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International Atomic Energy Agency

INDC(HUN)-6/L

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A MUFT TYPE FORTY-GROUP CONSTANT LIBRARY

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June 1971

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Abstract

A MUFT-type library, making use of the evaluated nuclear data files distributed by IAEA has been produced. The specification of a MUFT-type library is given briefly and the computer program producing this library is described. Some results of reactor calculations performad by means of this library and their comparison with experiments are presented.

1. Introduction

MUFT-type multigroup constant libraries have been in use for many years [1] [2] [3]. They can succesfully applied to thermal and intermediate systems containing water or deuterium. This has been the situation in our laboratory, but the data sets in use are out of date and are responsible for many discrepancies between our calculation and experimental results. Since data files from the Nuclear Data Section of IAEA with newly evaluated nuclear data are now available, we have prepared a program - ZEBRA - for producing MUFT-type multigroup constants from these data. A description of the content of the above data files and of the program which handles, can be found in the report [4]. The starting point for ZEBRA is the DF1 file /see [4] /, because it is simpler to handle than the original files. The forty-group constant sets prepared by ZEBRA can immediately be used by the program GRACE [5].

In this report a short description of MUFT-type constants, the method of their calculation and of the related program ZEBRA are given. Results of some reactor calculations are also presented.

2. MUFT-type constants

One of the most essential feature of the MUFT method is the application of the Greuling-Goertzel /for light nuclei/ as well as Fermi age / for heavy nuclei/ approximation for slowing down processes. For the lightest nuclei, such as H,D and

Be, the anisotropy of slowing down is also taken into account. Thus the transport properties of any nucleus are described by six or nine constants in each lethargy group. These contants are

σ_a absorption cross-section

σ_f fission cross-section

σ_i inelastic scattering cross-section

σ_s elastic scattering cross-section

$\mu\sigma_s$ μ is the average cosine of the scattering angle

$\xi\sigma_s$ slowing-down cross-section in the Fermi age model or

$\xi^*\sigma_s$ slowing down cross-section in the Greuling-Goertzel model

Γ slowing down constant

$\eta\sigma_s$ anisotropic slowing down cross-section

Z anisotropic slowing down constant

The above quantities are definied by the following relations:

$$\sigma_x^j = \frac{1}{\Delta u_j} \int_{u_{j-1}}^{u_j} \sigma_x(u)\,du \qquad /1/$$

where

$$X = a, f, i \text{ or } s$$

$$\mu_j = \frac{1}{\Delta u_j} \int_{u_{j-1}}^{u_j} G_1^0(u)/\sigma_s(u)\,du \qquad /2a/$$

$$\xi_j = -\frac{1}{\Delta u_j} \int_{u_{j-1}}^{u_j} G_0^1(u)/\sigma_s(u)\,du \qquad /2b/$$

$$\eta_j = -\frac{1}{\Delta u_j} \int_{u_{j-1}}^{u_j} G_1^1(u)/\sigma_s(u)\, du \qquad /2c/$$

$$\Gamma_j = \frac{1}{\Delta u_j} \int_{u_{j-1}}^{u_j} \lambda_0(u)\, du \qquad /2d/$$

$$Z_j = \frac{1}{\Delta u_j} \int_{u_{j-1}}^{u_j} \lambda_1(u)\, du \qquad /2e/$$

where

$$G_i^n(u) = \frac{2\pi}{n!} \int_{-1}^{1} d\mu_c\, P_i(\mu_0)(-U)^n \sigma_s^c(\mu_c, u) \qquad /3/$$

μ_c is the scattering angle in the center of mass system

$$\mu_c = 1 - \frac{(A+1)^2}{2A}(1 - e^{-U})$$

/A is the mass of the nucleus/

$\sigma_s^c(\mu_c, u)$ is the differential scattering cross-section

$P_i(\mu_0)$ is the i-th Legendre polynomial

μ_0 is the scattering angle in the laboratory system

$$\mu_0 = \frac{A+1}{2} e^{-U/2} - \frac{A-1}{2} e^{U/2}$$

$$\lambda_i(u) = -G_i^2(u)/G_i^1(u)$$

Formulas (1) and (2) are evaluated by numerical integration. In our data files $\sigma_s^c(\mu_c, u)$ are given as a tabelled function, and thus the formula /3/ is also evaluated by numerical integration.

In the case of isotropic scattering in the center of mass system the integration of /2/ and /3/ can be carried out analy-

tically as

$$\mu = \frac{2}{3A}$$

$$\xi = \frac{(A+1)^2}{4A}\left[1-\left(\frac{A-1}{A+1}\right)^2(1+q)\right]$$

$$\eta = \frac{(A+1)^2}{4A}\left[\frac{(A+1)}{3}(2/3-(2/3+q)e^{-3/2q})-(A-1)(2-(2+q)e^{-q/2})\right]$$

$$Z = -\frac{(A+1)^2}{4A}\frac{1}{2\eta}\left[\frac{A+1}{3}(8/9-(8/9+4/3q+q^2)e^{-3/2q}\right.$$

$$\left.-(A-1)(8-(8+4q+q^2)e^{-q/2}\right]$$

$$\Gamma_j = -\frac{(A+1)^2}{4A}\frac{1}{2\xi}(2-(2+2q+q^2)e^{-q})$$

$$q = \log\left(\frac{A+1}{A-1}\right)^2$$

Another feature of this MUFT-type library is the lack of cross-sections for heavy elements in their resonance region. /In our library they are included but not used/ These quantities can be obtained either by direct calculation [6] making use of the resonance parameters or by means of the total resonance integrals and resonance distribution functions which are contained in the library. In the first case the temperature and the heterogeneous effects of resonance cross-sections can be taken into account.

The transition between lethargy groups by inelastic scattering is described by a matrix $\|a_{pq}\|$. a_{pq} is the portion of neutrons scattered inelastically in group q which scatter

into group p, i.e $\sigma_i a_{pq}$ is the inelastic transfer cross--section. In the original MUFT library [3] this matrix is taken to be independent of nucleus type; in our library it can be calculated optionally for each nucleus by taking into account its inelastic excitation level structure as described in [4] .

3. The structure of MUFT-type library used by the program GRACE

The library is written in the ICL standard FORTRAN system. It contains records of different length.

RECORD TYPE	I/O LIST	CONTENT
1	XX	The characters: GRACE
2	(E(J) ,U(J) ,J=2,NG)	The lower energy and lethargy boundary of the groups
3	(AKH(J) ,J=1,NG-1)	The fission spectrum
4	IX	Number of elements in ν library
5	KE(N) ,NI, (JX(J) ,ENU(J) , AN(J) ,J=1,NI)	The name of the N-th fissionable element; the number of ν groups; the lowest group in the J-th ν group; the value of ν ; the value of $\frac{d\nu}{dE}$
6	IU	Number of elements in resonance absorption library
7	AKF,RSP, IPS	Name of the resonance element; the infinite dilute resonance integral; number of resonance distribution functions

RECORD TYPE	I/O LIST	CONTENT
8	(PSI(I), I=1,4o)	resonance distribution functions
9	IUF	Number of elements in resonance fission library.

Records of type 7 and 8 follow, giving the corresponding quantities for resonance fission.

1o	IN	Dimension of inelastic scattering matrix.
11	((AIN(I,J), I=1,IN), J=1,IN)	The inelastic scattering matrix
12	NGRUL, NTOT	Number of Greuling-Goertzel elements, Number of elements in the cross-section library.
13	KE(N), A(N)	Name of the N-th element; mass of the nucleus
14	(SA(J),SF(J),SI(J),SS(J), EM(J),TET(J), J=1,4o)	σ_a^j, σ_f^j, σ_i^j, σ_s^j $\mu\sigma_s^j$, $\xi\sigma_s^j$
15	(TETS(J),GAM(J),PSI(J), ZX(J), J=1,4o)	$\xi^*\sigma_s^j$ Γ_j, n_j, Z_j /this record exist if A<28.o /

There are IX records of type 5, IU records of types 7 and 8, IUF records of types 7 and 8, NTOT records of types 13 and 14, and NGRUL records of type 15.

4. Description of the program ZEBRA

As it has been mentioned, ZEBRA is based on the DF1 magnetic tape data file produced by the first stage of PRODGROUP [4]. This tape contains 12 data types for non-fissionable and 15 data types for fissionable elements. ZEBRA uses only the following

data types: elastic scattering /3./, total inelastic scattering /4./, non-elastic scattering /9./, inelastic scattering for discrete excitation levels /11./, secondary angular distribution for elastic scattering cross-section /12./ fission cross-section /13/, average number of secondary neutrons per fidsion /14./, fission spectrum /15./

From the technical point of view, it is advisable to reel the magnetic tapes only in one direction. Therefore beside the DF1 and GRACE library tape an additional tape is used in order to facilitate rearrangment of the calculated group constants.

Some subroutines are taken over from the program PRODGROUP; these are FORELEM, DIV,SINT,IRG. The other subroutines and their tasks are:

INEL - which calculates the inelastic transfer matrix

MEGAD - which reads the evaluated data from DF1 and calculates the group-averaged cross-sections for a given data type

CROSINT - which calculates the average cross-section for a given evaluated data set

FLUX(E) - which calculates the flux at energy E

GAMFUN - which calculates the quantities G_i^n

ANGUL - which calculates the quantities $\mu\sigma_s$, $\xi\sigma_s$, $\eta\sigma_s$, Γ, Z. from the secondary angular distribution of elastically scattered neutrons,

INTER - which interpolates the lethargy-dependent cross-sections.

The input scheme of ZEBRA is the following.

CARD	FORMAT	I/O LIST	Description
1	2I0	NG,IN	Number of groups; dimension of the inelastic scattering matrix
2	10F0.0	UG I ,I=1,NG	group boundaries
3	5I0	MSZ	logical number of magnetic tape for the library to be prepared
		NH	The serial number of the elements on DF1, which gives the fission spectrum
		IX	Number of elements in ν library
		IEL	if IEL=0 then one inelastic scattering matrix is given for all elements /original option/
		NE	Number of elements in the library
4	3F0.0	TEMP	Thermal cut-off energy /0.625/in eV
		T1	Fission spectrum cut-off energy /o.5/ in MeV
		T2	Material temperature /generally 0.0253/ in eV
5	2I0,2F0.0	ND(I)	serial number of data groups of I-th element on DF1
		IH(I)	=0 no inelastic matrix should be calculated; $\neq 0$ otherwise
		ETK(I)	energy in eV, above which the anisotropy of inelastic scattering should be taken into account
		AT(I)	atomic mass number

The last card is repeated for each element. The order of elements should be the same as that on DF1.

5. A program for library compilation

Often we have some library tapes containing forty group constants for different elements, and we need these elements on one library tape. A special program - GRACECOPY - has been developed in order to compile library tapes together. Its input scheme is the following.

CARD	FORMAT	I/O LIST	Description
1	10I0	ME	Logical number of the new library tape
		NH	Logical number of that library tape which gives the group boundaries for the new library
		NHE1	Logical number of that library tape which gives the fission spectrum for the new library. If NHE1 $<$ 0 there is no fission spectrum in the other library
		IX	Number of elements in the ν library
		IU	Number of elements in the absorption resonance library
		IUF	Number of elements in the fission resonance library
		INE	Logical number of library tape which gives the inelastic matrix for the new library
		NGRUL	Number of Greuling-Goertzel elements
		NTOT	Total number of elements in the library
2	A8,2X,A8,I0	AF (I)	Name of the element in the old library
		AU (I)	Name of the element in the new library
		NF (I)	Logical number of library tape which gives this element for the new library

The second card is repeated

for each element in the ν library

for each element in the cross-section library

for each element in the resonance absorption library

for each element in the resonance fission library

As it is seen, this program makes us able to rename the elements.

6. Test of the new library by comparison of reactor calculations and experiments

In order to test our library some results of NORA project experiments [7] have been reproduced by calculation. /Table 1./ It can be seen that the bucklings obtained by means of the new library, in most of cases, are nearer to the experimental values.

Another test has been possible by making use of the results of experiments on ZR-2 critical assembly [8] /Table 2/. The discrepancies are not larger than those in any usual similar cases [9] .

References

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Table 1.

Comparison with NORA experiments.

Case No.	B_m^2 /m^{-2}/			ρ^{28}			δ^{25}		
	exp.	calculated in [7]	calculated by us	exp.	calculated in [7]	calculated by us	exp.	calculated in [7]	calculated by us
1	12.43± 1.2	11.05	11.5	0.374	0.315	0.367			0.0176
2	17.74± 0.26	17.16	18.1		0.709	0.812			0.0384
3	20.1± 0.2	19.38	20.5	1.292	1.250	1.44			0.0673
4	19.93± 0.24	17.76	17.5	2.205	2.32	2.79			0.126
5	16.87± 0.55	15.54	13.6	2.893	3.00	3.70			0.164
8	33.21± 0.47	27.9	31.9	1.035	1.058	1.20	0.069	0.063	0.057
9	36.65± 0.41	30.89	34.2	1.308	1.438	1.66	0.100	0.086	0.076
10	33.93± 0.4	30.03	29.6	1.992	2.230	2.71	0.153	0.134	0.183
14	49.98± 0.43	42.11	47.5	1.218	1.330	1.52	0.080	0.079	0.0698
15	51.89± 0.7	44.00	45.4	1.77	1.880	2.25	0.105	0.113	0.100

Table 2.

ZR-2 critical experiments.

Lattice pitch /mm/	H/U	$1/k_{eff}$
15	192	1.0123
17	283	1.0038
19	386	1.00037
23	653	0.99297
25	763	0.98948

* * * * #RP06 USED ON 17/06/79 AT 29/57/56

GRACE LIBRARY

GROUP	EH	DU	FISSION SPECTRUM
1	1.00E 07	3.30E-01	1.001E-02
2	7.19E 06	6.60E-01	3.883E-02
3	5.17E 06	9.90E-01	8.424E-02
4	3.72E 06	1.32E 00	1.429E-01
5	2.67E 06	1.65E 00	1.420E-01
6	1.92E 06	1.98E 00	1.602E-01
7	1.38E 06	2.31E 00	1.154E-01
8	9.93E 05	2.50E 00	5.679E-02
9	8.21E 05	2.97E 00	1.229E-01
10	5.13E 05	3.30E 00	4.674E-02
11	3.69E 05	3.63E 00	2.882E-02
12	2.65E 05	3.96E 00	1.946E-02
13	1.91E 05	4.29E 00	1.134E-02
14	1.37E 05	5.19E 00	1.330E-02
15	5.57E 04	6.09E 00	4.577E-03
16	2.26E 04	6.99E 00	1.123E-03
17	9.21E 03	7.50E 00	2.273E-04
18	5.53E 03	8.79E 00	1.803E-04
19	1.52E 03	9.69E 00	2.282E-05
20	6.19E 02	1.06E 01	5.905E-06
21	2.52E 02	1.09E 01	7.187E-07
22	1.90E 02	1.12E 01	5.453E-07
23	1.35E 02	1.14E 01	2.127E-07
24	1.10E 02	1.17E 01	1.798E-07
25	8.20E 01	1.20E 01	1.263E-07
26	6.30E 01	1.23E 01	1.037E-07
27	4.50E 01	1.27E 01	6.332E-08
28	3.20E 01	1.29E 01	2.518E-08
29	2.60E 01	1.31E 01	2.258E-08
30	2.00E 01	1.34E 01	1.645E-08
31	1.50E 01	1.37E 01	1.132E-08
32	1.10E 01	1.40E 01	7.267E-09
33	8.00E 00	1.44E 01	5.293E-09
34	5.40E 00	1.50E 01	3.658E-09
35	3.15E 00	1.55E 01	1.616E-09
36	1.84E 00	1.58E 01	3.987E-10
37	1.40E 00	1.66E 01	6.110E-10
38	6.25E-01	1.70E 01	1.268E-10
39	4.00E-01	1.77E 01	8.597E-11
40	2.00E-01	0.00E-01	0.000E-01

U-235

GROUP	NU	DNU/DE
1	3.650	0.134E-06
2	3.272	0.145E-06
3	2.979	0.147E-06
4	2.766	0.933E-07
5	2.668	0.878E-07
6	2.602	0.890E-07
7	2.554	0.735E-07
8	2.526	0.153E-06
9	2.499	0.749E-07
10	2.476	0.909E-07
11	2.463	0.904E-07
12	2.454	0.899E-07
13	2.447	0.143E-06
14	2.440	0.699E-07
15	2.434	0.702E-07
16	2.432	0.610E-07
17	2.431	0.118E-06
18	2.430	0.558E-07
19	2.430	0.935E-07
20	2.430	0.646E-07
21	2.430	-.189E-11
22	2.430	0.159E-11
23	2.430	-.474E-01
24	3.614	0.423E-01
25	2.430	-.460E-11
26	2.430	0.647E-11
27	2.430	-.896E-11
28	2.430	0.146E-10
29	2.430	-.970E-11
30	2.430	0.291E-10
31	2.430	-.655E-10
32	2.430	0.970E-10
33	2.430	-.784E-10
34	2.430	0.129E-10
35	2.430	0.444E-10
36	2.430	0.661E-10
37	2.430	0.000E 00
38	2.430	-.129E-09
39	2.430	0.000E 00
40	2.430	0.000E 00

U-238

GROUP	NU	DNU/DE
1	3.612	0.120E-06
2	3.275	0.123E-06
3	3.025	0.126E-06
4	2.842	0.128E-06
5	2.708	0.129E-06
6	2.611	0.131E-06
7	2.540	0.108E-06
8	2.498	0.225E-06
9	2.460	0.110E-06
10	2.426	0.133E-06
11	2.407	0.133E-06
12	2.393	0.133E-06
13	2.383	0.209E-06
14	2.372	0.103E-06
15	2.363	0.103E-06
16	2.360	0.900E-07
17	2.359	-.320E-03
18	3.537	0.294E-03
19	2.358	0.103E-06
20	2.358	0.791E-07
21	2.358	0.154E-06
22	2.358	0.889E-07
23	2.358	0.242E-06
24	2.358	0.141E-06
25	2.358	-.306E-11
26	2.358	0.424E-07
27	2.358	0.660E-06
28	2.358	0.108E-06
29	2.358	0.000E 00
30	2.358	0.000E 00
31	2.358	0.000E 00
32	2.358	0.000E 00
33	2.358	-.112E-10
34	2.358	0.129E-10
35	2.358	0.000E 00
36	2.358	0.000E 00
37	2.358	0.000E 00
38	2.358	0.000E 00
39	2.358	-.146E-09
40	2.358	0.000E 00

PU-239

GROUP	NU	DNU/DE
1	4.065	0.119E-06
2	3.729	0.123E-06
3	3.482	0.121E-06
4	3.305	0.112E-06
5	3.188	0.111E-06
6	3.105	0.111E-06
7	3.045	0.915E-07
8	3.009	0.189E-06
9	2.977	0.918E-07
10	2.948	0.111E-06
11	2.932	0.110E-06
12	2.921	0.109E-06
13	2.913	0.173E-06
14	2.904	0.848E-07
15	2.897	0.845E-07
16	2.894	0.726E-07
17	2.893	0.146E-06
18	2.892	0.804E-07
19	2.892	0.841E-07
20	2.892	-.792E-13
21	2.892	0.000E 00
22	2.892	0.159E-11
23	2.892	-.233E-11
24	2.892	0.000E 00
25	2.892	-.306E-11
26	2.892	-.970E-11
27	2.892	0.157E-10
28	2.892	-.970E-11
29	2.892	0.243E-10
30	2.892	0.582E-11
31	2.892	-.364E-10
32	2.892	0.291E-10
33	2.892	-.112E-10
34	2.892	0.000E 00
35	2.892	0.000E 00
36	2.892	0.661E-10
37	2.892	0.000E 00
38	2.892	-.517E-09
39	2.892	0.291E-09
40	2.892	0.000E 00

PU-240

GROUP	NU	DNU/DE
1	3.812	0.776E-07
2	3.594	0.798E-07
3	3.432	0.817E-07
4	3.314	0.827E-07
5	3.227	0.838E-07
6	3.164	0.848E-07
7	3.118	0.700E-07
8	3.091	0.146E-06
9	3.066	0.714E-07
10	3.044	0.868E-07
11	3.032	0.860E-07
12	3.023	0.862E-07
13	3.016	0.136E-06
14	3.009	0.667E-07
15	3.004	0.667E-07
16	3.002	0.578E-07
17	3.001	0.114E-06
18	3.000	0.526E-07
19	3.000	0.408E-07
20	3.000	0.165E-07
21	3.000	0.519E-07
22	3.000	0.511E-07
23	3.000	0.102E-06
24	3.000	0.102E-06
25	3.000	0.162E-06
26	3.000	0.193E-06
27	3.000	0.217E-06
28	3.000	0.403E-06
29	3.000	0.471E-06
30	3.000	0.615E-06
31	3.000	0.808E-06
32	3.000	0.122E-05
33	3.000	0.184E-05
34	3.000	0.246E-05
35	3.000	0.318E-05
36	3.000	0.121E-04
37	3.000	0.320E-05
38	3.000	-.129E-09
39	3.000	0.000E 00
40	3.000	0.000E 00

PU-241		
GROUP	NU	DNU/DE
1	4.073	0.111E-06
2	3.762	0.115E-06
3	3.529	0.118E-06
4	3.358	0.120E-06
5	3.233	0.121E-06
6	3.142	0.123E-06
7	3.076	0.101E-06
8	3.037	0.211E-06
9	3.001	0.103E-06
10	2.969	0.125E-06
11	2.951	0.124E-06
12	2.938	0.124E-06
13	2.929	0.196E-06
14	2.918	0.964E-07
15	2.910	0.963E-07
16	2.907	0.840E-07
17	2.906	0.163E-06
18	2.905	0.759E-07
19	2.905	0.987E-07
20	2.905	0.766E-07
21	2.905	0.139E-06
22	2.905	0.143E-06
23	2.905	0.210E-06
24	2.905	0.159E-07
25	2.905	0.462E-06
26	2.905	0.683E-07
27	2.905	0.000E 00
28	2.905	0.000E 00
29	2.905	0.000E 00
30	2.905	0.000E 00
31	2.905	0.000E 00
32	2.905	0.000E 00
33	2.905	0.000E 00
34	2.905	0.000E 00
35	2.905	0.000E 00
36	2.905	0.661E-10
37	2.905	0.000E 00
38	2.905	- 517E-09
39	2.905	0.582E-09
40	2.905	0.000E 00

PU-242		
GROUP	NU	DNU/DE
1	3.812	0.775E-07
2	3.594	0.800E-07
3	3.432	0.817E-07
4	3.314	0.827E-07
5	3.227	0.838E-07
6	3.164	0.848E-07
7	3.118	0.700E-07
8	3.091	0.146E-06
9	3.066	0.714E-07
10	3.044	0.868E-07
11	3.032	0.861E-07
12	3.023	0.861E-07
13	3.016	0.136E-06
14	3.009	0.667E-07
15	3.004	0.667E-07
16	3.002	0.581E-07
17	3.001	0.112E-06
18	3.000	0.534E-07
19	3.000	0.619E-07
20	3.000	0.252E-07
21	3.000	0.400E-07
22	3.000	0.394E-07
23	3.000	0.790E-07
24	3.000	0.788E-07
25	3.000	0.125E-06
26	3.000	0.149E-06
27	3.000	0.167E-06
28	3.000	0.310E-06
29	3.000	0.363E-06
30	3.000	0.474E-06
31	3.000	0.622E-06
32	3.000	0.939E-06
33	3.000	0.142E-05
34	3.000	0.159E-05
35	3.000	0.300E-06
36	3.000	-.661E-10
37	3.000	0.000E 00
38	3.000	0.000E 00
39	3.000	0.000E 00
40	3.000	0.000E 00

INELASTIC SCATTERING MATRIX

1	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01
	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	
2	1.852E-03	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	
	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01		
3	1.391E-02	5.631E-03	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	
	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01			
4	5.109E-02	2.880E-02	1.394E-02	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01	
	0.000E-01	0.000E-01	0.000E-01	0.000E-01	0.000E-01				
5	1.103E-01	7.946E-02	5.113E-02	2.887E-02	0.000E-01	0.000E-01	0.000E-01	0.000E-01	
	0.000E-01	0.000E-01	0.000E-01	0.000E-01					
6	1.609E-01	1.387E-01	1.101E-01	7.942E-02	2.030E-02	0.000E-01	0.000E-01	0.000E-01	
	0.000E-01	0.000E-01	0.000E-01						
7	1.770E-01	1.741E-01	1.613E-01	1.393E-01	9.760E-02	7.048E-02	0.000E-01	0.000E-01	
	0.000E-01	0.000E-01							
8	9.466E-02	1.008E-01	1.025E-01	9.858E-02	8.027E-02	7.940E-02	1.328E-01	0.000E-01	
	0.000E-01								
9	1.836E-01	2.100E-01	2.321E-01	2.468E-01	1.092E-01	3.511E-01	9.412E-02	4.050E-01	
10	8.282E-02	1.011E-01	1.207E-01	1.404E-01	9.588E-02	2.209E-01	1.267E-01		
11	5.248E-02	6.646E-02	8.280E-02	1.013E-01	4.341E-02	1.414E-01			
12	3.147E-02	4.092E-02	5.258E-02	6.669E-02	3.597E-02				
13	1.807E-02	2.394E-02	3.146E-02	4.097E-02					
14	1.789E-02	2.415E-02	3.245E-02						
15	3.267E-03	4.490E-03							
16	0.000E-01								

MATERIAL H-1 ATOMIC MASS 1.000

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	0.000E-01	0.000E-01	0.000E-01	1.146E 00	7.642E-01	1.146E 00
2	7.19E 06	0.000E-01	0.000E-01	0.000E-01	1.501E 00	1.001E 00	1.501E 00
3	5.17E 06	0.000E-01	0.000E-01	0.000E-01	1.842E 00	1.228E 00	1.842E 00
4	3.72E 06	0.000E-01	0.000E-01	0.000E-01	2.249E 00	1.499E 00	2.249E 00
5	2.67E 06	0.000E-01	0.000E-01	0.000E-01	2.720E 00	1.813E 00	2.720E 00
6	1.92E 06	0.000E-01	0.000E-01	0.000E-01	3.265E 00	2.176E 00	3.265E 00
7	1.38E 06	0.000E-01	0.000E-01	0.000E-01	3.896E 00	2.598E 00	3.896E 00
8	9.93E 05	0.000E-01	0.000E-01	0.000E-01	4.472E 00	2.982E 00	4.472E 00
9	8.21E 05	0.000E-01	0.000E-01	0.000E-01	5.335E 00	3.556E 00	5.335E 00
10	5.13E 05	0.000E-01	0.000E-01	0.000E-01	6.567E 00	4.378E 00	6.567E 00
11	3.69E 05	0.000E-01	0.000E-01	0.000E-01	7.780E 00	5.187E 00	7.780E 00
12	2.65E 05	0.000E-01	0.000E-01	0.000E-01	9.107E 00	6.072E 00	9.107E 00
13	1.91E 05	0.000E-01	0.000E-01	0.000E-01	1.055E 01	7.032E 00	1.055E 01
14	1.37E 05	0.000E-01	0.000E-01	0.000E-01	1.324E 01	8.827E 00	1.324E 01
15	5.57E 04	0.000E-01	0.000E-01	0.000E-01	1.652E 01	1.101E 01	1.652E 01
16	2.26E 04	2.784E-04	0.000E-01	0.000E-01	1.855E 01	1.236E 01	1.855E 01
17	9.21E 03	1.000E-03	0.000E-01	0.000E-01	1.919E 01	1.280E 01	1.919E 01
18	5.53E 03	1.162E-03	0.000E-01	0.000E-01	1.951E 01	1.301E 01	1.951E 01
19	1.52E 03	1.911E-03	0.000E-01	0.000E-01	1.981E 01	1.320E 01	1.981E 01
20	6.19E 02	2.510E-03	0.000E-01	0.000E-01	2.000E 01	1.333E 01	2.000E 01
21	2.52E 02	3.576E-03	0.000E-01	0.000E-01	2.012E 01	1.341E 01	2.012E 01
22	1.90E 02	4.143E-03	0.000E-01	0.000E-01	2.018E 01	1.346E 01	2.018E 01
23	1.35E 02	4.640E-03	0.000E-01	0.000E-01	2.024E 01	1.349E 01	2.024E 01
24	1.10E 02	5.160E-03	0.000E-01	0.000E-01	2.029E 01	1.353E 01	2.029E 01
25	8.20E 01	5.929E-03	0.000E-01	0.000E-01	2.033E 01	1.356E 01	2.033E 01
26	6.30E 01	6.861E-03	0.000E-01	0.000E-01	2.038E 01	1.359E 01	2.038E 01
27	4.50E 01	8.620E-03	0.000E-01	0.000E-01	2.044E 01	1.363E 01	2.044E 01
28	3.20E 01	1.026E-02	0.000E-01	0.000E-01	2.048E 01	1.365E 01	2.048E 01
29	2.60E 01	1.175E-02	0.000E-01	0.000E-01	2.052E 01	1.368E 01	2.052E 01
30	2.00E 01	1.350E-02	0.000E-01	0.000E-01	2.056E 01	1.371E 01	2.056E 01
31	1.50E 01	1.540E-02	0.000E-01	0.000E-01	2.061E 01	1.374E 01	2.061E 01
32	1.10E 01	1.757E-02	0.000E-01	0.000E-01	2.066E 01	1.377E 01	2.066E 01
33	8.00E 00	2.083E-02	0.000E-01	0.000E-01	2.072E 01	1.381E 01	2.072E 01
34	5.40E 00	2.626E-02	0.000E-01	0.000E-01	2.079E 01	1.386E 01	2.079E 01
35	3.15E 00	3.442E-02	0.000E-01	0.000E-01	2.087E 01	1.391E 01	2.087E 01
36	1.84E 00	4.253E-02	0.000E-01	0.000E-01	2.093E 01	1.395E 01	2.093E 01
37	1.40E 00	5.460E-02	0.000E-01	0.000E-01	2.119E 01	1.412E 01	2.119E 01
38	6.25E-01	8.303E-02	0.000E-01	0.000E-01	2.226E 01	1.484E 01	2.226E 01
39	4.00E-01	1.137E-01	0.000E-01	0.000E-01	2.353E 01	1.568E 01	2.353E 01
40	2.00E-01	2.927E-01	0.000E-01	0.000E-01	3.351E 01	2.234E 01	3.351E 01

MATERIAL H-1 ATOMIC MASS 1.000

GROUP	EH	KSI*SIGS*	GAMMA	H	Z
1	1.00E 07	1.146E 00	1.000E 00	5.095E-01	6.667E-01
2	7.19E 06	1.501E 00	1.000E 00	6.671E-01	6.667E-01
3	5.17E 06	1.842E 00	1.000E 00	8.185E-01	6.667E-01
4	3.72E 06	2.249E 00	1.000E 00	9.994E-01	6.667E-01
5	2.67E 06	2.720E 00	1.000E 00	1.209E 00	6.667E-01
6	1.92E 06	3.265E 00	1.000E 00	1.451E 00	6.667E-01
7	1.38E 06	3.896E 00	1.000E 00	1.732E 00	6.667E-01
8	9.93E 05	4.472E 00	1.000E 00	1.988E 00	6.667E-01
9	8.21E 05	5.335E 00	1.000E 00	2.371E 00	6.667E-01
10	5.13E 05	6.567E 00	1.000E 00	2.919E 00	6.667E-01
11	3.69E 05	7.780E 00	1.000E 00	3.458E 00	6.667E-01
12	2.65E 05	9.107E 00	1.000E 00	4.048E 00	6.667E-01
13	1.91E 05	1.055E 01	1.000E 00	4.688E 00	6.667E-01
14	1.37E 05	1.324E 01	1.000E 00	5.885E 00	6.667E-01
15	5.57E 04	1.652E 01	1.000E 00	7.340E 00	6.667E-01
16	2.26E 04	1.855E 01	1.000E 00	8.242E 00	6.667E-01
17	9.21E 03	1.919E 01	1.000E 00	8.531E 00	6.667E-01
18	5.53E 03	1.951E 01	1.000E 00	8.673E 00	6.667E-01
19	1.52E 03	1.981E 01	1.000E 00	8.803E 00	6.667E-01
20	6.19E 02	2.000E 01	1.000E 00	8.888E 00	6.667E-01
21	2.52E 02	2.012E 01	1.000E 00	8.941E 00	6.667E-01
22	1.90E 02	2.018E 01	1.000E 00	8.970E 00	6.667E-01
23	1.35E 02	2.024E 01	1.000E 00	8.995E 00	6.667E-01
24	1.10E 02	2.029E 01	1.000E 00	9.017E 00	6.667E-01
25	8.20E 01	2.033E 01	1.000E 00	9.037E 00	6.667E-01
26	6.30E 01	2.038E 01	1.000E 00	9.059E 00	6.667E-01
27	4.50E 01	2.044E 01	1.000E 00	9.083E 00	6.667E-01
28	3.20E 01	2.048E 01	1.000E 00	9.103E 00	6.667E-01
29	2.60E 01	2.052E 01	1.000E 00	9.120E 00	6.667E-01
30	2.00E 01	2.056E 01	1.000E 00	9.139E 00	6.667E-01
31	1.50E 01	2.061E 01	1.000E 00	9.160E 00	6.667E-01
32	1.10E 01	2.066E 01	1.000E 00	9.182E 00	6.667E-01
33	8.00E 00	2.072E 01	1.000E 00	9.207E 00	6.667E-01
34	5.40E 00	2.079E 01	1.000E 00	9.238E 00	6.667E-01
35	3.15E 00	2.087E 01	1.000E 00	9.274E 00	6.667E-01
36	1.84E 00	2.093E 01	1.000E 00	9.302E 00	6.667E-01
37	1.40E 00	2.119E 01	1.000E 00	9.416E 00	6.667E-01
38	6.25E-01	2.226E 01	1.000E 00	9.892E 00	6.667E-01
39	4.00E-01	2.353E 01	1.000E 00	1.046E 01	6.667E-01
40	2.00E-01	3.351E 01	1.000E 00	1.489E 01	6.667E-01

MATERIAL H2OB ATOMIC MASS 1.000

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	0.000E-01	0.000E-01	0.000E-01	1.146E 00	7.642E-01	1.146E 00
2	7.19E 06	0.000E-01	0.000E-01	0.000E-01	1.501E 00	1.001E 00	1.501E 00
3	5.17E 06	0.000E-01	0.000E-01	0.000E-01	1.842E 00	1.228E 00	1.842E 00
4	3.72E 06	0.000E-01	0.000E-01	0.000E-01	2.249E 00	1.499E 00	2.249E 00
5	2.67E 06	0.000E-01	0.000E-01	0.000E-01	2.720E 00	1.813E 00	2.720E 00
6	1.92E 06	0.000E-01	0.000E-01	0.000E-01	3.265E 00	2.176E 00	3.265E 00
7	1.38E 06	0.000E-01	0.000E-01	0.000E-01	3.896E 00	2.598E 00	3.896E 00
8	9.93E 05	0.000E-01	0.000E-01	0.000E-01	4.472E 00	2.982E 00	4.472E 00
9	8.21E 05	0.000E-01	0.000E-01	0.000E-01	5.335E 00	3.556E 00	5.335E 00
10	5.13E 05	0.000E-01	0.000E-01	0.000E-01	6.567E 00	4.378E 00	6.567E 00
11	3.69E 05	0.000E-01	0.000E-01	0.000E-01	7.780E 00	5.187E 00	7.780E 00
12	2.65E 05	0.000E-01	0.000E-01	0.000E-01	9.107E 00	6.072E 00	9.107E 00
13	1.91E 05	0.000E-01	0.000E-01	0.000E-01	1.055E 01	7.032E 00	1.055E 01
14	1.37E 05	0.000E-01	0.000E-01	0.000E-01	1.324E 01	8.827E 00	1.324E 01
15	5.57E 04	0.000E-01	0.000E-01	0.000E-01	1.652E 01	1.101E 01	1.652E 01
16	2.26E 04	2.784E-04	0.000E-01	0.000E-01	1.855E 01	1.236E 01	1.855E 01
17	9.21E 03	1.000E-03	0.000E-01	0.000E-01	1.919E 01	1.280E 01	1.919E 01
18	5.53E 03	1.162E-03	0.000E-01	0.000E-01	1.951E 01	1.301E 01	1.951E 01
19	1.52E 03	1.911E-03	0.000E-01	0.000E-01	1.981E 01	1.320E 01	1.981E 01
20	6.19E 02	2.510E-03	0.000E-01	0.000E-01	2.000E 01	1.333E 01	2.000E 01
21	2.52E 02	3.576E-03	0.000E-01	0.000E-01	2.012E 01	1.341E 01	2.012E 01
22	1.90E 02	4.143E-03	0.000E-01	0.000E-01	2.018E 01	1.346E 01	2.018E 01
23	1.35E 02	4.640E-03	0.000E-01	0.000E-01	2.024E 01	1.349E 01	2.024E 01
24	1.10E 02	5.160E-03	0.000E-01	0.000E-01	2.029E 01	1.353E 01	2.029E 01
25	8.20E 01	5.929E-03	0.000E-01	0.000E-01	2.033E 01	1.356E 01	2.033E 01
26	6.30E 01	6.861E-03	0.000E-01	0.000E-01	2.038E 01	1.359E 01	2.038E 01
27	4.50E 01	8.620E-03	0.000E-01	0.000E-01	2.044E 01	1.363E 01	2.044E 01
28	3.20E 01	1.026E-02	0.000E-01	0.000E-01	2.048E 01	1.365E 01	2.048E 01
29	2.60E 01	1.175E-02	0.000E-01	0.000E-01	2.052E 01	1.368E 01	2.052E 01
30	2.00E 01	1.350E-02	0.000E-01	0.000E-01	2.056E 01	1.371E 01	2.056E 01
31	1.50E 01	1.540E-02	0.000E-01	0.000E-01	2.061E 01	1.374E 01	2.061E 01
32	1.10E 01	1.757E-02	0.000E-01	0.000E-01	2.066E 01	1.377E 01	2.066E 01
33	8.00E 00	2.083E-02	0.000E-01	0.000E-01	2.072E 01	1.381E 01	2.072E 01
34	5.40E 00	2.626E-02	0.000E-01	0.000E-01	2.079E 01	1.386E 01	2.079E 01
35	3.15E 00	3.442E-02	0.000E-01	0.000E-01	2.087E 01	1.391E 01	2.087E 01
36	1.84E 00	4.253E-02	0.000E-01	0.000E-01	2.093E 01	1.395E 01	2.093E 01
37	1.40E 00	5.460E-02	0.000E-01	0.000E-01	2.119E 01	1.412E 01	2.119E 01
38	6.25E-01	8.303E-02	0.000E-01	0.000E-01	2.301E 01	1.534E 01	2.301E 01
39	4.00E-01	1.137E-01	0.000E-01	0.000E-01	2.697E 01	1.798E 01	2.697E 01
40	2.00E-01	2.927E-01	0.000E-01	0.000E-01	4.524E 01	3.016E 01	4.524E 01

MATERIAL H2OB ATOMIC MASS 1.000

GROUP	EH	KSI*SIGS*	GAMMA	H	7
1	1.00E 07	1.146E 00	1.000E 00	5.095E-01	6.667E-01
2	7.19E 06	1.501E 00	1.000E 00	6.671E-01	6.667E-01
3	5.17E 06	1.842E 00	1.000E 00	8.185E-01	6.667E-01
4	3.72E 06	2.249E 00	1.000E 00	9.994E-01	6.667E-01
5	2.67E 06	2.720E 00	1.000E 00	1.209E 00	6.667E-01
6	1.92E 06	3.265E 00	1.000E 00	1.451E 00	6.667E-01
7	1.38E 06	3.896E 00	1.000E 00	1.732E 00	6.667E-01
8	9.93E 05	4.472E 00	1.000E 00	1.988E 00	6.667E-01
9	8.21E 05	5.335E 00	1.000E 00	2.371E 00	6.667E-01
10	5.13E 05	6.567E 00	1.000E 00	2.919E 00	6.667E-01
11	3.69E 05	7.780E 00	1.000E 00	3.458E 00	6.667E-01
12	2.65E 05	9.107E 00	1.000E 00	4.048E 00	6.667E-01
13	1.91E 05	1.055E 01	1.000E 00	4.688E 00	6.667E-01
14	1.37E 05	1.324E 01	1.000E 00	5.885E 00	6.667E-01
15	5.57E 04	1.652E 01	1.000E 00	7.340E 00	6.667E-01
16	2.26E 04	1.855E 01	1.000E 00	8.242E 00	6.667E-01
17	9.21E 03	1.919E 01	1.000E 00	8.531E 00	6.667E-01
18	5.53E 03	1.951E 01	1.000E 00	8.673E 00	6.667E-01
19	1.52E 03	1.981E 01	1.000E 00	8.803E 00	6.667E-01
20	6.19E 02	2.000E 01	1.000E 00	8.888E 00	6.667E-01
21	2.52E 02	2.012E 01	1.000E 00	8.941E 00	6.667E-01
22	1.90E 02	2.018E 01	1.000E 00	8.970E 00	6.667E-01
23	1.35E 02	2.024E 01	1.000E 00	8.995E 00	6.667E-01
24	1.10E 02	2.029E 01	1.000E 00	9.017E 00	6.667E-01
25	8.20E 01	2.033E 01	1.000E 00	9.037E 00	6.667E-01
26	6.30E 01	2.038E 01	1.000E 00	9.059E 00	6.667E-01
27	4.50E 01	2.044E 01	1.000E 00	9.083E 00	6.667E-01
28	3.20E 01	2.048E 01	1.000E 00	9.103E 00	6.667E-01
29	2.60E 01	2.052E 01	1.000E 00	9.120E 00	6.667E-01
30	2.00E 01	2.056E 01	1.000E 00	9.139E 00	6.667E-01
31	1.50E 01	2.061E 01	1.000E 00	9.160E 00	6.667E-01
32	1.10E 01	2.066E 01	1.000E 00	9.182E 00	6.667E-01
33	8.00E 00	2.072E 01	1.000E 00	9.207E 00	6.667E-01
34	5.40E 00	2.079E 01	1.000E 00	9.238E 00	6.667E-01
35	3.15E 00	2.087E 01	1.000E 00	9.274E 00	6.667E-01
36	1.84E 00	2.093E 01	1.000E 00	9.302E 00	6.667E-01
37	1.40E 00	2.119E 01	1.000E 00	9.416E 00	6.667E-01
38	6.25E-01	2.301E 01	1.000E 00	1.023E 01	6.667E-01
39	4.00E-01	2.697E 01	1.000E 00	1.199E 01	6.667E-01
40	2.00E-01	4.524E 01	1.000E 00	2.010E 01	6.667E-01

MATERIAL H-2 ATOMIC MASS 2.015

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	1.262E-01	0.000E-01	0.000E-01	1.125E 00	4.880E-01	6.865E-01
2	7.19E 06	8.084E-02	0.000E-01	0.000E-01	1.466E 00	6.349E-01	8.972E-01
3	5.17E 06	3.749E-02	0.000E-01	0.000E-01	1.831E 00	6.604E-01	1.266E 00
4	3.72E 06	1.270E-02	0.000E-01	0.000E-01	2.180E 00	5.814E-01	1.732E 00
5	2.67E 06	2.515E-03	0.000E-01	0.000E-01	2.489E 00	5.904E-01	2.057E 00
6	1.92E 06	0.000E-01	0.000E-01	0.000E-01	2.715E 00	6.081E-01	2.283E 00
7	1.38E 06	0.000E-01	0.000E-01	0.000E-01	2.887E 00	5.140E-01	2.573E 00
8	9.93E 05	0.000E-01	0.000E-01	0.000E-01	2.998E 00	4.160E-01	2.801E 00
9	8.21E 05	0.000E-01	0.000E-01	0.000E-01	3.110E 00	4.496E-01	2.885E 00
10	5.13E 05	0.000E-01	0.000E-01	0.000E-01	3.204E 00	6.755E-01	2.737E 00
11	3.69E 05	0.000E-01	0.000E-01	0.000E-01	3.253E 00	8.246E-01	2.626E 00
12	2.65E 05	0.000E-01	0.000E-01	0.000E-01	3.289E 00	8.470E-01	2.639E 00
13	1.91E 05	0.000E-01	0.000E-01	0.000E-01	3.331E 00	6.749E-01	2.875E 00
14	1.37E 05	0.000E-01	0.000E-01	0.000E-01	3.392E 00	9.097E-01	2.683E 00
15	5.57E 04	0.000E-01	0.000E-01	0.000E-01	3.400E 00	1.129E 00	2.450E 00
16	2.26E 04	4.766E-07	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
17	9.21E 03	1.000E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
18	5.53E 03	1.410E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
19	1.52E 03	2.884E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
20	6.19E 02	4.446E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
21	2.52E 02	5.782E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
22	1.90E 02	6.641E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
23	1.35E 02	7.430E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
24	1.10E 02	8.331E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
25	8.20E 01	9.796E-06	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
26	6.30E 01	1.089E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
27	4.50E 01	1.316E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
28	3.20E 01	1.529E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
29	2.60E 01	1.703E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
30	2.00E 01	1.945E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
31	1.50E 01	2.247E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
32	1.10E 01	2.595E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
33	8.00E 00	3.121E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
34	5.40E 00	3.978E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
35	3.15E 00	5.150E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
36	1.84E 00	6.362E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
37	1.40E 00	8.340E-05	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
38	6.25E-01	1.276E-04	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
39	4.00E-01	1.762E-04	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00
40	2.00E-01	4.364E-04	0.000E-01	0.000E-01	3.400E 00	1.125E 00	2.454E 00

MATERIAL H-2 ATOMIC MASS 2.015

GROUP	EH	KSI*SIGS*	GAMMA	H	Z
1	1.00E 07	6.865E-01	7.286E-01	-2.310E-01	1.401E 00
2	7.19E 06	8.972E-01	7.241E-01	-2.940E-01	1.395E 00
3	5.17E 06	1.266E 00	7.429E-01	-4.583E-01	1.303E 00
4	3.72E 06	1.732E 00	7.473E-01	-6.394E-01	1.235E 00
5	2.67E 06	2.057E 00	7.313E-01	-6.992E-01	1.241E 00
6	1.92E 06	2.283E 00	7.117E-01	-6.943E-01	1.252E 00
7	1.38E 06	2.573E 00	7.104E-01	-7.764E-01	1.233E 00
8	9.93E 05	2.801E 00	7.047E-01	-8.161E-01	1.230E 00
9	8.21E 05	2.885E 00	6.865E-01	-7.463E-01	1.273E 00
10	5.13E 05	2.737E 00	6.657E-01	-6.052E-01	1.380E 00
11	3.69E 05	2.626E 00	6.474E-01	-4.936E-01	1.504E 00
12	2.65E 05	2.639E 00	6.421E-01	-4.754E-01	1.561E 00
13	1.91E 05	2.875E 00	6.628E-01	-6.201E-01	1.385E 00
14	1.37E 05	2.683E 00	6.388E-01	-4.637E-01	1.578E 00
15	5.57E 04	2.450E 00	6.103E-01	-2.974E-01	1.982E 00
16	2.26E 04	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
17	9.21E 03	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
18	5.53E 03	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
19	1.52E 03	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
20	6.19E 02	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
21	2.52E 02	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
22	1.90E 02	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
23	1.35E 02	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
24	1.10E 02	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
25	8.20E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
26	6.30E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
27	4.50E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
28	3.20E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
29	2.60E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
30	2.00E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
31	1.50E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
32	1.10E 01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
33	8.00E 00	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
34	5.40E 00	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
35	3.15E 00	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
36	1.84E 00	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
37	1.40E 00	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
38	6.25E-01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
39	4.00E-01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00
40	2.00E-01	2.454E 00	5.802E-01	-1.595E-01	2.694E 00

MATERIAL C-12 ATOMIC MASS 12.004

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	4.341E-02	0.000E-01	3.559E-01	1.109E 00	4.677E-01	1.070E-01
2	7.19E 06	9.447E-04	0.000E-01	1.730E-01	9.617E-01	2.222E-01	1.235E-01
3	5.17E 06	6.525E-05	0.000E-01	4.354E-03	1.796E 00	3.955E-01	2.339E-01
4	3.72E 06	0.000E-01	0.000E-01	0.000E-01	2.083E 00	3.740E-02	3.416E-01
5	2.67E 06	0.000E-01	0.000E-01	0.000E-01	1.737E 00	1.191E-01	2.702E-01
6	1.92E 06	0.000E-01	0.000E-01	0.000E-01	2.016E 00	2.370E-01	2.971E-01
7	1.38E 06	0.000E-01	0.000E-01	0.000E-01	2.478E 00	3.250E-01	3.596E-01
8	9.93E 05	0.000E-01	0.000E-01	0.000E-01	2.798E 00	3.713E-01	4.052E-01
9	8.21E 05	0.000E-01	0.000E-01	0.000E-01	3.140E 00	3.833E-01	4.603E-01
10	5.13E 05	0.000E-01	0.000E-01	0.000E-01	3.524E 00	3.771E-01	5.254E-01
11	3.69E 05	0.000E-01	0.000E-01	0.000E-01	3.798E 00	3.530E-01	5.754E-01
12	2.65E 05	0.000E-01	0.000E-01	0.000E-01	4.023E 00	3.215E-01	6.181E-01
13	1.91E 05	0.000E-01	0.000E-01	0.000E-01	4.199E 00	3.012E-01	6.509E-01
14	1.37E 05	0.000E-01	0.000E-01	0.000E-01	4.415E 00	2.760E-01	6.912E-01
15	5.57E 04	0.000E-01	0.000E-01	0.000E-01	4.586E 00	2.217E-01	7.288E-01
16	2.26E 04	4.766E-06	0.000E-01	0.000E-01	4.658E 00	2.587E-01	7.346E-01
17	9.21E 03	1.000E-05	0.000E-01	0.000E-01	4.685E 00	2.602E-01	7.390E-01
18	5.53E 03	1.042E-05	0.000E-01	0.000E-01	4.699E 00	2.610E-01	7.412E-01
19	1.52E 03	1.859E-05	0.000E-01	0.000E-01	4.707E 00	2.614E-01	7.423E-01
20	6.19E 02	2.906E-05	0.000E-01	0.000E-01	4.709E 00	2.615E-01	7.427E-01
21	2.52E 02	3.784E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
22	1.90E 02	4.756E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
23	1.35E 02	5.512E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
24	1.10E 02	6.087E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
25	8.20E 01	7.127E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
26	6.30E 01	8.051E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
27	4.50E 01	9.417E-05	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
28	3.20E 01	1.120E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.429E-01
29	2.60E 01	1.241E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
30	2.00E 01	1.400E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
31	1.50E 01	1.653E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
32	1.10E 01	1.958E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
33	8.00E 00	2.299E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
34	5.40E 00	2.960E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
35	3.15E 00	3.814E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
36	1.84E 00	4.664E-04	0.000E-01	0.000E-01	4.710E 00	2.616E-01	7.428E-01
37	1.40E 00	6.159E-04	0.000E-01	0.000E-01	4.709E 00	2.615E-01	7.428E-01
38	6.25E-01	9.353E-04	0.000E-01	0.000E-01	4.709E 00	2.615E-01	7.427E-01
39	4.00E-01	1.281E-03	0.000E-01	0.000E-01	4.709E 00	2.615E-01	7.427E-01
40	2.00E-01	3.291E-03	0.000E-01	0.000E-01	4.707E 00	2.614E-01	7.424E-01

MATERIAL C-12 ATOMIC MASS 12.004

GROUP	EH	KSI*SIGS*	GAMMA	H	Z
1	1.00E 07	1.070E-01	1.151E-01	-4.054E-02	1.903E-01
2	7.19E 06	1.235E-01	1.112E-01	-4.334E-02	3.731E-02
3	5.17E 06	2.339E-01	1.180E-01	-1.034E-01	1.845E-01
4	3.72E 06	3.416E-01	1.314E-01	-1.964E-01	1.667E-01
5	2.67E 06	2.702E-01	1.162E-01	-1.060E-01	1.725E-01
6	1.92E 06	2.971E-01	1.089E-01	-9.019E-02	1.789E-01
7	1.38E 06	3.596E-01	1.078E-01	-1.045E-01	1.817E-01
8	9.93E 05	4.052E-01	1.071E-01	-1.143E-01	1.828E-01
9	8.21E 05	4.603E-01	1.076E-01	-1.326E-01	1.819E-01
10	5.13E 05	5.254E-01	1.080E-01	-1.543E-01	1.798E-01
11	3.69E 05	5.754E-01	1.088E-01	-1.746E-01	1.778E-01
12	2.65E 05	6.181E-01	1.098E-01	-1.943E-01	1.759E-01
13	1.91E 05	6.509E-01	1.103E-01	-2.086E-01	1.749E-01
14	1.37E 05	6.912E-01	1.107E-01	-2.255E-01	1.737E-01
15	5.57E 04	7.288E-01	1.115E-01	-2.444E-01	1.722E-01
16	2.26E 04	7.346E-01	1.082E-01	-2.169E-01	1.736E-01
17	9.21E 03	7.390E-01	1.082E-01	-2.182E-01	1.736E-01
18	5.53E 03	7.412E-01	1.082E-01	-2.189E-01	1.736E-01
19	1.52E 03	7.423E-01	1.082E-01	-2.192E-01	1.736E-01
20	6.19E 02	7.427E-01	1.082E-01	-2.193E-01	1.736E-01
21	2.52E 02	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
22	1.90E 02	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
23	1.35E 02	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
24	1.10E 02	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
25	8.20E 01	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
26	6.30E 01	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
27	4.50E 01	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
28	3.20E 01	7.429E-01	1.082E-01	-2.194E-01	1.736E-01
29	2.60E 01	7.428E-01	1.082E-01	-2.194E-01	1.736E-01
30	2.00E 01	7.428E-01	1.082E-01	-2.194E-01	1.736E-01
31	1.50E 01	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
32	1.10E 01	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
33	8.00E 00	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
34	5.40E 00	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
35	3.15E 00	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
36	1.84E 00	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
37	1.40E 00	7.428E-01	1.082E-01	-2.193E-01	1.736E-01
38	6.25E-01	7.427E-01	1.082E-01	-2.193E-01	1.736E-01
39	4.00E-01	7.427E-01	1.082E-01	-2.193E-01	1.736E-01
40	2.00E-01	7.424E-01	1.082E-01	-2.192E-01	1.736E-01

MATERIAL O-16 ATOMIC MASS 16.000

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	7.419E-02	0.000E-01	2.683E-01	8.338E-01	2.456E-01	7.361E-02
2	7.19E 06	3.673E-02	0.000E-01	7.492E-03	1.081E 00	2.715E-01	1.013E-01
3	5.17E 06	5.585E-02	0.000E-01	0.000E-01	1.884E 00	4.913E-01	1.743E-01
4	3.72E 06	1.508E-04	0.000E-01	0.000E-01	1.931E 00	4.991E-01	1.792E-01
5	2.67E 06	0.000E-01	0.000E-01	0.000E-01	1.198E 00	2.264E-01	1.217E-01
6	1.92E 06	0.000E-01	0.000E-01	0.000E-01	2.264E 00	1.562E-01	2.638E-01
7	1.38E 06	0.000E-01	0.000E-01	0.000E-01	4.275E 00	2.942E-01	4.983E-01
8	9.93E 05	0.000E-01	0.000E-01	0.000E-01	4.180E 00	2.439E-01	4.926E-01
9	8.21E 05	0.000E-01	0.000E-01	0.000E-01	3.126E 00	7.370E-01	2.990E-01
10	5.13E 05	0.000E-01	0.000E-01	0.000E-01	8.702E 00	1.418E 00	9.116E-01
11	3.69E 05	0.000E-01	0.000E-01	0.000E-01	3.820E 00	-7.332E-01	5.700E-01
12	2.65E 05	0.000E-01	0.000E-01	0.000E-01	3.700E 00	-3.203E-01	5.032E-01
13	1.91E 05	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.696E-01	4.419E-01
14	1.37E 05	0.000E-01	0.000E-01	0.000E-01	3.700E 00	2.169E-01	4.359E-01
15	5.57E 04	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
16	2.26E 04	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
17	9.21E 03	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
18	5.53E 03	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
19	1.52E 03	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
20	6.19E 02	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
21	2.52E 02	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
22	1.90E 02	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
23	1.35E 02	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
24	1.10E 02	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
25	8.20E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
26	6.30E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
27	4.50E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
28	3.20E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
29	2.60E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
30	2.00E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
31	1.50E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
32	1.10E 01	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
33	8.00E 00	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
34	5.40E 00	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
35	3.15E 00	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
36	1.84E 00	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
37	1.40E 00	0.000E-01	0.000E-01	0.000E-01	3.700E 00	1.542E-01	4.438E-01
38	6.25E-01	0.000E-01	0.000E-01	0.000E-01	3.724E 00	1.552E-01	4.467E-01
39	4.00E-01	0.000E-01	0.000E-01	0.000E-01	3.768E 00	1.570E-01	4.520E-01
40	2.00E-01	0.000E-01	0.000E-01	0.000E-01	4.144E 00	1.727E-01	4.971E-01

MATERIAL O-16 ATOMIC MASS 16.000

GROUP	EH	KSI*SIGS*	GAMMA	H	Z
1	1.00E 07	7.361E-02	8.158E-02	-2.234E-02	1.316E-01
2	7.19E 06	1.013E-01	8.181E-02	-3.153E-02	1.308E-01
3	5.17E 06	1.743E-01	8.249E-02	-5.603E-02	1.383E-01
4	3.72E 06	1.792E-01	8.287E-02	-6.253E-02	1.578E-01
5	2.67E 06	1.217E-01	8.181E-02	-3.852E-02	1.463E-01
6	1.92E 06	2.638E-01	8.572E-02	-9.804E-02	1.278E-01
7	1.38E 06	4.983E-01	9.215E-02	-2.478E-01	1.424E-01
8	9.93E 05	4.926E-01	8.479E-02	-1.756E-01	1.311E-01
9	8.21E 05	2.990E-01	7.277E-02	-5.093E-02	8.354E-02
10	5.13E 05	9.116E-01	7.887E-02	-3.039E-01	3.952E-04
11	3.69E 05	5.700E-01	9.066E-02	-2.559E-01	1.181E-01
12	2.65E 05	5.032E-01	8.755E-02	-2.009E-01	1.215E-01
13	1.91E 05	4.419E-01	8.442E-02	-1.542E-01	1.259E-01
14	1.37E 05	4.359E-01	8.331E-02	-1.448E-01	1.297E-01
15	5.57E 04	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
16	2.26E 04	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
17	9.21E 03	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
18	5.53E 03	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
19	1.52E 03	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
20	6.19E 02	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
21	2.52E 02	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
22	1.90E 02	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
23	1.35E 02	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
24	1.10E 02	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
25	8.20E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
26	6.30E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
27	4.50E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
28	3.20E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
29	2.60E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
30	2.00E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
31	1.50E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
32	1.10E 01	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
33	8.00E 00	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
34	5.40E 00	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
35	3.15E 00	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
36	1.84E 00	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
37	1.40E 00	4.438E-01	8.167E-02	-1.354E-01	1.287E-01
38	6.25E-01	4.467E-01	8.167E-02	-1.362E-01	1.287E-01
39	4.00E-01	4.520E-01	8.167E-02	-1.379E-01	1.287E-01
40	2.00E-01	4.971E-01	8.167E-02	-1.516E-01	1.287E-01

MATERIAL NA23 ATOMIC MASS 22.997

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	6.343E-02	0.000E-01	9.052E-01	6.310E-01	4.347E-01	1.709E-02
2	7.19E 06	1.711E-02	0.000E-01	9.038E-01	8.938E-01	5.944E-01	2.605E-02
3	5.17E 06	6.980E-04	0.000E-01	8.146E-01	1.291E 00	6.869E-01	5.257E-02
4	3.72E 06	1.143E-04	0.000E-01	7.136E-01	1.653E 00	6.936E-01	8.346E-02
5	2.67E 06	1.232E-04	0.000E-01	6.662E-01	2.205E 00	9.087E-01	1.128E-01
6	1.92E 06	1.400E-04	0.000E-01	4.952E-01	2.488E 00	6.099E-01	1.634E-01
7	1.38E 06	1.760E-04	0.000E-01	5.719E-01	3.229E 00	8.108E-01	2.104E-01
8	9.93E 05	2.207E-04	0.000E-01	3.602E-01	3.979E 00	1.246E 00	2.379E-01
9	8.21E 05	3.022E-04	0.000E-01	2.430E-01	4.975E 00	6.443E-01	3.769E-01
10	5.13E 05	4.314E-04	0.000E-01	5.647E-03	3.444E 00	1.937E-01	2.829E-01
11	3.69E 05	5.739E-04	0.000E-01	0.000E-01	3.200E 00	1.127E-01	2.686E-01
12	2.65E 05	7.023E-04	0.000E-01	0.000E-01	4.873E 00	4.035E-01	3.890E-01
13	1.91E 05	7.854E-04	0.000E-01	0.000E-01	3.378E 00	1.406E-01	2.818E-01
14	1.37E 05	5.285E-04	0.000E-01	0.000E-01	3.741E 00	9.851E-02	3.170E-01
15	5.57E 04	1.285E-03	0.000E-01	0.000E-01	4.465E 00	7.233E-02	3.822E-01
16	2.26E 04	8.368E-04	0.000E-01	0.000E-01	4.779E 00	9.786E-02	4.074E-01
17	9.21E 03	2.079E-03	0.000E-01	0.000E-01	7.655E 00	2.219E-01	6.469E-01
18	5.53E 03	5.638E-02	0.000E-01	0.000E-01	9.247E 01	2.681E 00	7.814E 00
19	1.52E 03	6.746E-03	0.000E-01	0.000E-01	4.088E 00	1.185E-01	3.455E-01
20	6.19E 02	5.885E-03	0.000E-01	0.000E-01	3.135E 00	9.087E-02	2.649E-01
21	2.52E 02	6.802E-03	0.000E-01	0.000E-01	3.093E 00	8.967E-02	2.614E-01
22	1.90E 02	7.629E-03	0.000E-01	0.000E-01	3.100E 00	8.985E-02	2.619E-01
23	1.35E 02	8.517E-03	0.000E-01	0.000E-01	3.101E 00	8.991E-02	2.621E-01
24	1.10E 02	9.419E-03	0.000E-01	0.000E-01	3.101E 00	8.988E-02	2.620E-01
25	8.20E 01	1.060E-02	0.000E-01	0.000E-01	3.099E 00	8.985E-02	2.619E-01
26	6.30E 01	1.218E-02	0.000E-01	0.000E-01	3.098E 00	8.980E-02	2.618E-01
27	4.50E 01	1.428E-02	0.000E-01	0.000E-01	3.101E 00	8.990E-02	2.620E-01
28	3.20E 01	1.624E-02	0.000E-01	0.000E-01	3.113E 00	9.025E-02	2.631E-01
29	2.60E 01	1.821E-02	0.000E-01	0.000E-01	3.119E 00	9.043E-02	2.636E-01
30	2.00E 01	2.085E-02	0.000E-01	0.000E-01	3.123E 00	9.055E-02	2.639E-01
31	1.50E 01	2.413E-02	0.000E-01	0.000E-01	3.127E 00	9.064E-02	2.642E-01
32	1.10E 01	2.805E-02	0.000E-01	0.000E-01	3.133E 00	9.082E-02	2.647E-01
33	8.00E 00	3.342E-02	0.000E-01	0.000E-01	3.142E 00	9.108E-02	2.655E-01
34	5.40E 00	4.223E-02	0.000E-01	0.000E-01	3.155E 00	9.148E-02	2.666E-01
35	3.15E 00	5.526E-02	0.000E-01	0.000E-01	3.171E 00	9.191E-02	2.679E-01
36	1.84E 00	6.735E-02	0.000E-01	0.000E-01	3.184E 00	9.229E-02	2.690E-01
37	1.40E 00	8.873E-02	0.000E-01	0.000E-01	3.203E 00	9.285E-02	2.706E-01
38	6.25E-01	1.342E-01	0.000E-01	0.000E-01	3.233E 00	9.371E-02	2.732E-01
39	4.00E-01	1.837E-01	0.000E-01	0.000E-01	3.255E 00	9.436E-02	2.750E-01
40	2.00E-01	4.734E-01	0.000E-01	0.000E-01	3.304E 00	9.579E-02	2.792E-01

MATERIAL NA23 ATOMIC MASS 22.997

GROUP	EH	KSI*SIGS*	GAMMA	H	Z
1	1.00E 07	1.709E-02	5.327E-02	-3.848E-03	1.345E-01
2	7.19E 06	2.605E-02	4.955E-02	-3.640E-03	2.061E-01
3	5.17E 06	5.257E-02	4.889E-02	-6.816E-03	2.161E-01
4	3.72E 06	8.346E-02	5.186E-02	-1.612E-02	1.323E-01
5	2.67E 06	1.128E-01	4.947E-02	-1.619E-02	2.406E-01
6	1.92E 06	1.634E-01	5.453E-02	-4.166E-02	1.062E-01
7	1.38E 06	2.104E-01	5.509E-02	-5.598E-02	1.045E-01
8	9.93E 05	2.379E-01	5.150E-02	-4.403E-02	1.245E-01
9	8.21E 05	3.769E-01	5.799E-02	-1.309E-01	9.925E-02
10	5.13E 05	2.829E-01	5.806E-02	-9.495E-02	9.044E-02
11	3.69E 05	2.686E-01	5.903E-02	-9.632E-02	8.963E-02
12	2.65E 05	3.890E-01	5.788E-02	-1.287E-01	9.161E-02
13	1.91E 05	2.818E-01	5.835E-02	-9.607E-02	8.909E-02
14	1.37E 05	3.170E-01	5.876E-02	-1.110E-01	8.841E-02
15	5.57E 04	3.822E-01	5.901E-02	-1.361E-01	8.794E-02
16	2.26E 04	4.074E-01	5.889E-02	-1.440E-01	8.813E-02
17	9.21E 03	6.469E-01	5.716E-02	-2.029E-01	8.868E-02
18	5.53E 03	7.814E 00	5.716E-02	-2.451E 00	8.868E-02
19	1.52E 03	3.455E-01	5.716E-02	-1.084E-01	8.868E-02
20	6.19E 02	2.649E-01	5.716E-02	-8.310E-02	8.868E-02
21	2.52E 02	2.614E-01	5.716E-02	-8.201E-02	8.868E-02
22	1.90E 02	2.619E-01	5.716E-02	-8.217E-02	8.868E-02
23	1.35E 02	2.621E-01	5.716E-02	-8.222E-02	8.868E-02
24	1.10E 02	2.620E-01	5.716E-02	-8.220E-02	8.868E-02
25	8.20E 01	2.619E-01	5.716E-02	-8.217E-02	8.868E-02
26	6.30E 01	2.618E-01	5.716E-02	-8.212E-02	8.868E-02
27	4.50E 01	2.620E-01	5.716E-02	-8.221E-02	8.868E-02
28	3.20E 01	2.631E-01	5.716E-02	-8.253E-02	8.868E-02
29	2.60E 01	2.636E-01	5.716E-02	-8.270E-02	8.868E-02
30	2.00E 01	2.639E-01	5.716E-02	-8.280E-02	8.868E-02
31	1.50E 01	2.642E-01	5.716E-02	-8.289E-02	8.868E-02
32	1.10E 01	2.647E-01	5.716E-02	-8.306E-02	8.868E-02
33	8.00E 00	2.655E-01	5.716E-02	-8.330E-02	8.868E-02
34	5.40E 00	2.666E-01	5.716E-02	-8.365E-02	8.868E-02
35	3.15E 00	2.679E-01	5.716E-02	-8.405E-02	8.868E-02
36	1.84E 00	2.690E-01	5.716E-02	-8.440E-02	8.868E-02
37	1.40E 00	2.706E-01	5.716E-02	-8.491E-02	8.868E-02
38	6.25E-01	2.732E-01	5.716E-02	-8.570E-02	8.868E-02
39	4.00E-01	2.750E-01	5.716E-02	-8.629E-02	8.868E-02
40	2.00E-01	2.792E-01	5.716E-02	-8.760E-02	8.868E-02

MATERIAL AL-27 ATOMIC MASS 26.990

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	1.174E-01	0.000E-01	8.568E-01	8.191E-01	5.630E-01	1.899E-02
2	7.19E 06	4.263E-02	0.000E-01	8.600E-01	1.224E 00	8.118E-01	3.056E-02
3	5.17E 06	1.242E-02	0.000E-01	8.012E-01	1.539E 00	8.146E-01	5.367E-02
4	3.72E 06	3.466E-03	0.000E-01	5.604E-01	2.043E 00	8.514E-01	8.835E-02
5	2.67E 06	4.117E-04	0.000E-01	2.927E-01	2.711E 00	1.126E 00	1.175E-01
6	1.92E 06	3.704E-04	0.000E-01	2.872E-01	2.653E 00	9.665E-01	1.250E-01
7	1.38E 06	3.860E-04	0.000E-01	1.945E-01	3.052E 00	1.003E 00	1.519E-01
8	9.93E 05	4.819E-04	0.000E-01	0.000E-01	3.402E 00	1.161E 00	1.662E-01
9	8.21E 05	6.563E-04	0.000E-01	0.000E-01	3.945E 00	1.025E 00	2.164E-01
10	5.13E 05	1.383E-03	0.000E-01	0.000E-01	4.049E 00	6.826E-01	2.496E-01
11	3.69E 05	1.480E-03	0.000E-01	0.000E-01	3.924E 00	4.560E-01	2.571E-01
12	2.65E 05	1.347E-03	0.000E-01	0.000E-01	4.300E 00	4.601E-01	2.847E-01
13	1.91E 05	2.965E-03	0.000E-01	0.000E-01	7.729E 00	5.423E-01	5.328E-01
14	1.37E 05	3.173E-03	0.000E-01	0.000E-01	5.259E 00	1.715E-01	3.771E-01
15	5.57E 04	7.918E-03	0.000E-01	0.000E-01	6.069E 00	2.912E-02	4.478E-01
16	2.26E 04	3.032E-03	0.000E-01	0.000E-01	1.014E 00	8.087E-03	7.458E-02
17	9.21E 03	6.017E-03	0.000E-01	0.000E-01	1.582E 00	3.908E-02	1.144E-01
18	5.53E 03	1.014E-02	0.000E-01	0.000E-01	1.405E 00	3.470E-02	1.016E-01
19	1.52E 03	1.372E-02	0.000E-01	0.000E-01	1.386E 00	3.424E-02	1.002E-01
20	6.19E 02	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
21	2.52E 02	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
22	1.90E 02	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
23	1.35E 02	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
24	1.10E 02	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
25	8.20E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
26	6.30E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
27	4.50E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
28	3.20E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
29	2.60E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
30	2.00E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
31	1.50E 01	1.400E-02	0.000E-01	0.000E-01	1.386E 00	3.423E-02	1.002E-01
32	1.10E 01	1.564E-02	0.000E-01	0.000E-01	1.390E 00	3.434E-02	1.005E-01
33	8.00E 00	2.226E-02	0.000E-01	0.000E-01	1.407E 00	3.476E-02	1.017E-01
34	5.40E 00	2.844E-02	0.000E-01	0.000E-01	1.423E 00	3.515E-02	1.029E-01
35	3.15E 00	3.274E-02	0.000E-01	0.000E-01	1.434E 00	3.543E-02	1.037E-01
36	1.84E 00	3.469E-02	0.000E-01	0.000E-01	1.439E 00	3.555E-02	1.041E-01
37	1.40E 00	4.605E-02	0.000E-01	0.000E-01	1.443E 00	3.565E-02	1.043E-01
38	6.25E-01	8.846E-02	0.000E-01	0.000E-01	1.444E 00	3.568E-02	1.044E-01
39	4.00E-01	1.059E-01	0.000E-01	0.000E-01	1.445E 00	3.568E-02	1.045E-01
40	2.00E-01	1.994E-01	0.000E-01	0.000E-01	1.414E 00	3.492E-02	1.022E-01

MATERIAL AL-27 ATOMIC MASS 26.990

GROUP	EH	KSI*SIGS*	GAMMA	H	Z
1	1.00E 07	1.899E-02	4.541E-02	-4.292E-03	1.143E-01
2	7.19E 06	3.056E-02	4.295E-02	-4.300E-03	1.739E-01
3	5.17E 06	5.367E-02	4.171E-02	-7.046E-03	1.806E-01
4	3.72E 06	8.835E-02	4.495E-02	-1.722E-02	1.119E-01
5	2.67E 06	1.175E-01	4.252E-02	-1.729E-02	1.296E-01
6	1.92E 06	1.250E-01	4.228E-02	-1.757E-02	1.252E-01
7	1.38E 06	1.519E-01	4.310E-02	-2.485E-02	1.148E-01
8	9.93E 05	1.662E-01	4.218E-02	-2.304E-02	1.248E-01
9	8.21E 05	2.164E-01	4.418E-02	-4.156E-02	9.765E-02
10	5.13E 05	2.496E-01	4.644E-02	-6.315E-02	8.459E-02
11	3.69E 05	2.571E-01	4.783E-02	-7.470E-02	8.014E-02
12	2.65E 05	2.847E-01	4.803E-02	-8.420E-02	7.948E-02
13	1.91E 05	5.328E-01	4.902E-02	-1.718E-01	7.733E-02
14	1.37E 05	3.771E-01	4.994E-02	-1.310E-01	7.556E-02
15	5.57E 04	4.478E-01	5.055E-02	-1.629E-01	7.445E-02
16	2.26E 04	7.458E-02	5.047E-02	-2.697E-02	7.458E-02
17	9.21E 03	1.144E-01	4.881E-02	-3.623E-02	7.532E-02
18	5.53E 03	1.016E-01	4.881E-02	-3.217E-02	7.532E-02
19	1.52E 03	1.002E-01	4.881E-02	-3.174E-02	7.532E-02
20	6.19E 02	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
21	2.52E 02	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
22	1.90E 02	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
23	1.35E 02	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
24	1.10E 02	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
25	8.20E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
26	6.30E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
27	4.50E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
28	3.20E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
29	2.60E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
30	2.00E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
31	1.50E 01	1.002E-01	4.881E-02	-3.173E-02	7.532E-02
32	1.10E 01	1.005E-01	4.881E-02	-3.183E-02	7.532E-02
33	8.00E 00	1.017E-01	4.881E-02	-3.222E-02	7.532E-02
34	5.40E 00	1.029E-01	4.881E-02	-3.258E-02	7.532E-02
35	3.15E 00	1.037E-01	4.881E-02	-3.284E-02	7.532E-02
36	1.84E 00	1.041E-01	4.881E-02	-3.295E-02	7.532E-02
37	1.40E 00	1.043E-01	4.881E-02	-3.304E-02	7.532E-02
38	6.25E-01	1.044E-01	4.881E-02	-3.307E-02	7.532E-02
39	4.00E-01	1.045E-01	4.881E-02	-3.308E-02	7.532E-02
40	2.00E-01	1.022E-01	4.881E-02	-3.237E-02	7.532E-02

MATERIAL CROM ATOMIC MASS 52.010

GROUP	EN	SIGA	SIGF	SIGI	SIGS	MU*SIGS.	KSI*SIGS
1	1.00E 07	7.137E-02	0.000E-01	1.133E 00	2.084E 00	1.823E 00	1.006E-02
2	7.19E 06	1.901E-02	0.000E-01	1.251E 00	2.351E 00	1.933E 00	1.611E-02
3	5.17E 06	6.874E-03	0.000E-01	1.283E 00	2.422E 00	1.747E 00	2.594E-02
4	3.72E 06	3.687E-03	0.000E-01	9.945E-01	2.687E 00	1.491E 00	4.598E-02
5	2.67E 06	2.257E-03	0.000E-01	8.435E-01	2.957E 00	1.230E 00	6.640E-02
6	1.92E 06	2.514E-03	0.000E-01	4.449E-01	2.441E 00	8.067E-01	6.284E-02
7	1.38E 06	3.518E-03	0.000E-01	9.924E-02	2.700E 00	6.165E-01	8.011E-02
8	9.93E 05	4.000E-03	0.000E-01	4.541E-02	2.998E 00	5.450E-01	9.432E-02
9	8.21E 05	3.999E-03	0.000E-01	1.180E-02	3.040E 00	5.507E-01	9.573E-02
10	5.13E 05	4.019E-03	0.000E-01	0.000E-01	3.043E 00	4.098E-01	1.013E-01
11	3.69E 05	4.256E-03	0.000E-01	0.000E-01	2.576E 00	3.118E-01	8.707E-02
12	2.65E 05	4.604E-03	0.000E-01	0.000E-01	3.196E 00	3.467E-01	1.096E-01
13	1.91E 05	4.940E-03	0.000E-01	0.000E-01	6.780E 00	4.752E-01	2.425E-01
14	1.37E 05	4.699E-03	0.000E-01	0.000E-01	5.394E 00	2.686E-01	1.971E-01
15	5.57E 04	6.735E-03	0.000E-01	0.000E-01	4.978E 00	1.350E-01	1.863E-01
16	2.26E 04	1.212E-02	0.000E-01	0.000E-01	4.896E 00	7.765E-02	1.853E-01
17	9.21E 03	3.776E-02	0.000E-01	0.000E-01	1.709E 01	2.190E-01	6.488E-01
18	5.53E 03	4.829E-02	0.000E-01	0.000E-01	1.062E 01	1.362E-01	4.033E-01
19	1.52E 03	3.557E-02	0.000E-01	0.000E-01	4.268E 00	5.471E-02	1.620E-01
20	6.19E 02	2.534E-02	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
21	2.52E 02	3.396E-02	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
22	1.90E 02	3.979E-02	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
23	1.35E 02	4.531E-02	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
24	1.10E 02	5.073E-02	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
25	8.20E 01	5.831E-02	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
26	6.30E 01	6.793E-02	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
27	4.50E 01	8.069E-02	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
28	3.20E 01	9.324E-02	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
29	2.60E 01	1.042E-01	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
30	2.00E 01	1.198E-01	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
31	1.50E 01	1.394E-01	0.000E-01	0.000E-01	4.285E 00	5.493E-02	1.627E-01
32	1.10E 01	1.613E-01	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
33	8.00E 00	1.927E-01	0.000E-01	0.000E-01	4.286E 00	5.494E-02	1.627E-01
34	5.40E 00	2.439E-01	0.000E-01	0.000E-01	4.284E 00	5.491E-02	1.626E-01
35	3.15E 00	3.191E-01	0.000E-01	0.000E-01	4.285E 00	5.492E-02	1.627E-01
36	1.84E 00	3.902E-01	0.000E-01	0.000E-01	4.282E 00	5.489E-02	1.626E-01
37	1.40E 00	5.141E-01	0.000E-01	0.000E-01	4.280E 00	5.487E-02	1.625E-01
38	6.25E-01	7.757E-01	0.000E-01	0.000E-01	4.280E 00	5.486E-02	1.625E-01
39	4.00E-01	1.062E 00	0.000E-01	0.000E-01	4.280E 00	5.486E-02	1.625E-01
40	2.00E-01	2.737E 00	0.000E-01	0.000E-01	4.280E 00	5.486E-02	1.625E-01

MATERIAL IRON ATOMIC MASS 55.850

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	8.891E-02	0.000E-01	1.292E 00	1.977E 00	1.729E 00	8.899E-03
2	7.19E 06	4.163E-02	0.000E-01	1.316E 00	2.268E 00	1.863E 00	1.449E-02
3	5.17E 06	2.006E-02	0.000E-01	1.349E 00	2.257E 00	1.628E 00	2.255E-02
4	3.72E 06	7.478E-03	0.000E-01	9.933E-01	2.366E 00	1.312E 00	3.775E-02
5	2.67E 06	2.772E-03	0.000E-01	8.538E-01	2.275E 00	8.396E-01	5.142E-02
6	1.92E 06	2.526E-03	0.000E-01	5.908E-01	2.276E 00	6.794E-01	5.718E-02
7	1.38E 06	2.994E-03	0.000E-01	4.359E-01	2.119E 00	5.686E-01	5.552E-02
8	9.93E 05	4.175E-03	0.000E-01	2.095E-01	2.136E 00	6.350E-01	5.375E-02
9	8.21E 05	5.147E-03	0.000E-01	0.000E-01	2.721E 00	5.782E-01	7.673E-02
10	5.13E 05	4.938E-03	0.000E-01	0.000E-01	3.699E 00	5.617E-01	1.124E-01
11	3.69E 05	5.209E-03	0.000E-01	0.000E-01	2.746E 00	2.894E-01	8.799E-02
12	2.65E 05	6.436E-03	0.000E-01	0.000E-01	3.491E 00	2.558E-01	1.159E-01
13	1.91E 05	5.422E-03	0.000E-01	0.000E-01	4.266E 00	2.381E-01	1.463E-01
14	1.37E 05	1.595E-02	0.000E-01	0.000E-01	4.556E 00	1.855E-01	1.565E-01
15	5.57E 04	2.847E-02	0.000E-01	0.000E-01	1.205E 01	3.055E-01	4.205E-01
16	2.26E 04	2.130E-02	0.000E-01	0.000E-01	4.133E 00	8.952E-02	1.468E-01
17	9.21E 03	5.771E-02	0.000E-01	0.000E-01	1.601E 01	1.911E-01	5.666E-01
18	5.53E 03	1.434E-02	0.000E-01	0.000E-01	6.110E 00	7.294E-02	2.162E-01
19	1.52E 03	2.258E-01	0.000E-01	0.000E-01	8.979E 00	1.072E-01	3.177E-01
20	6.19E 02	2.043E-02	0.000E-01	0.000E-01	1.072E 01	1.279E-01	3.793E-01
21	2.52E 02	2.725E-02	0.000E-01	0.000E-01	1.122E 01	1.340E-01	3.971E-01
22	1.90E 02	3.184E-02	0.000E-01	0.000E-01	1.134E 01	1.353E-01	4.012E-01
23	1.35E 02	3.646E-02	0.000E-01	0.000E-01	1.139E 01	1.359E-01	4.029E-01
24	1.10E 02	4.131E-02	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.033E-01
25	8.20E 01	4.751E-02	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.035E-01
26	6.30E 01	5.525E-02	0.000E-01	0.000E-01	1.142E 01	1.363E-01	4.040E-01
27	4.50E 01	6.543E-02	0.000E-01	0.000E-01	1.141E 01	1.362E-01	4.038E-01
28	3.20E 01	7.495E-02	0.000E-01	0.000E-01	1.141E 01	1.361E-01	4.036E-01
29	2.60E 01	8.436E-02	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.035E-01
30	2.00E 01	9.680E-02	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
31	1.50E 01	1.128E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
32	1.10E 01	1.319E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
33	8.00E 00	1.576E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
34	5.40E 00	1.991E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
35	3.15E 00	2.609E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
36	1.84E 00	3.185E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
37	1.40E 00	4.196E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
38	6.25E-01	6.331E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
39	4.00E-01	8.666E-01	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01
40	2.00E-01	2.233E 00	0.000E-01	0.000E-01	1.140E 01	1.361E-01	4.034E-01

MATERIAL NI00 ATOMIC MASS 58.690

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	5.229E-01	0.000E-01	8.645E-01	2.091E 00	1.828E 00	8.961E-03
2	7.19E 06	4.441E-01	0.000E-01	1.022E 00	2.193E 00	1.792E 00	1.365E-02
3	5.17E 06	3.036E-01	0.000E-01	1.196E 00	1.933E 00	1.385E 00	1.867E-02
4	3.72E 06	1.619E-01	0.000E-01	1.027E 00	2.038E 00	9.820E-01	3.598E-02
5	2.67E 06	5.972E-02	0.000E-01	6.105E-01	2.343E 00	9.153E-01	4.864E-02
6	1.92E 06	1.742E-02	0.000E-01	2.774E-01	2.787E 00	7.148E-01	7.063E-02
7	1.38E 06	8.483E-03	0.000E-01	6.682E-04	3.085E 00	4.895E-01	8.847E-02
8	9.93E 05	7.749E-03	0.000E-01	0.000E-01	3.149E 00	6.259E-01	8.598E-02
9	8.21E 05	7.889E-03	0.000E-01	0.000E-01	3.116E 00	5.498E-01	8.746E-02
10	5.13E 05	8.000E-03	0.000E-01	0.000E-01	3.871E 00	5.768E-01	1.123E-01
11	3.69E 05	8.277E-03	0.000E-01	0.000E-01	4.854E 00	5.339E-01	1.472E-01
12	2.65E 05	8.781E-03	0.000E-01	0.000E-01	6.023E 00	4.916E-01	1.885E-01
13	1.91E 05	6.229E-03	0.000E-01	0.000E-01	7.180E 00	4.837E-01	2.282E-01
14	1.37E 05	1.302E-02	0.000E-01	0.000E-01	7.992E 00	2.903E-01	2.625E-01
15	5.57E 04	9.663E-03	0.000E-01	0.000E-01	9.539E 00	9.989E-02	3.217E-01
16	2.26E 04	1.105E-01	0.000E-01	0.000E-01	3.778E 01	4.021E-01	1.274E 00
17	9.21E 03	1.418E-02	0.000E-01	0.000E-01	1.186E 01	1.348E-01	3.997E-01
18	5.53E 03	3.315E-02	0.000E-01	0.000E-01	1.946E 01	2.210E-01	6.556E-01
19	1.52E 03	2.479E-02	0.000E-01	0.000E-01	1.497E 01	1.701E-01	5.065E-01
20	6.19E 02	3.721E-02	0.000E-01	0.000E-01	1.655E 01	1.880E-01	5.576E-01
21	2.52E 02	4.956E-02	0.000E-01	0.000E-01	1.694E 01	1.925E-01	5.709E-01
22	1.90E 02	5.797E-02	0.000E-01	0.000E-01	1.702E 01	1.933E-01	5.735E-01
23	1.35E 02	6.662E-02	0.000E-01	0.000E-01	1.707E 01	1.939E-01	5.752E-01
24	1.10E 02	7.521E-02	0.000E-01	0.000E-01	1.711E 01	1.943E-01	5.764E-01
25	8.20E 01	8.643E-02	0.000E-01	0.000E-01	1.714E 01	1.947E-01	5.774E-01
26	6.30E 01	1.005E-01	0.000E-01	0.000E-01	1.716E 01	1.949E-01	5.781E-01
27	4.50E 01	1.191E-01	0.000E-01	0.000E-01	1.718E 01	1.951E-01	5.787E-01
28	3.20E 01	1.364E-01	0.000E-01	0.000E-01	1.719E 01	1.952E-01	5.791E-01
29	2.60E 01	1.535E-01	0.000E-01	0.000E-01	1.719E 01	1.953E-01	5.793E-01
30	2.00E 01	1.762E-01	0.000E-01	0.000E-01	1.720E 01	1.953E-01	5.794E-01
31	1.50E 01	2.052E-01	0.000E-01	0.000E-01	1.720E 01	1.954E-01	5.796E-01
32	1.10E 01	2.393E-01	0.000E-01	0.000E-01	1.720E 01	1.954E-01	5.796E-01
33	8.00E 00	2.860E-01	0.000E-01	0.000E-01	1.720E 01	1.954E-01	5.797E-01
34	5.40E 00	3.619E-01	0.000E-01	0.000E-01	1.720E 01	1.954E-01	5.796E-01
35	3.15E 00	4.734E-01	0.000E-01	0.000E-01	1.720E 01	1.953E-01	5.794E-01
36	1.84E 00	5.790E-01	0.000E-01	0.000E-01	1.719E 01	1.953E-01	5.792E-01
37	1.40E 00	7.629E-01	0.000E-01	0.000E-01	1.718E 01	1.951E-01	5.787E-01
38	6.25E-01	1.151E 00	0.000E-01	0.000E-01	1.715E 01	1.948E-01	5.778E-01
39	4.00E-01	1.576E 00	0.000E-01	0.000E-01	1.712E 01	1.944E-01	5.767E-01
40	2.00E-01	4.061E 00	0.000E-01	0.000E-01	1.702E 01	1.933E-01	5.733E-01

MATERIAL MOOO MOLIBDEN ATOMIC MASS 95.950

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.611E-02	0.000E-01	1.968E 00	2.201E 00	1.938E 00	5.482E-03
2	7.19E 06	2.020E-02	0.000E-01	2.114E 00	1.764E 00	1.348E 00	8.675E-03
3	5.17E 06	1.668E-02	0.000E-01	2.149E 00	1.606E 00	9.537E-01	1.360E-02
4	3.72E 06	1.543E-02	0.000E-01	2.057E 00	1.997E 00	9.565E-01	2.169E-02
5	2.67E 06	1.648E-02	0.000E-01	1.887E 00	2.782E 00	1.376E 00	2.929E-02
6	1.92E 06	2.002E-02	0.000E-01	1.469E 00	3.796E 00	2.015E 00	3.713E-02
7	1.38E 06	2.687E-02	0.000E-01	1.135E 00	5.041E 00	2.522E 00	5.250E-02
8	9.93E 05	3.220E-02	0.000E-01	6.895E-01	6.240E 00	2.670E 00	7.441E-02
9	8.21E 05	4.220E-02	0.000E-01	3.061E-01	7.213E 00	2.637E 00	9.538E-02
10	5.13E 05	4.577E-02	0.000E-01	1.192E-01	8.124E 00	2.435E 00	1.186E-01
11	3.69E 05	5.018E-02	0.000E-01	5.733E-02	8.486E 00	1.964E 00	1.359E-01
12	2.65E 05	5.557E-02	0.000E-01	1.284E-02	9.066E 00	1.539E 00	1.569E-01
13	1.91E 05	6.236E-02	0.000E-01	0.000E-01	9.444E 00	1.167E 00	1.725E-01
14	1.37E 05	8.616E-02	0.000E-01	0.000E-01	8.840E 00	7.229E-01	1.692E-01
15	5.57E 04	1.631E-01	0.000E-01	0.000E-01	8.437E 00	4.375E-01	1.668E-01
16	2.26E 04	3.237E-01	0.000E-01	0.000E-01	9.219E 00	2.416E-01	1.871E-01
17	9.21E 03	5.216E-01	0.000E-01	0.000E-01	8.497E 00	5.904E-02	1.759E-01
18	5.53E 03	6.672E-01	0.000E-01	0.000E-01	1.008E 01	7.005E-02	2.087E-01
19	1.52E 03	8.220E-01	0.000E-01	0.000E-01	7.285E 00	5.062E-02	1.508E-01
20	6.19E 02	2.839E 00	0.000E-01	0.000E-01	1.260E 01	8.754E-02	2.608E-01
21	2.52E 02	8.206E-02	0.000E-01	0.000E-01	5.194E 00	3.609E-02	1.075E-01
22	1.90E 02	8.031E-01	0.000E-01	0.000E-01	6.133E 00	4.261E-02	1.270E-01
23	1.35E 02	1.929E 01	0.000E-01	0.000E-01	2.878E 01	1.999E-01	5.957E-01
24	1.10E 02	1.340E-01	0.000E-01	0.000E-01	5.005E 00	3.478E-02	1.036E-01
25	8.20E 01	2.406E 00	0.000E-01	0.000E-01	5.521E 00	3.836E-02	1.143E-01
26	6.30E 01	2.834E 01	0.000E-01	0.000E-01	3.562E 01	2.475E-01	7.373E-01
27	4.50E 01	1.498E 01	0.000E-01	0.000E-01	1.752E 01	1.217E-01	3.627E-01
28	3.20E 01	1.978E-01	0.000E-01	0.000E-01	4.703E 00	3.268E-02	9.736E-02
29	2.60E 01	1.225E-01	0.000E-01	0.000E-01	4.781E 00	3.322E-02	9.896E-02
30	2.00E 01	1.014E-01	0.000E-01	0.000E-01	4.836E 00	3.360E-02	1.001E-01
31	1.50E 01	1.580E 00	0.000E-01	0.000E-01	4.871E 00	3.385E-02	1.008E-01
32	1.10E 01	1.553E-01	0.000E-01	0.000E-01	4.890E 00	3.398E-02	1.012E-01
33	8.00E 00	1.678E-01	0.000E-01	0.000E-01	4.939E 00	3.432E-02	1.022E-01
34	5.40E 00	2.122E-01	0.000E-01	0.000E-01	4.975E 00	3.457E-02	1.030E-01
35	3.15E 00	2.779E-01	0.000E-01	0.000E-01	4.993E 00	3.469E-02	1.034E-01
36	1.84E 00	3.399E-01	0.000E-01	0.000E-01	5.001E 00	3.475E-02	1.035E-01
37	1.40E 00	4.478E-01	0.000E-01	0.000E-01	5.006E 00	3.478E-02	1.036E-01
38	6.25E-01	6.756E-01	0.000E-01	0.000E-01	5.008E 00	3.480E-02	1.037E-01
39	4.00E-01	9.249E-01	0.000E-01	0.000E-01	5.009E 00	3.480E-02	1.037E-01
40	2.00E-01	2.384E 00	0.000E-01	0.000E-01	5.010E 00	3.481E-02	1.037E-01

MATERIAL CD-NAT ATOMIC MASS 112.410

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	3.473E-02	0.000E-01	2.015E 00	2.193E 00	1.259E-02	3.756E-02
2	7.19E 06	7.542E-03	0.000E-01	2.106E 00	1.901E 00	1.128E-02	3.363E-02
3	5.17E 06	1.041E-02	0.000E-01	2.087E 00	1.965E 00	1.165E-02	3.475E-02
4	3.72E 06	1.522E-02	0.000E-01	1.975E 00	2.457E 00	1.457E-02	4.345E-02
5	2.67E 06	2.274E-02	0.000E-01	1.792E 00	3.345E 00	1.984E-02	5.916E-02
6	1.92E 06	3.389E-02	0.000E-01	1.479E 00	4.184E 00	2.481E-02	7.400E-02
7	1.38E 06	4.953E-02	0.000E-01	1.098E 00	5.020E 00	2.977E-02	8.879E-02
8	9.93E 05	6.445E-02	0.000E-01	9.631E-01	5.569E 00	3.303E-02	9.849E-02
9	8.21E 05	8.342E-02	0.000E-01	4.682E-01	6.330E 00	3.754E-02	1.120E-01
10	5.13E 05	9.820E-02	0.000E-01	1.255E-01	7.012E 00	4.159E-02	1.240E-01
11	3.69E 05	1.041E-01	0.000E-01	2.006E-02	7.129E 00	4.228E-02	1.261E-01
12	2.65E 05	1.110E-01	0.000E-01	0.000E-01	7.158E 00	4.245E-02	1.266E-01
13	1.91E 05	1.234E-01	0.000E-01	0.000E-01	7.118E 00	4.221E-02	1.259E-01
14	1.37E 05	1.642E-01	0.000E-01	0.000E-01	6.963E 00	4.129E-02	1.232E-01
15	5.57E 04	2.919E-01	0.000E-01	0.000E-01	6.587E 00	3.906E-02	1.165E-01
16	2.26E 04	5.965E-01	0.000E-01	0.000E-01	6.140E 00	3.641E-02	1.086E-01
17	9.21E 03	1.003E 00	0.000E-01	0.000E-01	5.608E 00	3.326E-02	9.920E-02
18	5.53E 03	1.401E 00	0.000E-01	0.000E-01	5.563E 00	3.299E-02	9.840E-02
19	1.52E 03	1.981E 00	0.000E-01	0.000E-01	1.267E 01	7.516E-02	2.242E-01
20	6.19E 02	3.653E 00	0.000E-01	0.000E-01	2.026E 01	1.202E-01	3.584E-01
21	2.52E 02	5.019E 00	0.000E-01	0.000E-01	1.057E 01	6.269E-02	1.870E-01
22	1.90E 02	3.334E 00	0.000E-01	0.000E-01	8.067E 00	4.784E-02	1.427E-01
23	1.35E 02	1.632E 01	0.000E-01	0.000E-01	1.529E 01	9.069E-02	2.705E-01
24	1.10E 02	2.236E 01	0.000E-01	0.000E-01	2.086E 01	1.237E-01	3.690E-01
25	8.20E 01	9.910E 00	0.000E-01	0.000E-01	8.115E 00	4.813E-02	1.435E-01
26	6.30E 01	1.519E 00	0.000E-01	0.000E-01	7.714E 00	4.575E-02	1.364E-01
27	4.50E 01	1.317E 00	0.000E-01	0.000E-01	7.537E 00	4.470E-02	1.333E-01
28	3.20E 01	1.793E 01	0.000E-01	0.000E-01	6.560E 00	3.890E-02	1.160E-01
29	2.60E 01	1.790E-01	0.000E-01	0.000E-01	5.289E 00	3.137E-02	9.355E-02
30	2.00E 01	7.764E-01	0.000E-01	0.000E-01	5.405E 00	3.205E-02	9.559E-02
31	1.50E 01	3.990E-02	0.000E-01	0.000E-01	5.434E 00	3.223E-02	9.612E-02
32	1.10E 01	5.777E-02	0.000E-01	0.000E-01	5.462E 00	3.240E-02	9.661E-02
33	8.00E 00	1.200E-01	0.000E-01	0.000E-01	5.497E 00	3.260E-02	9.723E-02
34	5.40E 00	3.792E-01	0.000E-01	0.000E-01	5.561E 00	3.298E-02	9.836E-02
35	3.15E 00	1.517E 00	0.000E-01	0.000E-01	5.691E 00	3.375E-02	1.007E-01
36	1.84E 00	4.234E 00	0.000E-01	0.000E-01	5.867E 00	3.480E-02	1.038E-01
37	1.40E 00	2.438E 01	0.000E-01	0.000E-01	6.459E 00	3.831E-02	1.142E-01
38	6.25E-01	2.584E 02	0.000E-01	0.000E-01	9.783E 00	5.802E-02	1.730E-01
39	4.00E-01	4.318E 03	0.000E-01	0.000E-01	3.703E 01	2.196E-01	6.549E-01
40	2.00E-01	2.964E 03	0.000E-01	0.000E-01	1.078E 01	6.394E-02	1.907E-01

MATERIAL U-235 ATOMIC MASS 235.119

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.275E 00	1.777E 00	6.402E-01	3.361E 00	3.110E 00	2.138E-03
2	7.19E 06	1.359E 00	1.240E 00	1.845E 00	3.791E 00	3.399E 00	3.340E-03
3	5.17E 06	1.224E 00	1.202E 00	2.111E 00	4.291E 00	3.653E 00	5.434E-03
4	3.72E 06	1.313E 00	1.281E 00	2.002E 00	4.458E 00	3.591E 00	7.380E-03
5	2.67E 06	1.362E 00	1.317E 00	1.774E 00	4.200E 00	2.832E 00	1.164E-02
6	1.92E 06	1.353E 00	1.290E 00	1.540E 00	3.884E 00	2.517E 00	1.163E-02
7	1.38E 06	1.322E 00	1.233E 00	1.444E 00	3.835E 00	2.189E 00	1.401E-02
8	9.93E 05	1.321E 00	1.206E 00	1.366E 00	4.187E 00	1.972E 00	1.884E-02
9	8.21E 05	1.316E 00	1.178E 00	1.220E 00	4.815E 00	2.020E 00	2.378E-02
10	5.13E 05	1.370E 00	1.203E 00	9.681E-01	5.683E 00	2.067E 00	3.076E-02
11	3.69E 05	1.506E 00	1.297E 00	8.037E-01	6.481E 00	1.715E 00	4.054E-02
12	2.65E 05	1.629E 00	1.366E 00	6.266E-01	7.517E 00	1.664E 00	4.979E-02
13	1.91E 05	1.825E 00	1.484E 00	5.065E-01	8.421E 00	1.528E 00	5.864E-02
14	1.37E 05	2.199E 00	1.697E 00	2.458E-01	9.688E 00	1.006E 00	7.385E-02
15	5.57E 04	2.932E 00	2.165E 00	2.664E-02	1.090E 01	3.255E-01	8.995E-02
16	2.26E 04	3.890E 00	2.847E 00	7.314E-05	1.157E 01	1.239E-01	9.738E-02
17	9.21E 03	5.026E 00	3.771E 00	0.000E-01	1.179E 01	3.344E-02	1.000E-01
18	5.53E 03	7.568E 00	5.451E 00	0.000E-01	1.190E 01	3.373E-02	1.009E-01
19	1.52E 03	1.310E 01	8.987E 00	0.000E-01	1.248E 01	3.538E-02	1.058E-01
20	6.19E 02	2.177E 01	1.530E 01	0.000E-01	1.315E 01	3.728E-02	1.115E-01
21	2.52E 02	3.418E 01	2.053E 01	0.000E-01	1.322E 01	3.748E-02	1.121E-01
22	1.90E 02	3.538E 01	1.965E 01	0.000E-01	1.325E 01	3.758E-02	1.124E-01
23	1.35E 02	4.344E 01	2.294E 01	0.000E-01	1.328E 01	3.766E-02	1.127E-01
24	1.10E 02	5.324E 01	2.751E 01	0.000E-01	1.981E 01	5.617E-02	1.680E-01
25	8.20E 01	3.877E 01	2.184E 01	0.000E-01	1.336E 01	3.789E-02	1.134E-01
26	6.30E 01	6.910E 01	4.307E 01	0.000E-01	1.308E 01	3.709E-02	1.110E-01
27	4.50E 01	1.182E 02	4.914E 01	0.000E-01	1.520E 01	4.311E-02	1.290E-01
28	3.20E 01	4.964E 01	2.447E 01	0.000E-01	1.211E 01	3.435E-02	1.028E-01
29	2.60E 01	8.675E 01	4.225E 01	0.000E-01	1.287E 01	3.650E-02	1.092E-01
30	2.00E 01	1.044E 02	5.190E 01	0.000E-01	1.389E 01	3.938E-02	1.178E-01
31	1.50E 01	1.247E 02	4.774E 01	0.000E-01	1.345E 01	3.813E-02	1.141E-01
32	1.10E 01	1.092E 02	8.049E 01	0.000E-01	1.223E 01	3.468E-02	1.037E-01
33	8.00E 00	5.680E 01	2.372E 01	0.000E-01	1.174E 01	3.329E-02	9.960E-02
34	5.40E 00	3.149E 01	1.561E 01	0.000E-01	1.182E 01	3.350E-02	1.002E-01
35	3.15E 00	2.389E 01	1.574E 01	0.000E-01	1.281E 01	3.632E-02	1.087E-01
36	1.84E 00	1.789E 01	1.445E 01	0.000E-01	1.368E 01	3.880E-02	1.161E-01
37	1.40E 00	7.242E 01	5.934E 01	0.000E-01	1.419E 01	4.023E-02	1.203E-01
38	6.25E-01	1.235E 02	1.071E 02	0.000E-01	1.525E 01	4.323E-02	1.293E-01
39	4.00E-01	2.166E 02	1.758E 02	0.000E-01	1.560E 01	4.423E-02	1.323E-01
40	2.00E-01	5.930E 02	5.041E 02	0.000E-01	1.646E 01	4.666E-02	1.396E-01

MATERIAL U-238 ATOMIC MASS 238.126

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.093E 00	1.014E 00	8.652E-01	3.289E 00	3.043E 00	2.066E-03
2	7.19E 06	7.290E-01	6.630E-01	2.349E 00	4.293E 00	3.849E 00	3.735E-03
3	5.17E 06	5.795E-01	5.647E-01	2.602E 00	4.782E 00	4.070E 00	5.978E-03
4	3.72E 06	5.978E-01	5.720E-01	2.618E 00	4.735E 00	3.813E 00	7.739E-03
5	2.67E 06	6.216E-01	5.760E-01	2.626E 00	4.384E 00	2.956E 00	1.199E-02
6	1.92E 06	4.606E-01	3.781E-01	3.122E 00	3.579E 00	2.319E 00	1.058E-02
7	1.38E 06	1.820E-01	4.239E-02	2.598E 00	4.150E 00	2.368E 00	1.497E-02
8	9.93E 05	1.612E-01	1.141E-02	2.221E 00	4.637E 00	2.184E 00	2.061E-02
9	8.21E 05	1.415E-01	1.464E-03	1.871E 00	5.526E 00	2.318E 00	2.695E-02
10	5.13E 05	1.246E-01	1.456E-04	1.589E 00	6.761E 00	2.459E 00	3.613E-02
11	3.69E 05	1.316E-01	0.000E-01	1.264E 00	7.962E 00	2.106E 00	4.918E-02
12	2.65E 05	1.507E-01	0.000E-01	1.132E 00	9.001E 00	1.992E 00	5.887E-02
13	1.91E 05	1.784E-01	0.000E-01	9.456E-01	1.008E 01	1.829E 00	6.931E-02
14	1.37E 05	2.490E-01	0.000E-01	4.351E-01	1.173E 01	1.218E 00	8.832E-02
15	5.57E 04	4.431E-01	0.000E-01	1.162E-02	1.288E 01	3.843E-01	1.050E-01
16	2.26E 04	7.426E-01	0.000E-01	0.000E-01	1.339E 01	1.430E-01	1.113E-01
17	9.21E 03	1.018E 00	0.000E-01	0.000E-01	1.435E 01	4.018E-02	1.202E-01
18	5.53E 03	3.307E 01	0.000E-01	0.000E-01	6.320E 02	1.769E 00	5.293E 00
19	1.52E 03	3.122E 00	0.000E-01	0.000E-01	2.065E 01	5.782E-02	1.730E-01
20	6.19E 02	4.327E 00	0.000E-01	0.000E-01	1.635E 01	4.578E-02	1.370E-01
21	2.52E 02	1.450E 01	0.000E-01	0.000E-01	6.541E 01	1.831E-01	5.478E-01
22	1.90E 02	5.428E 00	0.000E-01	0.000E-01	2.896E 01	8.109E-02	2.426E-01
23	1.35E 02	1.904E 01	0.000E-01	0.000E-01	3.540E 01	9.910E-02	2.965E-01
24	1.10E 02	2.748E 01	0.000E-01	0.000E-01	8.361E 01	2.341E-01	7.003E-01
25	8.20E 01	6.395E 01	0.000E-01	0.000E-01	7.031E 01	1.968E-01	5.889E-01
26	6.30E 01	1.790E-01	0.000E-01	0.000E-01	1.025E 01	2.869E-02	8.582E-02
27	4.50E 01	1.445E 02	0.000E-01	0.000E-01	1.707E 02	4.779E-01	1.430E 00
28	3.20E 01	7.799E-01	0.000E-01	0.000E-01	7.514E 00	2.104E-02	6.293E-02
29	2.60E 01	2.545E 02	0.000E-01	0.000E-01	9.896E 01	2.771E-01	8.289E-01
30	2.00E 01	1.395E 00	0.000E-01	0.000E-01	5.988E 00	1.676E-02	5.015E-02
31	1.50E 01	3.262E-01	0.000E-01	0.000E-01	8.494E 00	2.378E-02	7.114E-02
32	1.10E 01	1.271E 00	0.000E-01	0.000E-01	9.842E 00	2.755E-02	8.243E-02
33	8.00E 00	3.752E 02	0.000E-01	0.000E-01	2.890E 01	8.092E-02	2.421E-01
34	5.40E 00	1.074E 00	0.000E-01	0.000E-01	6.455E 00	1.807E-02	5.406E-02
35	3.15E 00	4.945E-01	0.000E-01	0.000E-01	7.055E 00	1.975E-02	5.909E-02
36	1.84E 00	4.851E-01	0.000E-01	0.000E-01	7.208E 00	2.018E-02	6.037E-02
37	1.40E 00	5.393E-01	0.000E-01	0.000E-01	7.320E 00	2.049E-02	6.131E-02
38	6.25E-01	7.209E-01	0.000E-01	0.000E-01	7.401E 00	2.072E-02	6.198E-02
39	4.00E-01	9.671E-01	0.000E-01	0.000E-01	7.426E 00	2.079E-02	6.220E-02
40	2.00E-01	2.411E 00	0.000E-01	0.000E-01	7.448E 00	2.085E-02	6.238E-02

MATERIAL PU-239 ATOMIC MASS 239.128

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.911E 00	2.188E 00	4.550E-01	3.279E 00	3.033E 00	2.051E-03
2	7.19E 06	1.977E 00	1.776E 00	1.378E 00	4.252E 00	3.812E 00	3.684E-03
3	5.17E 06	1.746E 00	1.739E 00	1.782E 00	4.404E 00	3.749E 00	5.484E-03
4	3.72E 06	1.874E 00	1.864E 00	1.561E 00	4.540E 00	3.656E 00	7.390E-03
5	2.67E 06	1.967E 00	1.951E 00	1.213E 00	4.366E 00	2.944E 00	1.189E-02
6	1.92E 06	1.973E 00	1.948E 00	1.001E 00	4.082E 00	2.645E 00	1.202E-02
7	1.38E 06	1.781E 00	1.745E 00	8.779E-01	4.495E 00	2.565E 00	1.614E-02
8	9.93E 05	1.715E 00	1.657E 00	8.291E-01	4.877E 00	2.297E 00	2.158E-02
9	8.21E 05	1.740E 00	1.645E 00	7.976E-01	5.554E 00	2.329E 00	2.697E-02
10	5.13E 05	1.688E 00	1.557E 00	6.946E-01	6.551E 00	2.383E 00	3.486E-02
11	3.69E 05	1.657E 00	1.510E 00	5.521E-01	7.408E 00	1.960E 00	4.557E-02
12	2.65E 05	1.642E 00	1.469E 00	4.639E-01	8.190E 00	1.812E 00	5.334E-02
13	1.91E 05	1.730E 00	1.516E 00	3.965E-01	8.852E 00	1.606E 00	6.061E-02
14	1.37E 05	1.790E 00	1.563E 00	2.984E-01	1.001E 01	1.039E 00	7.504E-02
15	5.57E 04	2.114E 00	1.674E 00	2.345E-01	1.100E 01	3.280E-01	8.926E-02
16	2.26E 04	2.688E 00	1.916E 00	1.710E-01	1.177E 01	1.256E-01	9.743E-02
17	9.21E 03	3.762E 00	2.248E 00	1.042E-02	1.179E 01	3.288E-02	9.836E-02
18	5.53E 03	6.133E 00	3.042E 00	0.000E-01	1.165E 01	3.248E-02	9.716E-02
19	1.52E 03	9.820E 00	4.846E 00	0.000E-01	1.286E 01	3.587E-02	1.073E-01
20	6.19E 02	2.297E 01	1.216E 01	0.000E-01	1.194E 01	3.329E-02	9.958E-02
21	2.52E 02	2.757E 01	1.425E 01	0.000E-01	1.181E 01	3.292E-02	9.848E-02
22	1.90E 02	2.600E 01	1.365E 01	0.000E-01	1.289E 01	3.593E-02	1.075E-01
23	1.35E 02	5.335E 01	2.801E 01	0.000E-01	1.119E 01	3.119E-02	9.330E-02
24	1.10E 02	7.185E 01	4.002E 01	0.000E-01	1.464E 01	4.082E-02	1.221E-01
25	8.20E 01	1.091E 02	6.115E 01	0.000E-01	1.586E 01	4.422E-02	1.323E-01
26	6.30E 01	1.116E 02	4.880E 01	0.000E-01	2.109E 01	5.879E-02	1.759E-01
27	4.50E 01	5.363E 01	9.283E 00	0.000E-01	2.256E 01	6.290E-02	1.882E-01
28	3.20E 01	3.961E 01	1.816E 01	0.000E-01	1.219E 01	3.398E-02	1.017E-01
29	2.60E 01	5.585E 01	3.870E 01	0.000E-01	1.350E 01	3.764E-02	1.126E-01
30	2.00E 01	8.668E 01	5.751E 01	0.000E-01	1.326E 01	3.696E-02	1.106E-01
31	1.50E 01	2.431E 02	1.245E 02	0.000E-01	2.101E 01	5.856E-02	1.752E-01
32	1.10E 01	1.172E 02	9.301E 01	0.000E-01	9.964E 00	2.778E-02	8.311E-02
33	8.00E 00	1.135E 02	5.998E 01	0.000E-01	1.009E 01	2.813E-02	8.416E-02
34	5.40E 00	1.012E 01	8.812E 00	0.000E-01	1.049E 01	2.924E-02	8.748E-02
35	3.15E 00	1.543E 01	1.384E 01	0.000E-01	1.116E 01	3.111E-02	9.307E-02
36	1.84E 00	2.343E 01	2.069E 01	0.000E-01	1.164E 01	3.245E-02	9.707E-02
37	1.40E 00	6.250E 01	4.544E 01	0.000E-01	1.262E 01	3.517E-02	1.052E-01
38	6.25E-01	7.492E 02	4.682E 02	0.000E-01	1.767E 01	4.927E-02	1.474E-01
39	4.00E-01	2.205E 03	1.349E 03	0.000E-01	1.222E 01	3.406E-02	1.019E-01
40	2.00E-01	9.561E 02	6.918E 02	0.000E-01	1.102E 01	3.073E-02	9.193E-02

MATERIAL PU-240 ATOMIC MASS 240.054

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.510E 00	1.951E 00	4.408E-01	3.298E 00	3.050E 00	2.065E-03
2	7.19E 06	1.704E 00	1.678E 00	1.366E 00	4.289E 00	3.845E 00	3.703E-03
3	5.17E 06	1.463E 00	1.448E 00	1.708E 00	4.799E 00	4.084E 00	5.959E-03
4	3.72E 06	1.532E 00	1.506E 00	1.668E 00	4.754E 00	3.827E 00	7.726E-03
5	2.67E 06	1.594E 00	1.548E 00	1.606E 00	4.428E 00	2.983E 00	1.204E-02
6	1.92E 06	1.502E 00	1.435E 00	1.659E 00	3.991E 00	2.593E 00	1.165E-02
7	1.38E 06	1.633E 00	1.546E 00	1.393E 00	3.906E 00	2.231E 00	1.396E-02
8	9.93E 05	1.458E 00	1.340E 00	1.365E 00	4.230E 00	1.994E 00	1.862E-02
9	8.21E 05	9.051E-01	7.520E-01	1.527E 00	5.237E 00	2.198E 00	2.532E-02
10	5.13E 05	3.901E-01	2.654E-01	1.513E 00	6.682E 00	2.437E 00	3.537E-02
11	3.69E 05	2.928E-01	1.411E-01	1.288E 00	7.944E 00	2.103E 00	4.867E-02
12	2.65E 05	2.600E-01	1.087E-01	9.871E-01	9.219E 00	2.034E 00	5.986E-02
13	1.91E 05	3.091E-01	1.015E-01	6.917E-01	1.063E 01	1.920E 00	7.254E-02
14	1.37E 05	3.404E-01	8.765E-02	2.628E-01	1.269E 01	1.291E 00	9.494E-02
15	5.57E 04	6.586E-01	1.039E-01	-9.047E-02	1.476E 01	3.894E-01	1.197E-01
16	2.26E 04	8.483E-01	1.042E-01	0.000E-01	1.630E 01	-4.455E-02	1.361E-01
17	9.21E 03	1.100E 00	1.012E-01	0.000E-01	1.769E 01	4.914E-02	1.470E-01
18	5.53E 03	1.795E 00	1.425E-01	0.000E-01	2.015E 01	5.597E-02	1.674E-01
19	1.52E 03	3.939E 00	1.572E-01	0.000E-01	2.557E 01	7.101E-02	2.124E-01
20	6.19E 02	5.044E 01	1.539E-01	0.000E-01	2.646E 01	7.348E-02	2.198E-01
21	2.52E 02	1.004E 02	1.495E-01	0.000E-01	2.463E 01	6.840E-02	2.046E-01
22	1.90E 02	1.267E 02	1.472E-01	0.000E-01	2.367E 01	6.572E-02	1.966E-01
23	1.35E 02	1.498E 02	1.451E-01	0.000E-01	2.282E 01	6.337E-02	1.896E-01
24	1.10E 02	1.709E 02	1.433E-01	0.000E-01	2.205E 01	6.123E-02	1.832E-01
25	8.20E 01	1.944E 02	1.412E-01	0.000E-01	2.119E 01	5.883E-02	1.760E-01
26	6.30E 01	2.198E 02	1.389E-01	0.000E-01	2.026E 01	5.625E-02	1.683E-01
27	4.50E 01	2.484E 02	1.364E-01	0.000E-01	1.921E 01	5.334E-02	1.596E-01
28	3.20E 01	2.716E 02	1.343E-01	0.000E-01	1.836E 01	5.098E-02	1.525E-01
29	2.60E 01	2.915E 02	1.326E-01	0.000E-01	1.763E 01	4.896E-02	1.465E-01
30	2.00E 01	3.147E 02	1.305E-01	0.000E-01	1.678E 01	4.660E-02	1.394E-01
31	1.50E 01	3.400E 02	1.283E-01	0.000E-01	1.585E 01	4.403E-02	1.317E-01
32	1.10E 01	3.665E 02	1.259E-01	0.000E-01	1.488E 01	4.133E-02	1.236E-01
33	8.00E 00	3.966E 02	1.233E-01	0.000E-01	1.378E 01	3.827E-02	1.145E-01
34	5.40E 00	4.360E 02	1.198E-01	0.000E-01	1.234E 01	3.426E-02	1.025E-01
35	3.15E 00	4.815E 02	1.157E-01	0.000E-01	1.067E 01	2.963E-02	8.866E-02
36	1.84E 00	5.158E 02	1.127E-01	0.000E-01	9.415E 00	2.615E-02	7.823E-02
37	1.40E 00	5.255E 02	1.026E-01	0.000E-01	6.936E 00	1.926E-02	5.763E-02
38	6.25E-01	1.791E 02	3.325E-02	0.000E-01	2.076E-01	5.764E-04	1.725E-03
39	4.00E-01	1.447E 02	2.706E-02	0.000E-01	1.213E 00	3.368E-03	1.007E-02
40	2.00E-01	2.530E 02	4.692E-02	0.000E-01	2.123E 00	5.897E-03	1.764E-02

MATERIAL PU-241 ATOMIC MASS 241.057

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.871E 00	2.202E 00	2.042E-01	3.568E 00	3.300E 00	2.225E-03
2	7.19E 06	1.956E 00	1.716E 00	1.090E 00	4.566E 00	4.092E 00	3.926E-03
3	5.17E 06	1.470E 00	1.462E 00	1.362E 00	5.160E 00	4.390E 00	6.385E-03
4	3.72E 06	1.532E 00	1.521E 00	1.090E 00	5.349E 00	4.306E 00	8.655E-03
5	2.67E 06	1.744E 00	1.727E 00	8.557E-01	4.893E 00	3.297E 00	1.324E-02
6	1.92E 06	1.767E 00	1.738E 00	8.326E-01	4.473E 00	2.906E 00	1.301E-02
7	1.38E 06	1.668E 00	1.625E 00	9.317E-01	4.483E 00	2.561E 00	1.595E-02
8	9.93E 05	1.604E 00	1.551E 00	9.804E-01	4.799E 00	2.263E 00	2.104E-02
9	8.21E 05	1.591E 00	1.501E 00	9.372E-01	5.465E 00	2.294E 00	2.631E-02
10	5.13E 05	1.666E 00	1.539E 00	8.873E-01	6.373E 00	2.330E 00	3.354E-02
11	3.69E 05	1.851E 00	1.673E 00	8.279E-01	7.109E 00	1.882E 00	4.337E-02
12	2.65E 05	2.036E 00	1.824E 00	7.456E-01	7.926E 00	1.750E 00	5.124E-02
13	1.91E 05	2.260E 00	1.981E 00	6.492E-01	8.585E 00	1.553E 00	5.834E-02
14	1.37E 05	2.754E 00	2.294E 00	4.327E-01	9.264E 00	9.477E-01	6.900E-02
15	5.57E 04	3.608E 00	2.838E 00	7.281E-02	1.024E 01	2.769E-01	8.268E-02
16	2.26E 04	4.741E 00	3.593E 00	0.000E-01	1.071E 01	-2.019E-02	8.899E-02
17	9.21E 03	5.886E 00	4.410E 00	0.000E-01	1.091E 01	3.018E-02	9.030E-02
18	5.53E 03	8.848E 00	6.730E 00	0.000E-01	1.228E 01	3.396E-02	1.016E-01
19	1.32E 03	1.633E 01	1.189E 01	0.000E-01	1.167E 01	3.228E-02	9.658E-02
20	6.19E 02	2.596E 01	1.809E 01	0.000E-01	1.275E 01	3.526E-02	1.055E-01
21	2.52E 02	3.570E 01	2.449E 01	0.000E-01	1.139E 01	3.149E-02	9.422E-02
22	1.90E 02	4.128E 01	2.813E 01	0.000E-01	1.155E 01	3.194E-02	9.555E-02
23	1.35E 02	4.605E 01	3.125E 01	0.000E-01	1.210E 01	3.347E-02	1.001E-01
24	1.10E 02	5.104E 01	3.441E 01	0.000E-01	1.269E 01	3.509E-02	1.050E-01
25	8.20E 01	5.843E 01	3.886E 01	0.000E-01	1.357E 01	3.754E-02	1.123E-01
26	6.30E 01	6.746E 01	4.418E 01	0.000E-01	1.588E 01	4.393E-02	1.314E-01
27	4.50E 01	7.152E 01	4.636E 01	0.000E-01	1.635E 01	4.521E-02	1.353E-01
28	3.20E 01	7.020E 01	4.550E 01	0.000E-01	1.614E 01	4.464E-02	1.336E-01
29	2.60E 01	6.906E 01	4.476E 01	0.000E-01	1.596E 01	4.415E-02	1.321E-01
30	2.00E 01	6.774E 01	4.389E 01	0.000E-01	1.576E 01	4.358E-02	1.304E-01
31	1.50E 01	6.630E 01	4.295E 01	0.000E-01	1.553E 01	4.296E-02	1.285E-01
32	1.10E 01	6.478E 01	4.196E 01	0.000E-01	1.530E 01	4.231E-02	1.266E-01
33	8.00E 00	6.307E 01	4.084E 01	0.000E-01	1.503E 01	4.157E-02	1.244E-01
34	5.40E 00	6.082E 01	3.937E 01	0.000E-01	1.468E 01	4.060E-02	1.215E-01
35	3.15E 00	5.822E 01	3.767E 01	0.000E-01	1.428E 01	3.948E-02	1.181E-01
36	1.84E 00	5.627E 01	3.640E 01	0.000E-01	1.397E 01	3.864E-02	1.156E-01
37	1.40E 00	5.428E 01	3.619E 01	0.000E-01	1.359E 01	3.759E-02	1.125E-01
38	6.25E-01	2.094E 02	1.122E 02	0.000E-01	1.497E 01	4.140E-02	1.239E-01
39	4.00E-01	1.820E 03	1.168E 03	0.000E-01	1.234E 01	3.413E-02	1.021E-01
40	2.00E-01	1.214E 03	9.054E 02	0.000E-01	1.244E 01	3.440E-02	1.029E-01

MATERIAL PU-242 ATOMIC MASS 242.059

GROUP	EH	SIGA	SIGF	SIGI	SIGS	MU*SIGS	KSI*SIGS
1	1.00E 07	2.580E 00	1.951E 00	3.663E-01	3.297E 00	3.049E 00	2.048E-03
2	7.19E 06	1.730E 00	1.679E 00	1.338E 00	4.293E 00	3.848E 00	3.676E-03
3	5.17E 06	1.465E 00	1.448E 00	1.708E 00	4.790E 00	4.076E 00	5.898E-03
4	3.72E 06	1.536E 00	1.506E 00	1.664E 00	4.741E 00	3.816E 00	7.640E-03
5	2.67E 06	1.592E 00	1.546E 00	1.662E 00	4.349E 00	2.930E 00	1.173E-02
6	1.92E 06	1.481E 00	1.398E 00	2.064E 00	3.604E 00	2.338E 00	1.046E-02
7	1.38E 06	1.612E 00	1.483E 00	1.138E 00	4.178E 00	2.386E 00	1.480E-02
8	9.93E 05	1.351E 00	1.177E 00	1.009E 00	4.657E 00	2.196E 00	2.034E-02
9	8.21E 05	7.010E-01	5.023E-01	1.300E 00	5.537E 00	2.325E 00	2.654E-02
10	5.13E 05	3.435E-01	1.498E-01	1.346E 00	6.869E 00	2.503E 00	3.607E-02
11	3.69E 05	2.849E-01	7.198E-02	1.106E 00	8.439E 00	2.234E 00	5.127E-02
12	2.65E 05	2.834E-01	4.400E-02	9.974E-01	9.791E 00	2.161E 00	6.305E-02
13	1.91E 05	3.012E-01	2.434E-02	8.307E-01	1.072E 01	1.938E 00	7.256E-02
14	1.37E 05	4.242E-01	1.320E-02	2.900E-01	1.198E 01	1.225E 00	8.889E-02
15	5.57E 04	7.241E-01	1.000E-02	1.223E-02	1.269E 01	3.373E-01	1.021E-01
16	2.26E 04	1.144E 00	1.000E-02	0.000E-01	1.363E 01	-3.390E-02	1.129E-01
17	9.21E 03	1.471E 00	1.000E-02	0.000E-01	1.452E 01	3.999E-02	1.196E-01
18	5.53E 03	2.075E 00	1.000E-02	0.000E-01	1.667E 01	4.592E-02	1.374E-01
19	1.52E 03	3.623E 00	1.000E-02	0.000E-01	2.040E 01	5.619E-02	1.681E-01
20	6.19E 02	6.969E 00	9.789E-03	0.000E-01	2.480E 01	6.829E-02	2.043E-01
21	2.52E 02	1.410E 01	8.854E-03	0.000E-01	2.713E 01	7.472E-02	2.235E-01
22	1.90E 02	5.193E 01	8.238E-03	0.000E-01	2.647E 01	7.290E-02	2.181E-01
23	1.35E 02	9.028E 01	7.696E-03	0.000E-01	2.560E 01	7.051E-02	2.110E-01
24	1.10E 02	1.253E 02	7.203E-03	0.000E-01	2.481E 01	6.834E-02	2.045E-01
25	8.20E 01	1.644E 02	6.651E-03	0.000E-01	2.393E 01	6.591E-02	1.972E-01
26	6.30E 01	2.065E 02	6.057E-03	0.000E-01	2.298E 01	6.330E-02	1.894E-01
27	4.50E 01	2.540E 02	5.386E-03	0.000E-01	2.191E 01	6.034E-02	1.805E-01
28	3.20E 01	2.925E 02	4.843E-03	0.000E-01	2.104E 01	5.795E-02	1.734E-01
29	2.60E 01	3.255E 02	4.378E-03	0.000E-01	2.030E 01	5.590E-02	1.672E-01
30	2.00E 01	3.641E 02	3.833E-03	0.000E-01	1.943E 01	5.350E-02	1.601E-01
31	1.50E 01	4.060E 02	3.241E-03	0.000E-01	1.848E 01	5.090E-02	1.523E-01
32	1.10E 01	4.501E 02	2.619E-03	0.000E-01	1.749E 01	4.816E-02	1.441E-01
33	8.00E 00	5.000E 02	1.914E-03	0.000E-01	1.636E 01	4.506E-02	1.348E-01
34	5.40E 00	5.654E 02	9.913E-04	0.000E-01	1.488E 01	4.099E-02	1.226E-01
35	3.15E 00	3.329E 02	9.837E-05	0.000E-01	7.536E 00	2.075E-02	6.209E-02
36	1.84E 00	1.662E 01	1.000E-31	0.000E-01	5.563E 00	1.532E-02	4.584E-02
37	1.40E 00	1.016E 01	1.000E-31	0.000E-01	7.435E 00	2.048E-02	6.126E-02
38	6.25E-01	9.591E 00	1.000E-31	0.000E-01	8.395E 00	2.312E-02	6.917E-02
39	4.00E-01	1.129E 01	1.000E-31	0.000E-01	8.670E 00	2.388E-02	7.144E-02
40	2.00E-01	2.750E 01	1.000E-31	0.000E-01	8.933E 00	2.460E-02	7.360E-02