882	0.023	0.725	2.769	3.846
5	4.432	2.125		1.430	0.113	8.100	5.603	0.029	0.563	2.607	3.728
6	4.888	1.579		1.173	0.316	7.956	5.798	0.042	0.438	2.504	2.937
7	6.776	1.287		0.706	0.282	9.051	6.933	0.059	0.304	2.442	1.724
8	8.902	1.358		0.122	0.278	10.660	9.019	0.091	0.180	2.406	0.293
9	10.538	0.965		0.032	0.325	11.860	10.776	0.118	0.098	2.388	0.076
10	12.016	0.230		0.020	0.425	12.691	12.082	0.129	0.049	2.379	0.048
11	13.064	0.0003		0.015	0.630	13.709	13.344	0.142	0.027	2.374	0.036
12	13.898	-		0.012	0.954	14.864	14.683	0.155	0.012	2.372	0.028
13	14.226			0.010	1.361	15.597	15.530	0.159	0.005	2.371	0.024
14	14.281			0.005	1.990	16.276	16.230	0.159	0.003	2.370	0.012
15	15.779			0.001	3.222	19.002	18.911	0.177	0.0029	2.370	0.002
16	27.007			-	4.893	31.900	31.521	0.303	0.0029	-	-
17	33.540				6.533	40.073	39.976	0.374	0.0029		
18	39.951				20.675	60.626	60.510	0.448	0.0029		
19	25.994				29.821	55.815	55.740	0.292	0.0029		
20	18.473				32.419	50.896	50.838	0.206	0.0029		
21	9.987				0.256	10.243	10.214	0.112	0.0029		
22	128.023				697.170	825.193	824.822	1.437	0.0029		
23	6.450				8.904	15.354	15.335	0.072	0.0029		
24	10.508				5.529	16.037	15.913	0.118	0.0029		
25	12.593				11.362	23.955	23.841	0.141	0.0029		
26	14.019				21.775	35.794	35.678	0.156	0.0029		
T	12.0	-	-	-	100.2	112.2	112.165	-	0.0029	-	-

U-234

$\sigma_{1 \to 1 + k}$

i ↓ \ k →	0	1	2	3	4	5	6	7	8	9	10
1	-	-	0.0125	0.0763	0.2507	0.3022	0.2533	0.1344	0.0347	0.0115	0.0017
2	0.0001	0.0069	0.0565	0.2135	0.2930	0.3152	0.1814	0.0744	0.0255	0.0070	0.0012
3	0.0021	0.0431	0.3164	0.6148	0.3451	0.1229	0.0385	0.0092	0.0004	0.0001	-
4	0.0082	0.1449	0.4861	0.7797	0.4870	0.1947	0.0648	0.0159	0.0036	0.0008	0.0002
5	0.0800	0.3564	0.8744	0.4829	0.2231	0.0811	0.0209	0.0048	0.0011	0.0002	-
6	0.6036	0.3519	0.3558	0.1799	0.0673	0.0162	0.0035	0.0005	0.0001	-	-
7	1.0081	0.2719	0.0072	-	-	-	-	-	-	-	-
8	0.9608	0.3841	0.0107	0.0006	0.0001	-	-	-	-	-	-
9	0.5290	0.4308	0.0031	0.0012	0.0005	0.0001	-	-	-	-	-
10	0.0075	0.1276	0.0208	0.0048	0.0010	-	-	-	-	-	-

U-234

$\sigma_{n,2n}{}^{1 \to 1 + k}$

i ↓ \ k →	0	1	2	3	4	5	6	7	8	9
1	-	-	0.0022	0.0202	0.0829	0.1113	0.0985	0.0426	0.0141	0.0054
2	-	-	-	0.0015	0.0139	0.0448	0.0431	0.0217	0.0081	0.0027

U-235

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	ν	σ_{er}	μ	$\nu\sigma_f$
1	3.030	0.535	0.440	1.898	0.0027	5.736	3.130	4.123	0.0104	0.857	7.825
2	3.369	0.698	0.494	1.650	0.0076	6.219	3.556	3.546	0.0118	0.804	5.851
3	4.626	1.751	0.044	1.078	0.0166	7.515	3.937	3.115	0.0186	0.773	3.358
4	4.783	1.800	-	1.195	0.0297	7.808	4.436	2.351	0.0259	0.704	3.407
5	3.965	1.691	-	1.291	0.0540	7.001	4.888	2.676	0.0274	0.532	3.455
6	4.001	1.412	-	1.216	0.0984	6.727	5.027	2.565	0.0353	0.424	3.119
7	5.015	1.154	-	1.162	0.1447	7.476	5.605	2.498	0.0393	0.367	2.903
8	6.975	0.781	-	1.286	0.2254	9.267	7.335	2.459	0.0629	0.271	3.162
9	8.685	0.489	-	1.513	0.3931	11.080	9.968	2.439	0.0940	0.126	3.690
10	9.780	0.142	-	1.854	0.6075	12.383	11.847	2.429	0.1037	0.054	4.503
11	10.597	0.021	-	2.237	0.8046	13.660	13.420	2.424	0.1153	0.022	5.422
12	10.783	0.003	-	2.806	1.023	14.615	13.522	2.422	0.1200	0.007	6.796
13	11.008	-	-	3.695	1.318	16.021	15.979	2.421	0.1230	0.0029	8.946
14	11.199	-	-	5.178	1.867	18.244	18.205	2.420	0.1242	0.0029	12.531
15	11.464	-	-	7.394	3.208	22.066	22.026	2.42	0.1282	0.0029	17.893
16	11.535	-	-	11.009	4.642	27.186	27.150	2.42	0.1289	0.0029	26.642
17	11.531	-	-	15.770	6.610	33.911	33.882	2.42	0.1279	0.0029	38.163
18	11.519	-	-	22.078	10.555	44.152	44.150	2.42	0.1288	0.0029	53.429
19	12.312	-	-	35.028	15.444	62.784	62.288	2.42	0.1376	0.0029	84.768
20	12.315	-	-	43.122	23.998	79.435	78.441	2.42	0.1366	0.0029	104.355
21	12.273	-	-	51.199	44.838	108.310	106.825	2.42	0.1372	0.0029	123.901
22	11.050	-	-	48.514	37.426	96.990	96.556	2.42	0.1235	0.0029	117.404
23	11.410	-	-	17.340	7.130	35.880	35.835	2.42	0.1265	0.0029	41.963
24	12.545	-	-	35.930	12.398	60.873	60.823	2.42	0.1403	0.0029	86.951
25	13.648	-	-	65.475	7.171	86.294	86.252	2.42	0.1525	0.0029	158.449
26	14.672	-	-	156.949	34.300	205.921	205.877	2.42	0.1628	0.0029	379.817
T	15.778	-	-	580.2	98.3	694.28	694.23	2.42	-	0.0029	1404.084

U-235

$\sigma_{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7
1	0.0059	0.0007	0.0163	0.0966	0.3050	0.3554	0.2908	0.1526
2	0.0061	0.0072	0.0579	0.2636	0.4496	0.5052	0.2610	0.1192
3	0.1885	0.1092	0.2890	0.4799	0.4863	0.2287	0.0789	0.0316
4	0.3902	0.4628	0.2751	0.3631	0.2011	0.0755	0.0243	0.0075
5	0.5993	0.7084	0.1807	0.1252	0.0529	0.0181	0.0045	0.0012
6	0.3407	0.7814	0.2593	0.0192	0.0082	0.0023	0.0006	0.0002
7	0.5845	0.4194	0.1152	0.0273	0.0062	0.0012	0.0002	-
8	0.3963	0.3213	0.0520	0.0086	0.0024	0.0004	-	-
9	0.1958	0.2553	0.0313	0.0058	0.0006	-	-	-
10	0.0444	0.0745	0.0175	0.0047	0.0010	0.0001	-	-
11	0.0114	0.0087	0.0008	-	-	-	-	-
12	-	0.0018	0.0007	0.0002	-	-	-	-

U-235

$\sigma_{n,2n}{}^{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9
1	-	0.0001	0.0031	0.0263	0.1008	0.1294	0.1114	0.0474	0.0155	0.0059
2	-	0.0001	0.0039	0.0468	0.1240	0.1701	0.0965	0.0367	0.0119	0.0040
3	0.0438	-	-	-	-	-	-	-	-	-

U-236

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	σ_{er}	μ	ν	$\nu\sigma_f$
1	2.822	0.293	0.777	1.688	0.012	5.592	3.840	0.026	0.620	4.073	6.875
2	3.289	0.903	0.624	1.669	0.017	6.462	4.219	0.018	0.692	3.496	5.835
3	4.362	2.184	-	0.886	0.029	7.461	4.216	0.020	0.743	3.065	2.716
4	4.576	2.186		0.853	0.050	7.665	4.347	0.023	0.725	2.801	2.389
5	4.432	2.159		0.784	0.113	7.488	4.991	0.028	0.563	2.626	2.059
6	4.876	2.011		0.440	0.316	7.643	5.491	0.042	0.438	2.515	1.107
7	6.759	1.700		0.018	0.282	8.759	6.650	0.058	0.304	2.448	0.044
8	8.883	1.283		-	0.278	10.444	8.802	0.090	0.180		
9	10.538	0.858			0.325	11.721	10.638	0.117	0.098		
10	12.000	0.229			0.424	12.653	12.045	0.127	0.049		
11	13.034	-			0.617	13.651	13.289	0.141	0.027		
12	13.984				0.903	14.887	14.792	0.154	0.012		
13	15.177				1.226	16.403	16.318	0.169	0.005		
14	17.270				1.746	19.016	18.914	0.191	0.0028		
15	21.63				2.760	24.392	24.150	0.241	0.0028		
16	28.431				5.174	33.605	32.911	0.316	0.0028		
17	26.507				5.999	32.506	32.432	0.293	0.0028		
18	41.310				16.125	47.435	57.315	0.460	0.0028		
19	28.619				20.338	48.957	48.877	0.318	0.0028		
20	21.539				34.844	56.383	55.992	0.238	0.0028		
21	10.105				0.127	10.232	10.204	0.112	0.0028		
22	42.722				359.020	401.742	401.622	0.475	0.0028		
23	7.573				2.878	10.451	10.430	0.084	0.0028		
24	8.968				1.056	10.024	9.962	0.100	0.0028		
25	9.271				1.175	10.446	10.410	0.103	0.0028		
26	9.385				1.589	10.974	10.943	0.104	0.0028		
T	9.50	-	-	-	5.20	14.75	14.673				

U-236

$\sigma_{1\to 1+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9	10
1	-	0.0023	0.0451	0.2110	0.5225	0.5050	0.3633	0.1387	0.0430	0.0139	0.0021
2	0.0002	0.0136	0.1180	0.4726	0.6263	0.5600	0.2431	0.0805	0.0242	0.0060	0.0011
3	0.0003	0.0148	0.1925	0.5358	0.7507	0.4397	0.1689	0.0550	0.0134	0.0030	0.0008
4	0.0016	0.0629	0.3479	0.7809	0.5999	0.2677	0.0943	0.0239	0.0055	0.0012	0.0003
5	0.1355	0.3426	0.6662	0.4875	0.2588	0.0999	0.0266	0.0062	0.0014	0.0003	0.0001
6	0.8391	0.5338	0.3504	0.1608	0.0430	0.0093	0.0017	0.0004	0.0001	-	-
7	1.3559	0.3181	0.0109	0.0122	0.0025	0.0004	-	-	-	-	-
8	0.9075	0.3649	0.0099	0.0007	0.0001	-	-	-	-	-	-
9	0.4591	0.3971	0.0012	0.0002	-	-	-	-	-	-	-
10	0.0621	0.1336	0.0260	0.0059	0.0011	0.0002	-	-	-	-	-

U-236

$\sigma_{n,2n}\ 1\to 1+k$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9
1	-	0.0010	0.0192	0.0893	0.2201	0.2122	0.1526	0.0581	0.0180	0.0067
2	0.0001	0.0053	0.0412	0.1483	0.1827	0.1532	0.0641	0.0208	0.0062	0.0018

U-238

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	σ_{er}	μ	ν	$\nu\sigma_f$
1	2.9548	0.3277	1.2255	1.0607	0.0037	5.5724	3.0813	0.0110	0.8431	4.1663	4.4192
2	3.2936	0.8914	1.1293	0.9641	0.0055	6.2839	3.6181	0.0112	0.8079	3.5677	3.4396
3	4.4214	2.5459	0.0043	0.5720	0.0099	7.5535	4.0079	0.0154	0.8010	3.1209	1.7852
4	4.6387	2.6483	-	0.5414	0.0221	7.8505	4.4747	0.0228	0.7274	2.8468	1.5413
5	3.8205	2.8389	-	0.4671	0.0571	7.1836	4.9365	0.0231	0.5869	2.6656	1.2451
6	4.5373	2.4789	-	0.0517	0.1196	7.1675	4.9897	0.0361	0.4742	2.5501	0.0808
7	6.4495	1.7596	-	0.0009	0.1222	8.3322	6.0238	0.0511	0.3520	2.4808	0.0022
8	8.6400	1.2494	-	-	0.1262	10.0156	7.9328	0.0807	0.2357	-	-
9	10.5671	0.7842	-	-	0.1700	11.5213	9.9890	0.1108	0.1421	-	-
10	12.2180	0.2131	-	-	0.2873	12.7184	11.8658	0.1259	0.0685	-	-
11	13.156	0.0003	-	-	0.4761	13.6324	13.3204	0.1412	0.0226	-	-
12	13.974	-	-	-	0.7359	14.7099	14.6005	0.1535	0.0071	-	-
13	15.295	-	-	-	1.0410	16.336	16.2660	0.1687	0.0028	-	-
14	18.344	-	-	-	1.30	19.644	19.5936	0.2008	0.0028	-	-
15	17.152	-	-	-	1.85	19.002	18.9520	0.1892	0.0028	-	-
16	19.084	-	-	-	3.534	22.618	22.5642	0.2105	0.0028	-	-
17	16.514	-	-	-	4.490	21.004	20.9580	0.1808	0.0028	-	-
18	67.596	-	-	-	20.803	88.399	88.2101	0.7458	0.0028	-	-
19	24.313	-	-	-	16.737	41.050	40.9822	0.2682	0.0028	-	-
20	76.278	-	-	-	56.947	133.225	133.0110	0.8352	0.0028	-	-
21	32.022	-	-	-	81.449	113.471	113.3812	0.3533	0.0028	-	-
22	17.263	-	-	-	171.794	189.057	189.0085	0.1904	0.0028	-	-
23	8.330	-	-	-	0.6653	8.9953	8.9648	0.0912	0.0028	-	-
24	8.746	-	-	-	0.4938	9.2398	9.2127	0.0965	0.0028	-	-
25	8.867	-	-	-	0.5991	9.4661	9.4408	0.0978	0.0028	-	-
26	8.916	-	-	-	0.8172	9.7332	9.7077	0.0976	0.0028	-	-
T	8.9519	-	-	-	2.7201	11.672	11.6469	-	0.0028	-	-

U-238

$\sigma_{1 \to 1 + k}$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7
1	-	0.0004	0.0145	0.1210	0.5407	0.8062	0.7740	0.5217
2	0.0002	0.0084	0.0714	0.3777	0.7779	1.0170	0.5794	0.3181
3	0.0065	0.0872	0.4679	0.7455	0.7356	0.3404	0.1164	0.0549
4	0.0489	0.3290	0.7132	0.8660	0.4556	0.1665	0.0528	0.0162
5	0.2803	0.6297	1.2251	0.5438	0.1223	0.0297	0.0062	0.0014
6	1.0291	0.5641	0.5329	0.2643	0.0696	0.0155	0.0027	-
7	1.3944	0.3315	0.0107	0.0167	0.0051	0.0010	-	-
8	0.8712	0.3573	0.0204	0.0004	-	-	-	-
9	0.4261	0.3512	0.0053	0.0012	0.0003	-	-	-
10	0.0529	0.1182	0.0320	0.0080	0.0015	0.0001	-	-

U-238

$\sigma_{n,2n}$ $i \to i + k$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7	8
1	-	-	0.0030	0.0413	0.2237	0.3586	0.3552	0.1648	0.0789
2	-	0.0001	0.0050	0.0813	0.2587	0.4005	0.2448	0.0968	0.0421
3	-	-	-	-	-	-	-	-	0.0042

Pu-239

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	$\sigma_{n,p}$	$\sigma_{n,\alpha}$	σ_t	σ_{tr}	σ_{er}	μ	ν	$\nu\sigma_f$
1	2.642	0.716	0.136	2.328	0.0025	0.0015	0.0078	5.834	3.452	0.0062	0.901	4.510	10.499
2	2.994	0.988	0.121	2.245	0.0008	-	0.0016	6.350	3.653	0.0053	0.900	3.954	8.877
3	3.836	2.069	0.004	1.701	0.0013	-	0.0003	7.612	4.198	0.0073	0.890	3.539	6.120
4	3.747	2.284	-	1.680	0.0029	-	-	7.914	4.728	0.0101	0.850	3.285	6.176
5	3.279	1.947	-	2.023	0.0094	-	-	7.258	4.758	0.0113	0.762	3.117	6.306
6	3.790	1.675	-	1.757	0.0248	-	-	7.247	4.913	0.0222	0.612	3.009	5.287
7	5.543	1.147	-	1.610	0.0913	-	-	8.391	5.842	0.0370	0.452	2.945	4.741
8	7.451	0.691	-	1.513	0.1782	-	-	10.833	7.464	0.0622	0.315	2.907	4.398
9	8.929	0.517	-	1.544	0.2286	-	-	11.219	9.437	0.0872	0.198	2.889	4.461
10	10.205	0.372	-	1.669	0.3063	-	-	12.552	11.396	0.0998	0.112	2.879	4.805
11	10.869	0.319	-	1.750	0.5674	-	-	13.505	12.914	0.1125	0.054	2.874	5.029
12	11.104	0.294	-	1.932	0.9810	-	-	14.311	13.998	0.1191	0.027	2.872	5.549
13	12.223	0.048	-	2.180	1.766	-	-	15.217	15.127	0.1341	0.0052	2.871	6.259
14	13.329	-	-	3.998	4.004	-	-	21.331	21.121	0.1454	0.0028	2.87	11.474
15	14.890	-	-	8.023	9.506	-	-	32.419	32.074	0.1637	0.0028	2.87	23.026
16	15.699	-	-	10.149	12.43	-	-	38.278	38.179	0.1725	0.0028	2.87	29.128
17	19.118	-	-	13.604	16.558	-	-	49.280	42.970	0.2086	0.0028	2.87	39.043
18	18.369	-	-	20.226	18.188	-	-	56.783	49.097	0.2019	0.0028	2.87	58.049
19	25.008	-	-	59.608	41.733	-	-	126.349	121.975	0.2748	0.0028	2.87	171.075
20	15.026	-	-	25.065	38.828	-	-	78.919	73.186	0.1639	0.0028	2.87	71.937
21	14.393	-	-	115.63	78.518	-	-	208.541	204.285	0.1582	0.0028	2.87	331.858
22	9.507	-	-	39.23	34.088	-	-	82.825	81.797	0.1045	0.0028	2.87	112.590
23	10.011	-	-	11.065	1.093	-	-	22.169	22.130	0.1092	0.0028	2.87	31.757
24	10.919	-	-	25.509	8.122	-	-	44.550	44.508	0.1200	0.0028	2.87	73.211
25	12.173	-	-	98.631	44.496	-	-	155.30	155.222	0.1338	0.0028	2.87	283.071
26	13.235	-	-	1640.47	1108.00	-	-	2761.705	2759.80	0.1444	0.0028	2.87	4708.115
T	8.626	-	-	741.6	271.3	-	-	1021.526	1021.507	-	0.0028	2.87	2128.392

Pu-239

$\sigma_{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9	10
1	0.4469	0.0058	0.0138	0.0625	0.1525	0.1460	0.1046	0.0317	0.0123	0.0037	0.0006
2	0.5244	0.0136	0.0472	0.1674	0.2042	0.1704	0.0710	0.0230	0.0068	0.0017	0.0003
3	0.6471	0.0562	0.2437	0.4098	0.4196	0.2005	0.0706	0.0223	0.0054	0.0011	0.0002
4	0.7293	0.1941	0.4049	0.5211	0.2841	0.1058	0.0350	0.0082	0.0018	0.0004	0.0001
5	0.8748	0.3933	0.3489	0.2109	0.0829	0.0273	0.0067	0.0015	0.0003	0.0001	-
6	0.8630	0.5133	0.1832	0.0780	0.0281	0.0067	0.0016	0.0003	0.0001	-	-
7	0.7324	0.2879	0.0966	0.0237	0.0052	0.0010	-	-	-	-	-
8	0.5591	0.1153	0.0114	0.0038	0.0010	0.0002	-	-	-	-	-
9	0.3917	0.1194	0.0063	-	-	-	-	-	-	-	-
10	0.2722	0.0894	0.0077	0.0020	0.0004	-	-	-	-	-	-
11	0.1909	0.1284	-	-	-	-	-	-	-	-	-
12	0.0710	0.1364	0.0808	0.0050	-	-	-	-	-	-	-
13	-	-	0.0325	0.0118	0.0029	0.0006	-	-	-	-	-

Pu-239

$\sigma_{n,2n}{}^{i \to i+k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9	10
1	-	0.00014	0.00308	0.01496	0.03820	0.03762	0.02742	0.01053	0.00327	0.00123	-
2	0.00002	0.00091	0.00753	0.02819	0.03564	0.03036	0.01283	0.004187	0.00125	0.00036	-
3	-	-	-	0.00003	0.00051	0.00132	0.00115	0.00058	0.00018	0.00005	-

Pu-240

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	ν	σ_{er}	μ	$\nu\sigma_f$
1	3.058	0.3232	0.5280	1.813	0.0037	5.726	3.055	4.139	0.0091	0.874	7.504
2	3.488	0.6583	0.3973	1.793	0.0062	6.342	3.400	3.716	0.0097	0.842	6.663
3	4.380	1.722	0.0003	1.487	0.0126	7.602	4.083	3.400	0.0149	0.803	5.056
4	4.220	2.071	-	1.555	0.0279	7.874	4.751	3.206	0.0194	0.743	4.985
5	3.628	2.059	-	1.539	0.0575	7.284	4.844	3.078	0.0173	0.672	4.737
6	3.682	2.027	-	1.402	0.1028	7.214	5.042	2.996	0.0229	0.586	4.200
7	5.896	1.564	-	0.573	0.1500	8.183	5.594	2.947	0.0409	0.428	1.689
8	8.219	1.248	-	0.135	0.1751	9.777	9.292	2.919	0.0700	0.299	0.394
9	9.988	0.948	-	0.093	0.2257	11.255	9.817	2.904	0.0979	0.1915	0.270
10	11.680	0.459	-	0.082	0.3247	12.546	11.498	2.897	0.1147	0.1049	0.238
11	12.752	0.0041	-	0.095	0.4965	13.348	12.659	2.893	0.1317	0.0517	0.275
12	13.727	-	-	0.096	0.7392	14.562	14.114	2.891	0.1467	0.0263	0.277
13	15.416	-	-	0.116	1.132	16.664	16.166	2.891	0.1676	0.0091	0.335
14	16.533	-	-	0.165	1.577	18.275	18.229	2.89	0.1796	0.0028	0.477
15	19.304	-	-	0.171	2.617	22.092	22.038	2.89	0.2113	0.0028	0.494
16	19.367	-	-	0.261	4.471	24.099	24.045	2.89	0.2120	0.0028	0.754
17	23.442	-	-	0.068	6.762	30.272	30.206	2.89	0.2547	0.0028	0.196
18	34.347	-	-	0.180	19.754	54.281	54.185	2.89	0.3760	0.0028	0.520
19	70.596	-	-	0.341	36.259	107.196	106.998	2.89	0.7726	0.0028	0.985
20	65.122	-	-	0.445	61.844	127.411	127.229	2.89	0.7075	0.0028	1.286
21	12.353	-	-	0.239	27.135	39.727	39.692	2.89	0.1352	0.0028	0.691
22	12.200	-	-	0.0008	0.9846	13.186	12.973	2.89	0.1335	0.0028	0.002
23	18.052	-	-	0.0025	9.215	27.270	26.641	2.89	0.1961	0.0028	0.007
24	835.563	-	-	1.843	9649.0	10486.406	9710.604	2.89	9.1475	0.0028	5.326
25	49.910	-	-	0.224	1164.6	1214.734	1167.346	2.89	0.5462	0.0028	0.647
26	1.780	-	-	0.031	160.33	162.141	162.013	2.89	0.0193	0.0028	0.090
T	3.732	-	-	0.058	290.0	293.79	293.78	2.89	-	0.0028	0.117

Pu-240

$\sigma_{1 \to 1 + k}$

i ↓ / k →	0	1	2	3	4	5	6	7
1	-	0.0004	0.0102	0.0375	0.2804	0.3961	0.3720	0.2477
2	0.0001	0.0058	0.0461	0.1974	0.3513	0.4468	0.2592	0.1455
3	0.0032	0.0480	0.2924	0.4990	0.5144	0.2446	0.0848	0.0341
4	0.2628	0.4245	0.4743	0.4693	0.2736	0.1032	0.0333	0.0099
5	1.0868	0.5445	0.3365	0.0567	0.0241	0.0087	0.0017	0.0004
6	1.2650	0.4102	0.2536	0.0736	0.0206	0.0031	0.0006	-
7	1.2758	0.2435	0.0301	0.0126	0.0027	0.0001	-	-
8	0.9148	0.3305	0.0029	-	-	-	-	-
9	0.4974	0.4506	0.0003	-	-	-	-	-
10	0.1064	0.2402	0.0872	0.0223	0.0029	-	-	
11	-	-	-	0.0025	0.0013	0.0002	-	-

Pu-240

$\sigma_{n,2n}{}^{1 \to 1 + k}$

i ↓ / k →	0	1	2	3	4	5	6	7
1	-	0.00001	0.00219	0.01687	0.09426	0.15408	0.15454	0.1070
2	-	-	0.00084	0.01983	0.07936	0.14319	0.09617	0.0579
3	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.0001

Pu-241

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	ν	σ_{er}	μ	$\nu\sigma_f$
1	2.859	0.327	0.362	2.162	0.0161	5.726	3.238	4.740	0.0087	0.870	10.248
2	2.993	0.602	0.678	2.061	0.0255	6.359	3.784	4.129	0.0073	0.860	8.510
3	3.988	1.830	0.153	1.475	0.0412	7.487	4.110	3.672	0.0106	0.846	5.416
4	4.110	2.114	-	1.518	0.0646	7.807	4.611	3.392	0.0163	0.777	5.149
5	3.885	1.632	-	1.744	0.0942	7.355	4.621	3.207	0.0166	0.704	5.593
6	4.402	1.815	-	1.597	0.1064	7.920	5.155	3.089	0.0246	0.626	4.933
7	5.637	2.114	-	1.509	0.1028	9.363	6.338	3.0185	0.0317	0.534	4.555
8	7.478	1.538	-	1.721	0.1407	10.878	7.950	2.977	0.0554	0.386	5.123
9	9.224	0.728	-	2.049	0.2847	12.286	10.012	2.957	0.0841	0.245	6.059
10	10.247	0.300	-	2.394	0.5419	13.483	12.020	2.946	0.0961	0.142	7.053
11	10.938	0.012	-	2.673	0.5982	14.221	13.439	2.941	0.1104	0.070	7.861
12	11.216	-	-	3.169	0.7304	15.115	14.792	2.938	0.1193	0.027	9.310
13	11.580	-	-	4.322	1.020	16.922	16.805	2.937	0.1256	[illegible].0077	12.694
14	11.996	-	-	6.409	1.552	19.957	19.917	2.936	0.1298	[illegible].0028	18.817
15	11.975	-	-	8.429	2.169	22.573	22.532	2.936	0.1306	0.0028	24.747
16	12.016	-	-	16.925	3.932	32.873	32.839	2.936	0.1310	0.0028	49.692
17	11.801	-	-	30.014	6.097	47.912	47.879	2.936	0.1277	0.0028	88.121
18	11.696	-	-	36.270	7.128	55.094	54.791	2.936	0.1275	0.0028	106.489
19	11.818	-	-	44.365	7.577	63.760	63.711	2.936	0.1288	0.0028	130.256
20	12.042	-	-	64.172	5.945	82.159	81.739	2.936	0.1303	0.0028	188.409
21	14.744	-	-	132.168	41.159	188.071	184.242	2.936	0.1607	0.0028	388.045
22	10.204	-	-	236.878	17.926	265.008	264.597	2.936	0.1112	0.0028	695.474
23	7.992	-	-	109.996	42.817	160.805	159.843	2.936	0.0865	0.0028	322.948
24	10.516	-	-	27.704	2.794	41.014	40.845	2.936	0.1146	0.0028	81.339
25	12.084	-	-	44.309	13.895	70.288	70.238	[illegible]936	0.1317	0.0028	130.091
26	13.381	-	-	817.929	358.76	1190.070	1189.879	[illegible]	0.1448	0.0028	2401.439
T	11.353	-	-	1007.3	368.1	1386.70	1386.67	2.9[illegible]	-	0.0028	2957.43

Pu-241

$\sigma_{i \to i+k}$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7
1	-	0.0005	0.0148	0.0912	0.2744	0.3010	0.2345	0.1324
2	-	0.0077	0.0758	0.3981	0.5779	0.5373	0.2396	0.1119
3	0.0011	0.0812	0.4411	0.5026	0.6986	0.3647	0.1327	0.0546
4	0.2137	0.2487	0.3845	0.6328	0.4016	0.1619	0.0541	0.0171
5	0.7873	0.4194	0.2247	0.1191	0.0551	0.0198	0.0051	0.0014
6	1.0517	0.6611	0.0747	0.0201	0.0062	0.0011	-	-
7	1.0774	0.9003	0.1170	0.0162	0.0025	0.0005	-	-
8	0.6476	0.6642	0.1808	0.0419	0.0031	0.0006	-	-
9	0.3240	0.3487	0.0391	0.0145	0.0020	-	-	-
10	0.0863	0.1515	0.0507	0.0114	0.0002	-	-	-
11	-	-	0.0054	0.0050	0.0010	0.0002	-	-

Pu-241

$\sigma_{n,2n}$ $i \to i+k$

$i \downarrow$ / $k \rightarrow$	0	1	2	3	4	5	6	7
1	-	0.00017	0.00515	0.03144	0.09454	0.10367	0.08079	0.04647
2	0.00003	0.00269	0.02971	0.13789	0.20016	0.18610	0.08302	0.03885
3	0.00009	0.00224	0.01935	0.04171	0.05002	0.02611	0.00950	0.00393

Pu-242

Group	σ_e	σ_{in}	$\sigma_{n,2n}$	σ_f	σ_c	σ_t	σ_{tr}	μ	ν	$\nu\sigma_f$	σ_{er}
1	2.812	0.579	0.501	1.880	0.0028	5.775	2.279	0.888	4.599	8.646	0.007
2	2.974	0.952	0.449	1.959	0.0041	6.338	3.712	0.883	3.992	7.820	0.006
3	3.596	1.893	0.0003	1.809	0.0073	7.305	3.168	0.872	3.539	6.402	0.008
4	3.751	2.000	-	1.666	0.020	7.437	3.464	0.793	3.261	5.433	0.014
5	3.890	1.716	-	1.370	0.042	7.018	4.388	0.676	3.077	5.768	0.018
6	4.550	1.208	-	1.345	0.058	7.161	4.696	0.540	2.960	3.981	0.031
7	6.178	1.210	-	0.408	0.111	7.907	5.531	0.379	2.890	1.179	0.046
8	7.971	1.006	-	0.070	0.121	9.168	7.028	0.265	2.849	0.199	0.070
9	9.847	0.673	-	0.032	0.143	10.695	8.977	0.172	2.828	0.091	0.098
10	11.914	0.273	-	0.033	0.236	12.456	11.284	0.096	2.818	0.093	0.117
11	14.043	-	-	0.046	0.415	14.504	13.825	0.047	2.813	0.113	0.145
12	16.031	-	-	0.061	0.579	16.671	16.392	0.016	2.810	0.171	0.172
13	18.681	-	-	-	0.907	19.588	19.328	0.0028	-	-	0.203
14	22.474	-	-	-	1.457	23.931	23.573	0.0028	-	-	0.242
15	27.535	-	-	-	2.538	30.073	29.684	0.0028	-	-	0.299
16	34.464	-	-	-	4.734	39.198	38.653	0.0028	-	-	0.374
17	33.936	-	-	-	6.995	40.931	40.836	0.0028	-	-	0.365
18	22.342	-	-	-	11.806	34.148	34.085	0.0028	-	-	0.242
19	79.513	-	-	-	43.121	122.634	122.411	0.0028	-	-	0.862
20	9.062	-	-	-	46.385	55.447	55.422	0.0028	-	-	0.097
21	10.591	-	-	-	0.115	10.706	10.676	0.0028	-	-	0.115
22	12.308	-	-	-	0.864	13.172	13.137	0.0028	-	-	0.133
23	120.526	-	-	-	1363.0	1483.526	1483.188	0.0028	-	-	1.298
24	5.482	-	-	-	15.656	21.138	20.564	0.0028	-	-	0.059
25	7.617	-	-	-	6.347	13.964	13.936	0.0028	-	-	0.083
26	8.092	-	-	-	6.623	14.715	14.692	0.0028	-	-	0.087
T	8.383				18.485	26.868	26.845	0.0028	-	-	-

..69

Pu-242

$\sigma_{1 \to 1 + k}$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9
1	0.5645	0.0078	0.0179	0.0985	0.2731	0.2841	0.2143	0.0840	0.0264	0.0098
2	0.6859	0.0132	0.0170	0.1029	0.2532	0.3862	0.2227	0.0983	0.0330	0.0104
3	0.8473	0.0461	0.1633	0.2938	0.3134	0.1522	0.0533	0.0166	0.0039	0.0011
4	0.9485	0.3090	0.2033	0.2827	0.1619	0.0619	0.0201	0.0049	0.0011	0.0003
5	0.7692	0.3458	0.3211	0.1740	0.0714	0.0247	0.0062	0.0014	0.0003	0.0001
6	0.6539	0.2382	0.1801	0.0937	0.0273	0.0093	0.0026	0.0006	0.0001	-
7	0.9488	0.2035	0.0246	0.0239	0.0055	0.0011	0.0001	-	-	-
8	0.7327	0.2704	0.0020	-	-	-	-	-	-	-
9	0.3560	0.3168	0.0003	-	-	-	-	-	-	-
10	0.0575	0.1578	0.0526	0.0045	0.0002	-	-	-	-	-

Pu-242

$\sigma_{n,2n}\ 1 \to 1 + k$

i ↓ / k →	0	1	2	3	4	5	6	7	8	9
1	-	0.0004	0.0089	0.0489	0.1356	0.1411	0.1065	0.0417	0.0131	0.0049
2	-	-	0.0010	0.0229	0.0904	0.1618	0.1081	0.0448	0.0152	0.0048
3	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	0.00004	-	-	-