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Fusion Reactivity Graphs and Tables for Charged Particle Reactions

J. Rand McNally, Jr.

OAK RIDGE NATIONAL LABORATORY
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It is subject to revision or correction and therefore does not represent a
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ABSTRACT

Graphs and tables are presented on 31 light isotope fusion reaction parameters [$\langle\sigma v\rangle$, $n\langle\sigma v\rangle$, $\langle\sigma v\rangle Q_+$, $n\langle\sigma v\rangle Q_+$ (for $n = 10^{20}$ fuel ion species/m³ and Q_+ = energy release in charged particles)] in the kinetic temperature range 1 to 1000 keV.

The O-D (point model) advanced fusion fuels computer code currently in use at the Oak Ridge National Laboratory incorporates 31 light isotope reactions. This code uses the reactivity parameter $\langle\sigma v\rangle$ based on Maxwellian ion velocity distributions as a function of kinetic temperature from $T = 1$ to 1000 keV. Tabular data are given for $\langle\sigma v\rangle$, as are graphs of $\langle\sigma v\rangle$, $n\langle\sigma v\rangle$, $\langle\sigma v\rangle Q_+$, and $n\langle\sigma v\rangle Q_+$ (where $n = 10^{20}$ fuel ion species/m³ and Q_+ is the energy release in charged particles).

Inasmuch as these tables may provide a useful mini-handbook of fusion reaction data, it was deemed advisable to provide appropriate graphs as well as the basic $\langle\sigma v\rangle$ data tables in summary form to members of the fusion energy research community for comment, correction, and (most hopefully) upgrading of the basic $\langle\sigma v\rangle$ data.

It is hoped that the present survey will prompt nuclear data experts to expand and improve the scope of this technical memo so as to incorporate charged particle nuclear cross-section data of prime interest to both fusion researchers and nuclear astrophysicists. Since suprathermal or "fast" fusion reactions are becoming increasingly important and require cross sections or σv values for energies up to about 15 MeV for the fast particle, a more comprehensive "barn book" analogous to BNL-325 ("Neutron Cross Sections") should eventually incorporate this additional information. Interest has also been expressed for the temperature range below 1 keV for pellet fusion research (but see Refs. 1 and 2) and above $T = 1$ MeV for both fusion and astrophysical applications.

The earliest survey of light isotope reaction parameters for fusion applications may be the 1954 tables of Tuck,¹ who listed

thermonuclear reaction rate parameters, $\langle\sigma v\rangle$, for DD, DT, $D^3\text{He}$, and TT for temperatures from 0.05 keV to 100 keV. In 1956 Thompson² gave graphs of $\langle\sigma v\rangle$ for DD_p , DD_n , DT, $D^3\text{He}$, TT, $D^6\text{Li}$, and $D^7\text{Li}$ for the temperature range 0.01 keV to 100 keV; this was subsequently revised and published in the open literature in 1957.³ Also, at about this time the extensive Jarmie and Seagrave plots of charged particle cross sections appeared as LA-2014.⁴ A summary of cross-section graphs and tables and graphs of Maxwell averaged $\langle\sigma v\rangle$ values based on LA-2014 was published by Greene;⁵ this report included DD_p , DD_n , DT, $D^3\text{He}$, TT, $T^3\text{He}$, $D^6\text{Li}_n$, $D^6\text{Li}_p$, $D^6\text{Li}_t$, and $D^6\text{Li}_\alpha$ with $\langle\sigma v\rangle$ tabulated from 1 to 1000 keV.

Later published summaries included that of Crocker, Blow, and Watson;⁶ Duane;⁷ Miley, Towner, and Ivich;⁸ and Zimmerman, Fowler, and Caughlan⁹ — the latter being of special interest to astrophysicists and somewhat more extensive in heavy particle reaction data. No extensive search of the foreign literature has been made and we apologize for any omissions. Also included in our tables are some new data (in Table I) and the graphs (see references at the end of Table II). Table II summarizes the reactions incorporated in Table I.

Table I incorporates 31 light isotope reaction rate parameters, $\langle\sigma v\rangle$ in m^3/sec , vs kinetic temperature, T , from 1 to 10 keV with interpolated values every 0.2 keV, from 10 to 100 keV with interpolated values every 2 keV, and from 100 to 1000 keV with interpolated values every 20 keV. Here, $T = 2/3 \bar{E}$. For interpolation the logs of the $\langle\sigma v\rangle$ vs T values were interpolated between entries in the left-hand $\langle\sigma v\rangle$ column (2nd column) by the cubic spline method of H. Akima,¹⁰ as

available in the International Mathematical Subroutine Library. Table I is also available on the National Magnetic Fusion Energy Computer Center (NMFECC) A7600 computer from filem (user #26660, directory JRM1) and is named NSIGVDAT. As new (or useful older) data becomes available this filem will be updated and possibly expanded. Updated outputs can be made available on request for those not having access to the NMFECC A7600 computer.

Figures 1(a)-1(f) depict $\langle\sigma v\rangle$ and $n\langle\sigma v\rangle$ ($n = 10^{20} \text{ m}^{-3}$) for the various reactions in selected combinations of related reactions. Figures 2(a)-2(f) give $\langle\sigma v\rangle Q_+$ and $n\langle\sigma v\rangle Q_+$, where Q_+ (in MeV) is the charged particle energy release only. The latter illustrates the relative degree of reactivity in a hot plasma induced by the charged reaction products.

It should be noted, however, that reactions involving pairs of like nuclei occur at least twice as often as reactions between pairs of unlike particles; i.e., the reaction rate is

$$R.R. = \left\{ \begin{array}{ll} \frac{1}{2} n^2 \langle\sigma v\rangle & \text{for like particles (e.g., DD)} \\ \begin{array}{l} n_1 n_2 \langle\sigma v\rangle \\ \leq \frac{1}{4} n^2 \langle\sigma v\rangle \end{array} & \text{for unlike particles (e.g., DT),} \end{array} \right.$$

where $n = \text{fuel density} (= n_1 + n_2)$. Thus, the $n\langle\sigma v\rangle Q_+$ curves for DD (${}^3\text{He}{}^3\text{He}$, etc.) and DD-CAT (CAT = catalyzed, meaning the first generation products T and ${}^3\text{He}$ are burned up as fast as they are

generated¹¹⁾ underestimate the power deposition rate by at least a factor of two compared to DT for constant n .

Actual burn evaluations of T and ^3He burning indicate that about 50-80% of T and 25-50% of ^3He may be consumed in fusion reactions in a high temperature, steady-state DD burning mode.¹² To satisfy the catalyzed burn condition the unburned T and ^3He need be isotopically separated from p and α ashes and then fed as fuel make-up with new D fuel to provide a driven catalyzed burning condition (in a DT reactor unburned T must also be isotopically separated from the protons and also fed back with D fuel). The fractional burn of tritium is approximately $F = n_D \tau_p \langle \sigma v \rangle / (1 + n_D \tau_p \langle \sigma v \rangle)$ where τ_p = particle confinement time.

The $^3\text{He} + ^6\text{Li}$ reaction is incompletely known and data is only given for the $p + ^8\text{Be}^{0,1}$ channels. Hopefully, because of its importance to detailed evaluation of the $p + ^6\text{Li}$ chain reaction prospects,¹³ new and extensive measurements will be made of the $d + ^7\text{Be}$, the $p + 2\alpha$ three body breakup, and the $\alpha + ^5\text{Li}$ channels, the latter of which could have the largest cross section according to Bromley and Almquist.¹⁴ Gould and Boyce¹⁵ indicate that the three body breakup channel is roughly as probable as the $p + ^8\text{Be}^{0,1}$ channels. The study by Gould and Boyce may not have included the very low energy proton spectrum from the $\alpha + ^5\text{Li}$ ($^5\text{Li} \rightarrow p + \alpha$) channel. The total $\langle \sigma v \rangle$ for $^3\text{He} + ^6\text{Li}$ probably exceeds our tabulated values by a factor of at least two and possibly four or more (see Ref. 14, p. 273). The $d + ^7\text{Be}$ branch ($Q = +0.1$ MeV) has a significant cross section up to at

least 1.3 MeV.¹⁶ The nuclear physics of the complex $^3\text{He} + ^6\text{Li}$ reaction merits a comprehensive study.

Advanced pellet fuels may use Li, Be, B, C and/or N as carriers in various combinations of D and T as hydrides or hydrates [e.g., LiH, BeH₂, BH₃, (CH₂)₂, CH₄, NH₃, LiBeH₃, LiBH₄, etc.].¹⁷ Side reactions such as D^6Li , D^7Li , p^{11}B , p^9Be , $\text{t} + ^7\text{Li}$, etc. could be important contributors in the course of any large scale thermal excursions which may occur in some of these advanced pellet fuels after ignition. For neutron induced reactions which can occur in very thick pellets (large ρR) consult BNL-325.¹⁸ Such mixed pellet fuels have a higher ignition temperature than DT ($\rho_0 = 0.21 \text{ g/cm}^3$, $T_{\text{ign}} = 4 \text{ keV}$) because of the increased bremsstrahlung radiation but offer much increased initial density (ρ_0 up to 1.16 g/cm^3 , $T_{\text{ign}} \approx 10 \text{ keV}$); thus they permit reduced pellet compression,¹⁹ i.e., $C = (\rho R_{\text{ign}}/\rho_0 R_0)^{3/2}$.

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FIGURE CAPTIONS

Figs. 1(a)-1(f). Plots of Maxwellian averaged $\langle\sigma v\rangle$ and $n\langle\sigma v\rangle$ values vs T for $\langle\sigma v\rangle$ in m^3/sec , n in units of 10^{20} fuel particles/ m^3 , and T in keV.

Figs. 2(a)-2(f). Plots of $\langle\sigma v\rangle Q_+$ and $n\langle\sigma v\rangle Q_+$ values vs T for $\langle\sigma v\rangle$ in m^3/sec , n in units of 10^{20} fuel particles/ m^3 , Q_+ (charged particle energy release) in MeV, and T in keV.

Table I. Reactions, $\langle\sigma v\rangle$ tabular references, and selected energy releases in keV (inversely proportional to mass)

136 = JMAX (# ELEMENTS IN TABLE/REACTION): SEE DESCRIPTION AT END
 T(J) IN KEV SIGV1(J) IN M3/SEC 3-26-79

1.000000E+00	9.650000E-29	2.610000E-28	5.750000E-28	1.100000E-27	1.900000E-27
2.000000E+00	3.040000E-27	4.580000E-27	6.570000E-27	9.060000E-27	1.210000E-26
3.000000E+00	1.570000E-26	2.000000E-26	2.490000E-26	3.040000E-26	3.670000E-26
4.000000E+00	4.370000E-26	5.140000E-26	5.980000E-26	6.900000E-26	7.900000E-26
5.000000E+00	8.970000E-26	1.010000E-25	1.130000E-25	1.260000E-25	1.400000E-25
6.000000E+00	1.550000E-25	1.700000E-25	1.860000E-25	2.030000E-25	2.210000E-25
7.000000E+00	2.390000E-25	2.580000E-25	2.780000E-25	2.990000E-25	3.200000E-25
8.000000E+00	3.420000E-25	3.640000E-25	3.880000E-25	4.120000E-25	4.370000E-25
9.000000E+00	4.620000E-25	4.880000E-25	5.150000E-25	5.420000E-25	5.700000E-25
1.000000E+01	5.990000E-25	6.180000E-25	6.390000E-25	6.610000E-25	6.840000E-25
2.000000E+01	2.650000E-24	3.170000E-24	3.710000E-24	4.270000E-24	4.850000E-24
3.000000E+01	5.440000E-24	6.040000E-24	6.660000E-24	7.280000E-24	7.900000E-24
4.000000E+01	8.540000E-24	9.180000E-24	9.820000E-24	1.050000E-23	1.110000E-23
5.000000E+01	1.180000E-23	1.240000E-23	1.300000E-23	1.370000E-23	1.430000E-23
6.000000E+01	1.500000E-23	1.560000E-23	1.630000E-23	1.690000E-23	1.760000E-23
7.000000E+01	1.820000E-23	1.890000E-23	1.950000E-23	2.010000E-23	2.070000E-23
8.000000E+01	2.130000E-23	2.200000E-23	2.260000E-23	2.320000E-23	2.380000E-23
9.000000E+01	2.440000E-23	2.500000E-23	2.560000E-23	2.620000E-23	2.680000E-23
1.000000E+02	2.740000E-23	3.320000E-23	3.860000E-23	4.370000E-23	4.850000E-23
2.000000E+02	5.320000E-23	5.760000E-23	6.180000E-23	6.580000E-23	6.970000E-23
3.000000E+02	7.330000E-23	7.660000E-23	8.020000E-23	8.350000E-23	8.660000E-23
4.000000E+02	8.960000E-23	9.250000E-23	9.530000E-23	9.800000E-23	1.010000E-22
5.000000E+02	1.030000E-22	1.060000E-22	1.080000E-22	1.100000E-22	1.130000E-22
6.000000E+02	1.150000E-22	1.170000E-22	1.190000E-22	1.210000E-22	1.230000E-22
7.000000E+02	1.250000E-22	1.270000E-22	1.290000E-22	1.300000E-22	1.320000E-22
8.000000E+02	1.340000E-22	1.360000E-22	1.370000E-22	1.390000E-22	1.400000E-22
9.000000E+02	1.420000E-22	1.430000E-22	1.440000E-22	1.460000E-22	1.470000E-22
1.000000E+03	1.480000E-22				

A01 SIGV1 D+D => 3HE(817)+N(2450) REF 1

T(J) IN KEV SIGV2(J) IN M3/SEC

1.000000E+00	9.660000E-29	2.610000E-28	5.760000E-28	1.100000E-27	1.910000E-27
2.000000E+00	3.050000E-27	4.590000E-27	6.580000E-27	9.070000E-27	1.210000E-26
3.000000E+00	1.570000E-26	1.990000E-26	2.480000E-26	3.040000E-26	3.660000E-26
4.000000E+00	4.350000E-26	5.110000E-26	5.950000E-26	6.860000E-26	7.840000E-26
5.000000E+00	8.900000E-26	1.000000E-25	1.120000E-25	1.250000E-25	1.390000E-25
6.000000E+00	1.530000E-25	1.680000E-25	1.830000E-25	2.000000E-25	2.170000E-25
7.000000E+00	2.350000E-25	2.530000E-25	2.720000E-25	2.920000E-25	3.120000E-25
8.000000E+00	3.330000E-25	3.550000E-25	3.770000E-25	4.000000E-25	4.230000E-25
9.000000E+00	4.480000E-25	4.720000E-25	4.970000E-25	5.230000E-25	5.490000E-25
1.000000E+01	5.760000E-25	6.020000E-25	6.290000E-25	6.570000E-25	6.860000E-25
2.000000E+01	2.410000E-24	2.850000E-24	3.310000E-24	3.790000E-24	4.270000E-24
3.000000E+01	4.760000E-24	5.250000E-24	5.750000E-24	6.260000E-24	6.770000E-24
4.000000E+01	7.280000E-24	7.790000E-24	8.300000E-24	8.810000E-24	9.320000E-24
5.000000E+01	9.840000E-24	1.030000E-23	1.080000E-23	1.140000E-23	1.190000E-23
6.000000E+01	1.240000E-23	1.290000E-23	1.340000E-23	1.390000E-23	1.440000E-23
7.000000E+01	1.490000E-23	1.540000E-23	1.590000E-23	1.640000E-23	1.690000E-23
8.000000E+01	1.730000E-23	1.780000E-23	1.830000E-23	1.880000E-23	1.930000E-23
9.000000E+01	1.970000E-23	2.020000E-23	2.070000E-23	2.120000E-23	2.160000E-23
1.000000E+02	2.210000E-23	2.660000E-23	3.090000E-23	3.510000E-23	3.900000E-23
2.000000E+02	4.290000E-23	4.650000E-23	5.010000E-23	5.350000E-23	5.680000E-23
3.000000E+02	6.000000E-23	6.310000E-23	6.610000E-23	6.900000E-23	7.180000E-23
4.000000E+02	7.450000E-23	7.720000E-23	8.020000E-23	8.220000E-23	8.460000E-23
5.000000E+02	8.700000E-23	8.920000E-23	9.140000E-23	9.350000E-23	9.550000E-23
6.000000E+02	9.750000E-23	9.930000E-23	1.010000E-22	1.030000E-22	1.040000E-22
7.000000E+02	1.060000E-22	1.080000E-22	1.090000E-22	1.100000E-22	1.120000E-22
8.000000E+02	1.130000E-22	1.140000E-22	1.150000E-22	1.160000E-22	1.170000E-22
9.000000E+02	1.180000E-22	1.190000E-22	1.200000E-22	1.200000E-22	1.210000E-22
1.000000E+03	1.220000E-22				

A02 SIGV2 D+D => T(1008)+P(3024) REF 1

Table I (continued)

T(J) IN KEV SIGV3(J) IN M3/SEC

1.000000E+00	6.270000E-27	1.860000E-26	4.440000E-26	9.110000E-26	1.670000E-25
2.000000E+00	2.830000E-25	4.470000E-25	6.720000E-25	9.670000E-25	1.340000E-24
3.000000E+00	1.810000E-24	2.380000E-24	3.060000E-24	3.060000E-24	4.790000E-24
4.000000E+00	5.860000E-24	7.070000E-24	8.430000E-24	9.950000E-24	1.160000E-23
5.000000E+00	1.350000E-23	1.550000E-23	1.770000E-23	2.000000E-23	2.260000E-23
6.000000E+00	2.530000E-23	2.810000E-23	3.120000E-23	3.440000E-23	3.700000E-23
7.000000E+00	4.140000E-23	4.520000E-23	4.910000E-23	5.310000E-23	5.740000E-23
8.000000E+00	6.170000E-23	6.630000E-23	7.090000E-23	7.570000E-23	8.070000E-23
9.000000E+00	8.570000E-23	9.090000E-23	9.620000E-23	1.020000E-22	1.070000E-22
1.000000E+01	1.130000E-22	1.740000E-22	2.390000E-22	3.060000E-22	3.700000E-22
2.000000E+01	4.310000E-22	4.080000E-22	5.390000E-22	5.060000E-22	6.260000E-22
3.000000E+01	6.650000E-22	6.960000E-22	7.270000E-22	7.530000E-22	7.740000E-22
4.000000E+01	7.930000E-22	8.090000E-22	8.230000E-22	8.350000E-22	8.450000E-22
5.000000E+01	8.540000E-22	8.610000E-22	8.660000E-22	8.700000E-22	8.740000E-22
6.000000E+01	8.760000E-22	8.770000E-22	8.780000E-22	8.780000E-22	8.770000E-22
7.000000E+01	8.760000E-22	8.743000E-22	8.720000E-22	8.700000E-22	8.670000E-22
8.000000E+01	8.640000E-22	8.610000E-22	8.570000E-22	8.540000E-22	8.500000E-22
9.000000E+01	8.460000E-22	8.420000E-22	8.370000E-22	8.330000E-22	8.290000E-22
1.000000E+02	8.240000E-22	7.770000E-22	7.310000E-22	6.890000E-22	6.500000E-22
2.000000E+02	6.160000E-22	5.850000E-22	5.570000E-22	5.320000E-22	5.100000E-22
3.000000E+02	4.900000E-22	4.720000E-22	4.550000E-22	4.400000E-22	4.260000E-22
4.000000E+02	4.130000E-22	4.010000E-22	3.910000E-22	3.810000E-22	3.710000E-22
5.000000E+02	3.630000E-22	3.560000E-22	3.470000E-22	3.400000E-22	3.340000E-22
6.000000E+02	3.280000E-22	3.220000E-22	3.160000E-22	3.110000E-22	3.070000E-22
7.000000E+02	3.020000E-22	2.980000E-22	2.940000E-22	2.900000E-22	2.860000E-22
8.000000E+02	2.830000E-22	2.790000E-22	2.760000E-22	2.730000E-22	2.700000E-22
9.000000E+02	2.690000E-22	2.650000E-22	2.620000E-22	2.600000E-22	2.580000E-22
1.000000E+03	2.550000E-22				

A03 SIGV3 D+T => A(3517)+N(14069)

REF 1

T(J) IN KEV SIGV4(J) IN M3/SEC

1.000000E+00	3.280000E-29	1.020000E-28	2.520000E-28	5.290000E-28	9.840000E-28
2.000000E+00	1.680000E-27	2.660000E-27	4.080000E-27	5.750000E-27	7.960000E-27
3.000000E+00	1.070000E-26	1.400000E-26	1.790000E-26	2.240000E-26	2.760000E-26
4.000000E+00	3.350000E-26	4.010000E-26	4.750000E-26	5.560000E-26	6.450000E-26
5.000000E+00	7.420000E-26	8.470000E-26	9.600000E-26	1.080000E-25	1.210000E-25
6.000000E+00	1.350000E-25	1.490000E-25	1.640000E-25	1.800000E-25	1.970000E-25
7.000000E+00	2.140000E-25	2.320000E-25	2.510000E-25	2.710000E-25	2.910000E-25
8.000000E+00	3.120000E-25	3.340000E-25	3.560000E-25	3.790000E-25	4.030000E-25
9.000000E+00	4.270000E-25	4.520000E-25	4.770000E-25	5.030000E-25	5.300000E-25
1.000000E+01	5.570000E-25	5.540000E-25	1.190000E-24	1.560000E-24	1.960000E-24
2.000000E+01	2.370000E-24	2.000000E-24	3.240000E-24	3.880000E-24	4.130000E-24
3.000000E+01	4.590000E-24	5.040000E-24	5.500000E-24	5.950000E-24	6.410000E-24
4.000000E+01	6.870000E-24	7.330000E-24	7.780000E-24	8.230000E-24	8.680000E-24
5.000000E+01	9.120000E-24	9.570000E-24	1.000000E-23	1.040000E-23	1.090000E-23
6.000000E+01	1.130000E-23	1.170000E-23	1.220000E-23	1.260000E-23	1.300000E-23
7.000000E+01	1.340000E-23	1.390000E-23	1.430000E-23	1.470000E-23	1.510000E-23
8.000000E+01	1.550000E-23	1.590000E-23	1.630000E-23	1.670000E-23	1.710000E-23
9.000000E+01	0.175000E-22	0.179200E-22	0.183400E-22	0.187400E-22	0.191200E-22
0.100000E+03	0.195000E-22	0.234800E-22	0.279400E-22	0.327800E-22	0.377800E-22
0.200000E+03	0.426700E-22	0.473600E-22	0.519200E-22	0.562000E-22	0.600700E-22
0.300000E+03	0.633700E-22	0.663900E-22	0.694000E-22	0.722500E-22	0.747800E-22
0.400000E+03	0.767900E-22	0.784800E-22	0.801200E-22	0.816200E-22	0.828900E-22
0.500000E+03	0.838400E-22	0.845800E-22	0.852600E-22	0.858400E-22	0.862900E-22
0.600000E+03	0.865500E-22	0.867100E-22	0.868400E-22	0.869000E-22	0.869100E-22
0.700000E+03	0.865400E-22	0.861200E-22	0.857600E-22	0.853600E-22	0.849500E-22
0.800000E+03	0.845400E-22	0.841200E-22	0.837100E-22	0.832900E-22	0.828600E-22
0.900000E+03	0.824200E-22	0.819300E-22	0.813700E-22	0.807600E-22	0.801000E-22
0.100000E+04	0.794300E-22				

A04 SIGV4 T+T => A(1259)+N(5034)+N(5034)

REF 1.2

Table I (continued)

Y(J) IN KEY SIGV5(J) IN M3/SEC

1.000000E+00	0.	0.	0.	0.	0.
2.000000E+00	0.	0.	0.	0.	0.
3.000000E+00	0.	0.	0.	0.	0.
4.000000E+00	0.	0.	0.	0.	0.
5.000000E+00	0.	0.	0.	0.	0.
6.000000E+00	0.	0.	0.	0.	0.
7.000000E+00	0.	0.	0.	0.	0.
8.000000E+00	0.	0.	0.	0.	0.
9.000000E+00	0.	0.	0.	0.	0.
0.100000E+02	0.115600E-25	0.249700E-25	0.511500E-25	0.974100E-25	0.169100E-24
0.200000E+02	0.262300E-24	0.376600E-24	0.523900E-24	0.704200E-24	0.911800E-24
0.300000E+02	0.113400E-23	0.138200E-23	0.168200E-23	0.202800E-23	0.241100E-23
0.400000E+02	0.280500E-23	0.322000E-23	0.368600E-23	0.415500E-23	0.473500E-23
0.500000E+02	0.528700E-23	0.586100E-23	0.648000E-23	0.713700E-23	0.782100E-23
0.600000E+02	0.851500E-23	0.923000E-23	0.998500E-23	0.107700E-22	0.115800E-22
0.700000E+02	0.124000E-22	0.132400E-22	0.141100E-22	0.150100E-22	0.159300E-22
0.800000E+02	0.168500E-22	0.177800E-22	0.187400E-22	0.197200E-22	0.207400E-22
0.900000E+02	0.217800E-22	0.228500E-22	0.239400E-22	0.250300E-22	0.260900E-22
0.100000E+03	0.271200E-22	0.301200E-22	0.308600E-22	0.318400E-22	0.329300E-22
0.200000E+03	0.917700E-22	0.104900E-21	0.119000E-21	0.133500E-21	0.147700E-21
0.300000E+03	0.160600E-21	0.173000E-21	0.186300E-21	0.199900E-21	0.213200E-21
0.400000E+03	0.225600E-21	0.237400E-21	0.249600E-21	0.261900E-21	0.273900E-21
0.500000E+03	0.285200E-21	0.296200E-21	0.307300E-21	0.318400E-21	0.329300E-21
0.600000E+03	0.339700E-21	0.349800E-21	0.360000E-21	0.370100E-21	0.380000E-21
0.700000E+03	0.389500E-21	0.398800E-21	0.408200E-21	0.417400E-21	0.426400E-21
0.800000E+03	0.435200E-21	0.443800E-21	0.452300E-21	0.460800E-21	0.469100E-21
0.900000E+03	0.477200E-21	0.485200E-21	0.493100E-21	0.500900E-21	0.508600E-21
0.100000E+04	0.516100E-21				

A05 SIGV5 T+3HE => D(9546)+A(4773) 41% OF SIGV5 REF 2
P(5374)+A(1344)+N(5374) 55% OF SIGV5 REF 2
P(10077)+A(403)+N(1612) 4% OF SIGV5 REF 2

T(J) IN KEY SIGV6(J) IN M3/SEC

1.000000E+00	3.100000E-32	1.800000E-31	7.280000E-31	2.310000E-30	6.110000E-30
2.000000E+00	1.410000E-29	2.940000E-29	5.630000E-29	1.010000E-28	1.700000E-28
3.000000E+00	2.730000E-28	4.220000E-28	6.290000E-28	9.090000E-28	1.280000E-27
4.000000E+00	1.750000E-27	2.360000E-27	3.110000E-27	4.030000E-27	5.140000E-27
5.000000E+00	6.460000E-27	8.030000E-27	9.070000E-27	1.200000E-26	1.450000E-26
6.000000E+00	1.730000E-26	2.050000E-26	2.410000E-26	2.810000E-26	3.260000E-26
7.000000E+00	3.760000E-26	4.320000E-26	4.930000E-26	5.610000E-26	6.350000E-26
8.000000E+00	7.150000E-26	8.030000E-26	8.980000E-26	1.000000E-25	1.110000E-25
9.000000E+00	1.230000E-25	1.360000E-25	1.500000E-25	1.650000E-25	1.810000E-25
1.000000E+01	1.970000E-25	4.330000E-25	8.170000E-25	1.390000E-24	2.190000E-24
2.000000E+01	3.260000E-24	4.610000E-24	6.280000E-24	8.270000E-24	1.060000E-23
3.000000E+01	1.320000E-23	1.620000E-23	1.950000E-23	2.300000E-23	2.680000E-23
4.000000E+01	3.090000E-23	3.520000E-23	3.960000E-23	4.420000E-23	4.890000E-23
5.000000E+01	5.370000E-23	5.870000E-23	6.360000E-23	6.870000E-23	7.370000E-23
6.000000E+01	7.880000E-23	8.380000E-23	8.880000E-23	9.380000E-23	9.870000E-23
7.000000E+01	1.040000E-22	1.080000E-22	1.130000E-22	1.180000E-22	1.220000E-22
8.000000E+01	1.270000E-22	1.310000E-22	1.360000E-22	1.400000E-22	1.440000E-22
9.000000E+01	1.480000E-22	1.520000E-22	1.560000E-22	1.600000E-22	1.630000E-22
1.000000E+02	1.670000E-22	1.970000E-22	2.190000E-22	2.340000E-22	2.450000E-22
2.000000E+02	2.520000E-22	2.570000E-22	2.590000E-22	2.610000E-22	2.610000E-22
3.000000E+02	2.600000E-22	2.590000E-22	2.580000E-22	2.560000E-22	2.540000E-22
4.000000E+02	2.520000E-22	2.500000E-22	2.480000E-22	2.450000E-22	2.440000E-22
5.000000E+02	2.420000E-22	2.400000E-22	2.380000E-22	2.360000E-22	2.340000E-22
6.000000E+02	2.330000E-22	2.310000E-22	2.290000E-22	2.280000E-22	2.260000E-22
7.000000E+02	2.240000E-22	2.220000E-22	2.200000E-22	2.200000E-22	2.190000E-22
8.000000E+02	2.180000E-22	2.160000E-22	2.150000E-22	2.140000E-22	2.130000E-22
9.000000E+02	2.120000E-22	2.110000E-22	2.100000E-22	2.090000E-22	2.080000E-22
1.000000E+03	2.070000E-22				

A06 SIGV6 D+3HE => P(14681)+A(3670)

REF 1

Table I (continued)

T(J) IN KEV	SIGV7(J) IN M3/SEC				
1.000000E+00	2.990000E-37	1.721191E-36	9.900027E-36	5.703547E-35	3.283245E-34
2.000000E+00	1.890000E-33	4.377672E-33	1.013970E-32	2.340585E-32	5.439864E-32
3.000000E+00	1.260000E-31	2.135001E-31	3.617652E-31	6.129924E-31	1.038685E-30
4.000000E+00	1.760000E-30	2.548315E-30	3.689727E-30	5.342387E-30	7.735287E-30
5.000000E+00	1.120000E-29	1.483088E-29	1.963886E-29	2.600553E-29	3.443620E-29
6.000000E+00	4.560000E-29	5.698682E-29	7.121715E-29	8.900090E-29	1.112256E-28
7.000000E+00	1.390000E-28	1.668118E-28	2.001885E-28	2.402432E-28	2.883125E-28
8.000000E+00	3.460000E-28	4.034673E-28	4.704797E-28	5.486220E-28	6.397434E-28
9.000000E+00	7.460000E-28	8.508699E-28	9.704829E-28	1.106911E-27	1.262518E-27
1.000000E+01	1.440000E-27	3.003029E-27	6.262629E-27	1.306032E-26	2.723647E-26
2.000000E+02	0.568000E-25	0.842880E-25	0.122200E-24	0.172100E-24	0.234100E-24
3.000000E+02	0.306000E-24	0.388200E-24	0.484600E-24	0.594800E-24	0.714000E-24
4.000000E+02	0.840000E-24	0.976600E-24	0.113200E-23	0.130300E-23	0.143500E-23
5.000000E+02	0.167000E-23	0.186200E-23	0.207100E-23	0.229300E-23	0.252500E-23
6.000000E+02	0.276000E-23	0.300300E-23	0.326000E-23	0.352900E-23	0.380400E-23
7.000000E+02	0.408000E-23	0.436000E-23	0.465100E-23	0.495000E-23	0.525400E-23
8.000000E+02	0.556000E-23	0.586800E-23	0.618400E-23	0.650700E-23	0.683900E-23
9.000000E+02	0.718000E-23	0.752900E-23	0.788000E-23	0.822900E-23	0.856800E-23
0.100000E+03	0.009000E-23	0.123000E-22	0.161700E-22	0.202700E-22	0.242900E-22
0.200000E+03	0.279000E-22	0.313300E-22	0.349400E-22	0.385500E-22	0.410000E-22
0.300000E+03	0.449000E-22	0.476200E-22	0.504900E-22	0.533700E-22	0.561000E-22
0.400000E+03	0.585000E-22	0.606900E-22	0.629200E-22	0.651200E-22	0.672400E-22
0.500000E+03	0.692000E-22	0.710800E-22	0.729700E-22	0.748400E-22	0.766300E-22
0.600000E+03	0.783000E-22	0.798900E-22	0.814600E-22	0.829900E-22	0.844800E-22
0.700000E+03	0.859000E-22	0.872800E-22	0.886500E-22	0.900100E-22	0.913300E-22
0.800000E+03	0.926000E-22	0.938400E-22	0.950600E-22	0.962700E-22	0.974500E-22
0.900000E+03	0.986000E-22	0.997200E-22	0.100800E-21	0.101900E-21	0.103000E-21
0.100000E+04	0.104000E-21				

A07 SIGV7 D+6L1 => 7BE(423)+N(2957)

REF 3

T(J) IN KEV	SIGV8(J) IN M3/SEC				
1.000000E+00	2.810000E-37	1.618262E-36	9.319472E-36	5.367033E-35	3.090842E-34
2.000000E+00	1.780000E-33	4.132111E-33	9.592330E-33	2.226777E-32	5.169266E-32
3.000000E+00	1.200000E-31	2.029394E-31	3.432033E-31	5.804127E-31	9.815715E-31
4.000000E+00	1.660000E-30	2.405177E-30	3.484872E-30	5.049241E-30	7.315867E-30
5.000000E+00	1.060000E-29	1.405214E-29	1.862856E-29	2.469539E-29	3.273804E-29
6.000000E+00	4.340000E-29	5.429528E-29	6.792575E-29	8.497800E-29	1.063112E-28
7.000000E+00	1.330000E-28	1.597013E-28	1.917635E-28	2.302625E-28	2.764907E-28
8.000000E+00	3.320000E-28	3.871620E-28	4.514895E-28	5.265054E-28	6.139850E-28
9.000000E+00	7.160000E-28	8.164056E-28	9.308918E-28	1.061432E-27	1.210279E-27
1.000000E+01	1.380000E-27	2.893246E-27	6.065854E-27	1.271740E-26	2.666275E-26
2.000000E+02	0.559000E-25	0.832000E-25	0.121200E-24	0.171400E-24	0.234800E-24
3.000000E+02	0.307000E-24	0.390900E-24	0.489600E-24	0.602100E-24	0.725800E-24
4.000000E+02	0.856000E-24	0.997200E-24	0.115800E-23	0.133500E-23	0.152500E-23
5.000000E+02	0.172000E-23	0.192400E-23	0.214600E-23	0.238300E-23	0.263000E-23
6.000000E+02	0.288000E-23	0.313600E-23	0.340700E-23	0.368900E-23	0.397900E-23
7.000000E+02	0.427000E-23	0.456700E-23	0.487700E-23	0.519700E-23	0.552300E-23
8.000000E+02	0.585000E-23	0.618000E-23	0.651700E-23	0.686200E-23	0.721600E-23
9.000000E+02	0.758000E-23	0.795300E-23	0.832800E-23	0.870000E-23	0.906000E-23
0.100000E+03	0.940000E-23	0.129500E-22	0.169300E-22	0.210800E-22	0.250800E-22
0.200000E+03	0.786000E-22	0.319000E-22	0.353600E-22	0.388100E-22	0.420400E-22
0.300000E+03	0.448000E-22	0.473200E-22	0.499600E-22	0.526200E-22	0.551500E-22
0.400000E+03	0.574000E-22	0.594500E-22	0.616100E-22	0.637000E-22	0.656900E-22
0.500000E+03	0.675000E-22	0.692000E-22	0.709000E-22	0.725600E-22	0.741400E-22
0.600000E+03	0.756000E-22	0.769900E-22	0.783800E-22	0.797300E-22	0.810500E-22
0.700000E+03	0.823000E-22	0.835100E-22	0.847200E-22	0.859100E-22	0.870700E-22
0.800000E+03	0.882000E-22	0.893000E-22	0.903900E-22	0.914700E-22	0.924900E-22

A08 SIGV8 D+6L1 => 7LI(628)+P(4398)

REF 3

Table I (continued)

T(J) IN KEY SIGV9(J) IN M3/SEC

1.000000E+00	1.020000E-37	1.053011E-36	6.092492E-36	3.524986E-35	2.039480E-34
2.000000E+00	1.180000E-33	2.743721E-33	6.379670E-33	1.483396E-32	3.449176E-32
3.000000E+00	8.020000E-32	1.361302E-31	2.310656E-31	3.922077E-31	6.657283E-31
4.000000E+00	1.130000E-30	1.642864E-30	2.388498E-30	3.472550E-30	5.048610E-30
5.000000E+00	7.340000E-30	9.752838E-30	1.295805E-29	1.721878E-29	2.287904E-29
6.000000E+00	3.040000E-29	3.809991E-29	4.775019E-29	5.984471E-29	7.500269E-29
7.000000E+00	9.400000E-29	1.131924E-28	1.363036E-28	1.641334E-28	1.976454E-28
8.000000E+00	2.300000E-28	2.782671E-28	3.253474E-28	3.803930E-28	4.447521E-28
9.000000E+00	5.200000E-28	5.950076E-28	6.800348E-28	7.790426E-28	8.914162E-28
1.000000E+01	1.020000E-27	2.182995E-27	4.672032E-27	9.99057E-27	2.139992E-26
0.200000E+02	0.458000E-25	0.695400E-25	0.103100E-24	0.140500E-24	0.206600E-24
0.300000E+02	0.276000E-24	0.357800E-24	0.456100E-24	0.570700E-24	0.700000E-24
0.400000E+02	0.840000E-24	0.995800E-24	0.117600E-23	0.137900E-23	0.160000E-23
0.500000E+02	0.183000E-23	0.207400E-23	0.234200E-23	0.263300E-23	0.294100E-23
0.600000E+02	0.326000E-23	0.359500E-23	0.395500E-23	0.433600E-23	0.473400E-23
0.700000E+02	0.514000E-23	0.555800E-23	0.599800E-23	0.645800E-23	0.693300E-23
0.800000E+02	0.742000E-23	0.792000E-23	0.843700E-23	0.897200E-23	0.952600E-23
0.900000E+02	0.101000E-22	0.106900E-22	0.112900E-22	0.118800E-22	0.124500E-22
0.100000E+03	0.130000E-22	0.139800E-22	0.149800E-22	0.160000E-22	0.170000E-22
0.200000E+03	0.501000E-22	0.574600E-22	0.653700E-22	0.734800E-22	0.813000E-22
0.300000E+03	0.882000E-22	0.946700E-22	0.101600E-21	0.108700E-21	0.115600E-21
0.400000E+03	0.122000E-21	0.128100E-21	0.134500E-21	0.140900E-21	0.147100E-21
0.500000E+03	0.153000E-21	0.158700E-21	0.164500E-21	0.170200E-21	0.175700E-21
0.600000E+03	0.181000E-21	0.186100E-21	0.191200E-21	0.196300E-21	0.201300E-21
0.700000E+03	0.206000E-21	0.210600E-21	0.215300E-21	0.219900E-21	0.224500E-21
0.800000E+03	0.229000E-21	0.233500E-21	0.237900E-21	0.242300E-21	0.246700E-21
0.900000E+03	0.251000E-21	0.255200E-21	0.259300E-21	0.263300E-21	0.267200E-21
0.100000E+04	0.271000E-21				

A09 SIGV9 D+6LI => P(1618)+A(484)+T(539)

REF 3

T(J) IN KEY SIGVA(J) IN M3/SEC

1.000000E+00	2.220000E-37	1.277343E-36	7.349579E-36	4.228806E-35	2.433171E-34
2.000000E+00	1.400000E-33	3.239003E-33	7.493683E-33	1.733723E-32	4.011101E-32
3.000000E+00	9.280000E-32	1.568403E-31	2.651015E-31	4.400687E-31	7.573157E-31
4.000000E+00	1.280000E-30	1.852617E-30	2.681401E-30	3.880947E-30	5.617123E-30
5.000000E+00	8.130000E-30	1.075907E-29	1.423835E-29	1.884274E-29	2.493612E-29
6.000000E+00	3.300000E-29	4.119178E-29	5.141716E-29	6.410080E-29	8.011292E-29
7.000000E+00	1.000000E-28	1.199196E-28	1.438071E-28	1.724530E-28	2.068051E-28
8.000000E+00	2.480000E-28	2.890058E-28	3.367919E-28	3.924792E-28	4.573743E-28
9.000000E+00	5.330000E-28	6.068782E-28	6.909967E-28	7.867752E-28	8.958290E-28
1.000000E+01	1.020000E-27	2.115023E-27	4.385615E-27	9.093006E-27	1.885650E-26
0.200000E+02	0.391000E-25	0.577100E-25	0.832200E-25	0.116600E-24	0.157700E-24
0.300000E+02	0.205000E-24	0.258600E-24	0.320900E-24	0.391100E-24	0.467200E-24
0.400000E+02	0.546000E-24	0.630300E-24	0.725300E-24	0.829100E-24	0.938900E-24
0.500000E+02	0.105000E-23	0.116500E-23	0.128900E-23	0.142000E-23	0.155500E-23
0.600000E+02	0.169000E-23	0.182700E-23	0.197100E-23	0.211900E-23	0.227000E-23
0.700000E+02	0.242000E-23	0.257200E-23	0.272900E-23	0.289800E-23	0.305100E-23
0.800000E+02	0.321000E-23	0.336800E-23	0.352700E-23	0.368900E-23	0.385300E-23
0.900000E+02	0.402000E-23	0.419100E-23	0.436200E-23	0.453800E-23	0.469100E-23
0.100000E+03	0.484000E-23	0.631200E-23	0.783500E-23	0.929500E-23	0.105800E-22
0.200000E+03	0.116000E-22	0.124900E-22	0.133900E-22	0.142500E-22	0.150100E-22
0.300000E+03	0.156000E-22	0.160900E-22	0.166000E-22	0.171100E-22	0.175000E-22
0.400000E+03	0.180000E-22	0.183000E-22	0.187800E-22	0.191700E-22	0.195400E-22
0.500000E+03	0.199000E-22	0.202400E-22	0.205900E-22	0.209400E-22	0.212700E-22
0.600000E+03	0.216000E-22	0.219700E-22	0.222400E-22	0.225700E-22	0.228900E-22
0.700000E+03	0.232000E-22	0.235100E-22	0.238300E-22	0.241500E-22	0.244700E-22
0.800000E+03	0.240000E-22	0.251300E-22	0.254700E-22	0.258100E-22	0.261500E-22
0.900000E+03	0.265000E-22	0.268400E-22	0.271700E-22	0.274000E-22	0.277900E-22
0.100000E+04	0.201000E-22				

A10 SIGVA D+6LI => A(11187)+A(11187)

REF 3

Table I (continued)

T(J) IN KEV	SIGVB(J) IN M3/SEC				
1.000000E+00	1.450000E-37	8.360420E-37	4.820463E-36	2.779393E-35	1.602546E-34
2.000000E+00	9.240000E-34	2.142965E-33	4.970032E-33	1.152665E-32	2.673297E-32
3.000000E+00	6.200000E-32	1.049577E-31	1.776795E-31	3.007878E-31	5.091942E-31
4.000000E+00	8.620000E-31	1.250116E-30	1.812983E-30	2.629205E-30	3.813127E-30
5.000000E+00	5.530000E-30	7.328269E-30	9.711314E-30	1.286929E-29	1.705120E-29
6.000000E+00	2.260000E-29	2.826880E-29	3.535956E-29	4.422893E-29	5.532303E-29
7.000000E+00	6.920000E-29	8.311769E-29	9.983468E-29	1.199140E-28	1.440316E-28
8.000000E+00	1.730000E-28	2.018417E-28	2.354919E-28	2.747522E-28	3.205577E-28
9.000000E+00	3.740000E-28	4.268201E-28	4.871000E-28	5.550935E-28	6.344024E-28
1.000000E+01	7.240000E-28	1.519690E-27	3.189860E-27	6.695582E-27	1.405416E-26
0.200000E+02	0.295000E-25	0.440100E-25	0.641500E-25	0.908200E-25	0.124200E-24
0.300000E+02	0.163000E-24	0.207700E-24	0.260300E-24	0.320400E-24	0.386800E-24
0.400000E+02	0.457000E-24	0.533700E-24	0.621200E-24	0.718300E-24	0.822300E-24
0.500000E+02	0.929000E-24	0.104000E-23	0.116200E-23	0.129200E-23	0.142900E-23
0.600000E+02	0.157000E-23	0.171700E-23	0.187300E-23	0.203000E-23	0.220900E-23
0.700000E+02	0.238000E-23	0.255500E-23	0.273800E-23	0.292800E-23	0.312200E-23
0.800000E+02	0.332000E-23	0.352200E-23	0.373000E-23	0.394500E-23	0.416900E-23
0.900000E+02	0.440000E-23	0.463800E-23	0.488000E-23	0.512200E-23	0.536000E-23
0.100000E+03	0.559000E-23	0.810500E-23	0.111000E-22	0.144100E-22	0.178000E-22
0.200000E+03	0.210000E-22	0.241700E-22	0.275700E-22	0.310600E-22	0.344200E-22
0.300000E+03	0.374000E-22	0.402000E-22	0.431800E-22	0.462200E-22	0.491500E-22
0.400000E+03	0.518000E-22	0.542900E-22	0.568400E-22	0.593900E-22	0.610400E-22
0.500000E+03	0.641000E-22	0.662500E-22	0.684300E-22	0.705700E-22	0.726500E-22
0.600000E+03	0.746000E-22	0.764800E-22	0.783700E-22	0.802300E-22	0.820500E-22
0.700000E+03	0.838000E-22	0.855000E-22	0.872000E-22	0.888000E-22	0.905200E-22
0.800000E+03	0.921000E-22	0.936400E-22	0.951500E-22	0.966400E-22	0.980900E-22
0.900000E+03	0.995000E-22	0.100900E-21	0.102200E-21	0.103500E-21	0.104900E-21
0.100000E+04	0.106000E-21				

A11 SIGVB D+6LI => 3HE(378)+A(284)+N(1134)

REF 3

T(J) IN KEV	SIGVC(J) IN M3/SEC				
0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+02	0.655000E-29	0.142000E-28	0.294000E-28	0.576000E-28	0.106000E-27
0.300000E+02	0.179000E-27	0.286000E-27	0.445000E-27	0.668000E-27	0.968000E-27
0.400000E+02	0.135000E-26	0.184000E-26	0.250000E-26	0.335000E-26	0.442000E-26
0.500000E+02	0.569000E-26	0.721000E-26	0.909000E-26	0.114000E-25	0.140000E-25
0.600000E+02	0.171000E-25	0.206000E-25	0.248000E-25	0.296000E-25	0.351000E-25
0.700000E+02	0.411000E-25	0.478000E-25	0.555000E-25	0.640000E-25	0.734000E-25
0.800000E+02	0.836000E-25	0.947000E-25	0.107000E-24	0.120000E-24	0.135000E-24
0.900000E+02	0.151000E-24	0.169000E-24	0.187000E-24	0.207000E-24	0.227000E-24
0.100000E+03	0.247000E-24	0.515000E-24	0.753000E-24	0.157000E-23	0.234000E-23
0.200000E+03	0.315000E-23	0.403000E-23	0.508000E-23	0.627000E-23	0.751000E-23
0.300000E+03	0.860000E-23	0.984000E-23	0.111000E-22	0.126000E-22	0.140000E-22
0.400000E+03	0.153000E-22	0.166000E-22	0.179000E-22	0.193000E-22	0.207000E-22
0.500000E+03	0.220000E-22	0.233000E-22	0.246000E-22	0.259000E-22	0.272000E-22
0.600000E+03	0.285000E-22	0.297000E-22	0.310000E-22	0.322000E-22	0.334000E-22
0.700000E+03	0.346000E-22	0.357000E-22	0.368000E-22	0.379000E-22	0.390000E-22
0.800000E+03	0.400000E-22	0.410000E-22	0.420000E-22	0.430000E-22	0.440000E-22
0.900000E+03	0.449000E-22	0.453000E-22	0.467000E-22	0.476000E-22	0.484000E-22
0.100000E+04	0.492000E-22				

A12 SIGVC 3HE+6LI => P(12390)+A(2245)+A(2245)

REF 4

Table I (continued)

T(J) IN KEV SIGVD(J) IN M3/SEC

1.000000E+00	5.428000E-53	5.280000E-48	1.862000E-44	8.292000E-42	9.327000E-40
2.000000E+00	4.012000E-38	8.590000E-37	1.091000E-35	9.287000E-35	5.773000E-34
3.000000E+00	2.792000E-33	1.102000E-32	3.682000E-32	1.070000E-31	2.769000E-31
4.000000E+00	6.487000E-31	1.397000E-30	2.796000E-30	5.253000E-30	9.341000E-30
5.000000E+00	1.583000E-29	2.569000E-29	4.016000E-29	6.070000E-29	8.902000E-29
6.000000E+00	1.271000E-28	1.771000E-28	2.414000E-28	3.227000E-28	4.235000E-28
7.000000E+00	5.470000E-28	6.959000E-28	8.734000E-28	1.083000E-27	1.326000E-27
8.000000E+00	1.608000E-27	1.931000E-27	2.298000E-27	2.712000E-27	3.176000E-27
9.000000E+00	3.692000E-27	4.265000E-27	4.896000E-27	5.588000E-27	6.344000E-27
1.000000E+01	7.167000E-27	1.955000E-26	4.092000E-26	7.308000E-26	1.175000E-25
2.000000E+01	1.756000E-25	2.481000E-25	3.359000E-25	4.393000E-25	5.588000E-25
3.000000E+01	6.945000E-25	8.466000E-25	1.015000E-24	1.208000E-24	1.401000E-24
4.000000E+01	1.618000E-24	1.850000E-24	2.098000E-24	2.361000E-24	2.639000E-24
5.000000E+01	2.930000E-24	3.236000E-24	3.554000E-24	3.885000E-24	4.227000E-24
6.000000E+01	4.581000E-24	4.946000E-24	5.321000E-24	5.706000E-24	6.100000E-24
7.000000E+01	6.502000E-24	6.913000E-24	7.331000E-24	7.756000E-24	8.188000E-24
8.000000E+01	8.626000E-24	9.070000E-24	9.519000E-24	9.973000E-24	1.043000E-23
9.000000E+01	1.090000E-23	1.136000E-23	1.183000E-23	1.231000E-23	1.279000E-23
1.000000E+02	1.327000E-23	1.819000E-23	2.322000E-23	2.830000E-23	3.380000E-23
2.000000E+02	3.845000E-23	4.351000E-23	4.857000E-23	5.360000E-23	5.861000E-23
3.000000E+02	6.358000E-23	6.852000E-23	7.340000E-23	7.822000E-23	8.297000E-23
4.000000E+02	8.763000E-23	9.222000E-23	9.671000E-23	1.011000E-22	1.054000E-22
5.000000E+02	1.096000E-22	1.137000E-22	1.176000E-22	1.215000E-22	1.252000E-22
6.000000E+02	1.289000E-22	1.324000E-22	1.358000E-22	1.392000E-22	1.424000E-22
7.000000E+02	1.455000E-22	1.485000E-22	1.514000E-22	1.543000E-22	1.570000E-22
8.000000E+02	1.596000E-22	1.622000E-22	1.647000E-22	1.671000E-22	1.694000E-22
9.000000E+02	1.716000E-22	1.738000E-22	1.759000E-22	1.779000E-22	1.798000E-22
1.000000E+03	1.817000E-22				

A13 SIGVD P+6LI => 3HE(2298)+A(1724)

REF 4

T(J) IN KEV SIGVE(J) IN M3/SEC

1.000000E+00	6.248073E-42	1.236762E-40	1.523416E-39	1.189332E-38	8.753124E-38
2.000000E+00	3.553074E-37	1.126229E-36	3.705180E-36	9.023742E-36	3.581069E-35
3.000000E+00	7.679157E-35	1.319664E-34	2.013351E-34	4.782962E-34	9.019706E-34
4.000000E+00	1.434234E-33	2.075086E-33	3.391451E-33	5.726910E-33	8.639465E-33
5.000000E+00	1.212912E-32	1.687653E-32	2.573613E-32	3.664982E-32	4.961762E-32
6.000000E+00	6.463952E-32	9.021606E-32	1.221718E-31	1.597895E-31	2.030689E-31
7.000000E+00	2.623214E-31	3.395038E-31	4.292032E-31	5.316594E-31	6.553853E-31
8.000000E+00	8.195594E-31	1.088711E-30	1.222840E-30	1.462272E-30	1.778353E-30
9.000000E+00	2.138970E-30	2.544148E-30	2.993863E-30	3.534832E-30	4.162055E-30
1.000000E+01	4.860153E-30	1.875119E-29	5.500759E-29	1.335866E-28	2.847868E-28
2.000000E+01	5.448750E-28	9.325781E-28	1.537726E-27	2.334615E-27	3.484482E-27
3.000000E+01	4.924700E-27	6.844492E-27	9.189044E-27	1.200029E-26	1.551893E-26
4.000000E+01	1.963613E-26	2.449768E-26	3.011926E-26	3.657577E-26	4.382579E-26
5.000000E+01	5.186932E-26	6.079361E-26	7.096463E-26	8.211852E-26	9.425528E-26
6.000000E+01	1.073749E-25	1.216898E-25	1.370958E-25	1.535747E-25	1.711267E-25
7.000000E+01	1.900601E-25	2.104334E-25	2.320871E-25	2.550213E-25	2.792231E-25
8.000000E+01	3.046649E-25	3.313690E-25	3.593355E-25	3.885653E-25	4.192072E-25
9.000000E+01	4.511682E-25	4.844483E-25	5.190474E-25	5.549657E-25	5.922030E-25
1.000000E+02	6.307594E-25	1.087775E-24	1.667903E-24	2.361956E-24	3.168375E-24
2.000000E+02	4.073524E-24	5.076392E-24	6.163758E-24	7.340049E-24	8.589610E-24
3.000000E+02	9.918522E-24	1.132145E-23	1.270995E-23	1.436417E-23	1.601417E-23
4.000000E+02	1.774833E-23	1.956664E-23	2.140294E-23	2.350559E-23	2.562383E-23
5.000000E+02	2.783765E-23	3.015207E-23	3.259388E-23	3.514710E-23	3.780052E-23
6.000000E+02	4.056615E-23	4.350377E-23	4.658193E-23	4.979540E-23	5.314412E-23
7.000000E+02	5.662810E-23	6.024734E-23	6.400183E-23	6.700150E-23	7.191659E-23
8.000000E+02	7.607605E-23	8.037237E-23	8.480315E-23	8.936919E-23	9.407040E-23
9.000000E+02	9.090703E-23	1.030788E-22	1.089859E-22	1.142202E-22	1.196058E-22
1.000000E+03	1.251186E-22				

A14 SIGVE 3HE+3HE => P(5716)+P(5716)+A(1429)

REF 5

Table I (continued)

T(J) IN KEV SIGVF(J) IN M3/SEC

1.000000E+00	2.225530E-48	8.846070E-45	3.204950E-42	2.622990E-40	8.018990E-39
2.000000E+00	1.236790E-37	1.163820E-36	7.577700E-36	3.722370E-35	1.466830E-34
3.000000E+00	4.848930E-34	1.390310E-33	3.546570E-33	8.208990E-33	1.750970E-32
4.000000E+00	3.484450E-32	6.534060E-32	1.163990E-31	1.983040E-31	3.248910E-31
5.000000E+00	5.142650E-31	7.895550E-31	1.179700E-30	1.720300E-30	2.454430E-30
6.000000E+00	3.433600E-30	4.718750E-30	6.381290E-30	8.504340E-30	1.118410E-29
7.000000E+00	1.453140E-29	1.867360E-29	2.375660E-29	2.994700E-29	3.743520E-29
8.000000E+00	4.643820E-29	5.720250E-29	7.000840E-29	8.517290E-29	1.030550E-28
9.000000E+00	1.240570E-28	1.486350E-28	1.772940E-28	2.106000E-28	2.491820E-28
1.000000E+01	2.937330E-28	1.274270E-27	4.204040E-27	1.108410E-26	2.447560E-26
2.000000E+01	4.717130E-26	8.196640E-26	1.315800E-25	1.986850E-25	2.859770E-25
3.000000E+01	3.962570E-25	5.324890E-25	6.978360E-25	8.956660E-25	1.129540E-24
4.000000E+01	1.403180E-24	1.720430E-24	2.085190E-24	2.501340E-24	2.972720E-24
5.000000E+01	3.503030E-24	4.095750E-24	4.754150E-24	5.481170E-24	6.279420E-24
6.000000E+01	7.151150E-24	8.098190E-24	9.121990E-24	1.022350E-23	1.140350E-23
7.000000E+01	1.266190E-23	1.399880E-23	1.541340E-23	1.690480E-23	1.847190E-23
8.000000E+01	2.011300E-23	2.182630E-23	2.360970E-23	2.546090E-23	2.737760E-23
9.000000E+01	2.935690E-23	3.139620E-23	3.349260E-23	3.564310E-23	3.784400E-23
1.000000E+02	4.009450E-23	6.456900E-23	9.073050E-23	1.165030E-22	1.406570E-22
2.000000E+02	1.626120E-22	1.821960E-22	1.994730E-22	2.146260E-22	2.278820E-22
3.000000E+02	2.394920E-22	2.496510E-22	2.585960E-22	2.664980E-22	2.735170E-22
4.000000E+02	2.797060E-22	2.854220E-22	2.905210E-22	2.951670E-22	2.994290E-22
5.000000E+02	3.033660E-22	3.070270E-22	3.104550E-22	3.136830E-22	3.167430E-22
6.000000E+02	3.196570E-22	3.224490E-22	3.251350E-22	3.277300E-22	3.302400E-22
7.000000E+02	3.326970E-22	3.350880E-22	3.374270E-22	3.397210E-22	3.419740E-22
8.000000E+02	3.441910E-22	3.463760E-22	3.485300E-22	3.506570E-22	3.527570E-22
9.000000E+02	3.548330E-22	3.568040E-22	3.589120E-22	3.609180E-22	3.629000E-22
1.000000E+03	3.648590E-22				

A15 SIGVF P+11B => A(2000)+A(2000)+A(2000)

REF 6

T(J) IN KEV SIGVG(J) IN M3/SEC

1.000000E+00	1.597226E-36	1.248193E-35	6.675035E-35	2.661966E-34	9.088807E-34
2.000000E+00	2.487753E-33	5.528370E-33	1.234449E-32	2.291921E-32	4.950713E-32
3.000000E+00	8.734842E-32	1.364431E-31	1.967911E-31	3.200658E-31	4.900010E-31
4.000000E+00	6.964105E-31	9.392942E-31	1.289958E-30	1.791615E-30	2.388674E-30
5.000000E+00	3.081133E-30	3.914954E-30	5.082869E-30	6.445915E-30	8.084092E-30
6.000000E+00	9.757399E-30	1.203218E-29	1.466813E-29	1.763771E-29	2.094093E-29
7.000000E+00	2.484056E-29	2.938646E-29	3.444273E-29	4.000937E-29	4.624193E-29
8.000000E+00	5.347981E-29	6.144808E-29	7.014673E-29	7.957968E-29	9.036211E-29
9.000000E+00	1.021094E-28	1.148215E-28	1.284984E-28	1.435801E-28	1.600425E-28
1.000000E+01	1.777143E-28	4.416189E-28	9.105077E-28	1.650410E-27	2.732166E-27
2.000000E+01	4.201040E-27	6.077516E-27	8.462629E-27	1.132300E-26	1.478386E-26
3.000000E+01	1.879657E-26	2.339843E-26	2.857865E-26	3.446426E-26	4.105598E-26
4.000000E+01	4.829996E-26	5.618190E-26	6.474523E-26	7.402561E-26	8.400331E-26
5.000000E+01	9.467834E-26	1.060535E-25	1.181403E-25	1.309305E-25	1.444240E-25
6.000000E+01	1.586208E-25	1.733935E-25	1.888047E-25	2.048651E-25	2.215747E-25
7.000000E+01	2.387727E-25	2.564286E-25	2.746254E-25	2.933633E-25	3.126422E-25
8.000000E+01	3.324621E-25	3.528230E-25	3.737250E-25	3.951657E-25	4.167800E-25
9.000000E+01	4.387963E-25	4.612144E-25	4.840345E-25	5.072565E-25	5.308803E-25
1.000000E+02	5.549061E-25	8.104665E-25	1.087239E-24	1.377774E-24	1.679017E-24
2.000000E+02	1.991803E-24	2.317440E-24	2.661216E-24	3.023604E-24	3.439045E-24
3.000000E+02	3.094161E-24	4.426264E-24	5.024545E-24	5.703430E-24	6.463006E-24
4.000000E+02	7.300731E-24	8.216604E-24	9.195713E-24	1.022902E-23	1.132815E-23
5.000000E+02	1.249311E-23	1.370852E-23	1.490990E-23	1.614374E-23	1.741005E-23
6.000000E+02	1.870801E-23	1.998055E-23	2.125440E-23	2.253563E-23	2.382399E-23
7.000000E+02	2.506861E-23	2.625984E-23	2.742401E-23	2.856114E-23	2.967121E-23
8.000000E+02	3.075423E-23	3.181020E-23	3.283912E-23	3.384098E-23	3.481500E-23
9.000000E+02	3.576356E-23	3.668427E-23	3.757793E-23	3.844454E-23	3.928410E-23
1.000000E+03	4.009661E-23				

A16 SIGVG P+7LI => A(8674)+A(8674)

REF 5

Table I (continued)

T(J) IN KEV SIGVH(J) IN M3/SEC

1.000000E+00	2.174972E-37	2.634161E-36	2.073949E-35	1.131411E-34	5.433681E-34
2.000000E+00	1.821460E-33	4.758154E-33	1.282475E-32	2.683084E-32	7.564635E-32
3.000000E+00	1.480579E-31	2.440654E-31	3.636690E-31	6.942409E-31	1.176799E-30
4.000000E+00	1.774406E-30	2.487063E-30	3.688820E-30	5.606369E-30	7.948883E-30
5.000000E+00	1.071396E-29	1.422672E-29	1.983968E-29	2.657700E-29	3.443891E-29
6.000000E+00	4.342518E-29	5.654432E-29	7.231861E-29	9.849416E-29	1.110710E-28
7.000000E+00	1.370213E-28	1.689093E-28	2.051977E-28	2.458864E-28	2.930218E-28
8.000000E+00	3.510690E-28	4.164111E-28	4.890481E-28	5.698432E-28	6.663577E-28
9.000000E+00	7.747633E-28	8.942599E-28	1.024848E-27	1.174525E-27	1.342435E-27
1.000000E+01	1.525945E-27	4.663250E-27	1.132609E-26	2.353689E-26	4.355455E-26
2.000000E+01	7.417354E-26	1.163519E-25	1.750501E-25	2.487380E-25	3.449296E-25
3.000000E+01	4.607064E-25	6.028378E-25	7.693628E-25	9.643302E-25	1.187764E-24
4.000000E+01	1.442273E-24	1.729290E-24	2.048091E-24	2.402415E-24	2.789122E-24
5.000000E+01	3.209012E-24	3.663415E-24	4.157907E-24	4.680468E-24	5.255097E-24
6.000000E+01	5.857795E-24	6.500810E-24	7.182056E-24	7.901174E-24	8.658163E-24
7.000000E+01	9.458344E-24	1.027721E-23	1.114014E-23	1.203914E-23	1.297165E-23
8.000000E+01	1.393212E-23	1.492506E-23	1.595045E-23	1.700836E-23	1.810690E-23
9.000000E+01	1.924098E-23	2.041062E-23	2.161502E-23	2.285657E-23	2.413287E-23
1.000000E+02	2.544472E-23	4.016212E-23	5.741862E-23	7.674253E-23	9.775125E-23
2.000000E+02	1.201410E-22	1.437662E-22	1.677896E-22	1.925538E-22	2.178501E-22
3.000000E+02	2.437595E-22	2.699090E-22	2.964067E-22	3.226948E-22	3.487702E-22
4.000000E+02	3.747254E-22	4.005504E-22	4.260933E-22	4.512139E-22	4.760640E-22
5.000000E+02	5.006436E-22	5.249942E-22	5.492901E-22	5.734057E-22	5.973410E-22
6.000000E+02	6.210959E-22	6.442455E-22	6.669906E-22	6.893910E-22	7.114227E-22
7.000000E+02	7.332278E-22	7.548317E-22	7.761651E-22	7.972280E-22	8.180204E-22
8.000000E+02	8.385423E-22	8.57937E-22	8.787745E-22	8.984848E-22	9.179246E-22
9.000000E+02	9.370339E-22	9.559927E-22	9.746210E-22	9.929780E-22	1.011066E-21
1.000000E+03	1.028803E-21				

A17 SIGVH D+7LI => N(10082)+A(2521)+A(2521)

REF 5

T(J) IN KEV SIGVI(J) IN M3/SEC

1.000000E+00	5.843883E-39	9.208190E-38	9.178436E-37	6.063819E-36	3.640856E-35
2.000000E+00	1.361316E-34	3.931225E-34	1.179366E-33	2.665879E-33	9.004412E-33
3.000000E+00	1.850238E-32	3.139978E-32	4.745661E-32	1.013362E-31	1.821522E-31
4.000000E+00	2.030871E-31	4.041411E-31	6.305839E-31	1.014093E-30	1.488107E-30
5.000000E+00	2.052868E-30	2.796164E-30	4.087234E-30	5.659908E-30	7.514187E-30
6.000000E+00	9.650071E-30	1.301874E-29	1.715299E-29	2.197254E-29	2.747739E-29
7.000000E+00	3.475617E-29	4.401550E-29	5.469231E-29	6.670662E-29	8.112588E-29
8.000000E+00	9.951562E-29	1.204933E-28	1.440588E-28	1.702392E-28	2.032698E-28
9.000000E+00	2.405023E-28	2.819368E-28	3.275733E-28	3.814749E-28	4.432066E-28
1.000000E+01	5.114307E-28	1.764293E-27	4.791652E-27	1.002767E-26	2.169783E-26
2.000000E+01	3.933637E-26	6.473732E-26	1.026761E-25	1.516945E-25	2.192125E-25
3.000000E+01	3.023483E-25	4.091503E-25	5.372871E-25	6.927316E-25	8.755184E-25
4.000000E+01	1.088599E-24	1.333691E-24	1.613379E-24	1.932033E-24	2.287236E-24
5.000000E+01	2.678908E-24	3.109562E-24	3.588483E-24	4.100883E-24	4.670761E-24
6.000000E+01	5.274119E-24	5.929578E-24	6.631921E-24	7.380252E-24	8.174569E-24
7.000000E+01	9.020237E-24	9.910273E-24	1.086590E-23	1.186313E-23	1.290676E-23
8.000000E+01	1.398984E-23	1.511801E-23	1.629126E-23	1.750975E-23	1.879714E-23
9.000000E+01	2.013063E-23	2.153422E-23	2.298392E-23	2.448771E-23	2.604561E-23
1.000000E+02	2.765762E-23	4.633091E-23	6.945232E-23	9.670615E-23	1.273136E-22
2.000000E+02	1.610334E-22	1.977090E-22	2.364591E-22	2.775456E-22	3.195072E-22
3.000000E+02	3.629116E-22	4.072257E-22	4.526040E-22	4.986366E-22	5.453213E-22
4.000000E+02	5.927274E-22	6.408548E-22	6.889390E-22	7.365195E-22	7.841893E-22
5.000000E+02	8.319494E-22	8.797164E-22	9.271421E-22	9.744775E-22	1.021723E-21
6.000000E+02	1.060078E-21	1.115305E-21	1.161319E-21	1.206971E-21	1.252263E-21
7.000000E+02	1.297194E-21	1.341764E-21	1.385974E-21	1.429023E-21	1.473311E-21
8.000000E+02	1.516439E-21	1.559206E-21	1.601612E-21	1.643657E-21	1.685342E-21
9.000000E+02	1.726666E-21	1.767630E-21	1.808233E-21	1.848475E-21	1.888356E-21
1.000000E+03	1.927077E-21				

A18 SIGVI T+7LI => N(6049)+N(6049)+A(1512)+A(1512)

REF 5

Table I (continued)

T(J) IN KEY SIGVJ(J) IN M3/SEC

1.000000E+00	1.525961E-50	1.161848E-48	5.582734E-47	1.197673E-45	3.720008E-44
2.000000E+00	2.061344E-43	1.309807E-42	6.623920E-42	3.292113E-41	3.084664E-40
3.000000E+00	7.445990E-40	1.341319E-39	2.098626E-39	1.157158E-38	2.706717E-38
4.000000E+00	4.689894E-38	7.106688E-38	1.707861E-37	3.892159E-37	6.708341E-37
5.000000E+00	1.015541E-36	1.630082E-36	3.379899E-36	5.640879E-36	8.413022E-36
6.000000E+00	1.169633E-35	2.077940E-35	3.306452E-35	4.810535E-35	6.590192E-35
7.000000E+00	9.882314E-35	1.492165E-34	2.106840E-34	2.832279E-34	3.842055E-34
8.000000E+00	5.515183E-34	7.544628E-34	9.930430E-34	1.260202E-33	1.741265E-33
9.000000E+00	2.311271E-33	2.978303E-33	3.742350E-33	4.845466E-33	6.261716E-33
1.000000E+01	7.911420E-33	5.977707E-32	3.107902E-31	1.209024E-30	4.042608E-30
2.000000E+01	1.080743E-29	2.589554E-29	5.256394E-29	9.515209E-29	1.809750E-28
3.000000E+01	2.986464E-28	5.060525E-28	7.864247E-28	1.213125E-27	1.706571E-27
4.000000E+01	2.576148E-27	3.617182E-27	5.001597E-27	6.862255E-27	9.125677E-27
5.000000E+01	1.179187E-26	1.500387E-26	1.935586E-26	2.442010E-26	3.019579E-26
6.000000E+01	3.668293E-26	4.499269E-26	5.457927E-26	6.534890E-26	7.730158E-26
7.000000E+01	9.135968E-26	1.076983E-25	1.258403E-25	1.457858E-25	1.680191E-25
8.000000E+01	1.935976E-25	2.216647E-25	2.522206E-25	2.852848E-25	3.239743E-25
9.000000E+01	3.662262E-25	4.121845E-25	4.618011E-25	5.150762E-25	5.720096E-25
1.000000E+02	6.326014E-25	1.529914E-24	3.071314E-24	5.445744E-24	8.855142E-24
2.000000E+02	1.346057E-23	1.927054E-23	2.644957E-23	3.495200E-23	4.509091E-23
3.000000E+02	5.674469E-23	7.001996E-23	8.408503E-23	1.012247E-22	1.190359E-22
4.000000E+02	1.383379E-22	1.591307E-22	1.815526E-22	2.056873E-22	2.314270E-22
5.000000E+02	2.587718E-22	2.875630E-22	3.171406E-22	3.479799E-22	3.800816E-22
6.000000E+02	4.134456E-22	4.478597E-22	4.834200E-22	5.201685E-22	5.580812E-22
7.000000E+02	5.970321E-22	6.369950E-22	6.780415E-22	7.201692E-22	7.633790E-22
8.000000E+02	8.076708E-22	8.530447E-22	8.995007E-22	9.470387E-22	9.956588E-22
9.000000E+02	1.045361E-21	1.096145E-21	1.148011E-21	1.200960E-21	1.254990E-21
1.000000E+03	1.310102E-21				

A19 SIGVJ 3HE+7LI => P(3852)+A(1512)+A(1512)+N(3852)

REF 5

T(J) IN KEY SIGVK(J) IN M3/SEC

1.000000E+00	5.773089E-41	1.186738E-39	1.512530E-38	1.215362E-37	9.275141E-37
2.000000E+00	3.815088E-36	1.228418E-35	4.100156E-35	1.011411E-34	4.120404E-34
3.000000E+00	8.885060E-34	1.530538E-33	2.338137E-33	5.674390E-33	1.079543E-32
4.000000E+00	1.723542E-32	2.499437E-32	4.123913E-32	7.031311E-32	1.066288E-31
5.000000E+00	1.501860E-31	2.098890E-31	3.230826E-31	4.628359E-31	6.291616E-31
6.000000E+00	8.220478E-31	1.153975E-30	1.569695E-30	2.059717E-30	2.624040E-30
7.000000E+00	3.403588E-30	4.425046E-30	5.615594E-30	6.975214E-30	8.626620E-30
8.000000E+00	1.083758E-29	1.339120E-29	1.628740E-29	1.953075E-29	2.300960E-29
9.000000E+00	2.869351E-29	3.418246E-29	4.027646E-29	4.770975E-29	5.640373E-29
1.000000E+01	6.611664E-29	2.608190E-28	7.038943E-28	1.935370E-27	4.191074E-27
2.000000E+01	8.134088E-27	1.400311E-26	2.355335E-26	3.611197E-26	5.448802E-26
3.000000E+01	7.762150E-26	1.037692E-25	1.469876E-25	1.949098E-25	2.527914E-25
4.000000E+01	3.220150E-25	4.035642E-25	4.960486E-25	6.102229E-25	7.363053E-25
5.000000E+01	8.773357E-25	1.034529E-24	1.214063E-24	1.411543E-24	1.626965E-24
6.000000E+01	1.860332E-24	2.120354E-24	2.402752E-24	2.706791E-24	3.032471E-24
7.000000E+01	3.385156E-24	3.765861E-24	4.171815E-24	4.603017E-24	5.060104E-24
8.000000E+01	5.544467E-24	6.054980E-24	6.591643E-24	7.154407E-24	7.740447E-24
9.000000E+01	8.370437E-24	9.020458E-24	9.698509E-24	1.040459E-23	1.113870E-23
1.000000E+02	1.190084E-23	2.110014E-23	3.325057E-23	4.829304E-23	6.581301E-23
2.000000E+02	8.571013E-23	1.078954E-22	1.318989E-22	1.578598E-22	1.849956E-22
3.000000E+02	2.136102E-22	2.437035E-22	2.752757E-22	3.074206E-22	3.401573E-22
4.000000E+02	3.736074E-22	4.077788E-22	4.424533E-22	4.774080E-22	5.130353E-22
5.000000E+02	5.492128E-22	5.857151E-22	6.218952E-22	6.582556E-22	6.947964E-22
6.000000E+02	7.315175E-22	7.675940E-22	8.044347E-22	8.430753E-22	8.773160E-22
7.000000E+02	9.137567E-22	9.501973E-22	9.866380E-22	1.023079E-21	1.059519E-21
8.000000E+02	1.095960E-21	1.132401E-21	1.168841E-21	1.205202E-21	1.241723E-21
9.000000E+02	1.278163E-21	1.314604E-21	1.351045E-21	1.387489E-21	1.423926E-21
1.000000E+03	1.460367E-21				

A20 SIGVK D+7BE => P(11179)+A(2795)+A(2795)

REF 5

Table I (continued)

T(J) IN KEV SIGVL(J) IN M3/SEC

1.000000E+00	5.186936E-43	1.455643E-41	2.501049E-40	2.530489E-39	2.615800E-38
2.000000E+00	1.186899E-37	4.392433E-37	1.648704E-36	4.583965E-36	2.331485E-35
3.000000E+00	5.237647E-35	9.176883E-35	1.414919E-34	4.055751E-34	8.197925E-34
4.000000E+00	1.343924E-33	1.977970E-33	3.515462E-33	6.437311E-33	1.012485E-32
5.000000E+00	1.457008E-32	2.099828E-32	3.442313E-32	5.122037E-32	7.139003E-32
6.000000E+00	9.493208E-32	1.399057E-31	1.974403E-31	2.660118E-31	3.456204E-31
7.000000E+00	4.628112E-31	6.226225E-31	8.113247E-31	1.028910E-30	1.301003E-30
8.000000E+00	1.683444E-30	2.130988E-30	2.643636E-30	3.222433E-30	4.032062E-30
9.000000E+00	4.969554E-30	6.034908E-30	7.228125E-30	8.733406E-30	1.053126E-29
1.000000E+01	1.256078E-29	5.774521E-29	1.975915E-28	5.405596E-28	1.291705E-27
2.000000E+01	2.706817E-27	4.957502E-27	8.836871E-27	1.413501E-26	2.248933E-26
3.000000E+01	3.326386E-26	4.861199E-26	6.790992E-26	9.324483E-26	1.246287E-25
4.000000E+01	1.634623E-25	2.105035E-25	2.670761E-25	3.353113E-25	4.140303E-25
5.000000E+01	5.032332E-25	6.045297E-25	7.246693E-25	8.587855E-25	1.006876E-24
6.000000E+01	1.168948E-24	1.356041E-24	1.562733E-24	1.788090E-24	2.032112E-24
7.000000E+01	2.298018E-24	2.586417E-24	2.895646E-24	3.225705E-24	3.580354E-24
8.000000E+01	3.967801E-24	4.381397E-24	4.821143E-24	5.287093E-24	5.787696E-24
9.000000E+01	6.317669E-24	6.877013E-24	7.465726E-24	8.083810E-24	8.731263E-24
1.000000E+02	9.408087E-24	1.794089E-23	2.991521E-23	4.552005E-23	6.459100E-23
2.000000E+02	8.723441E-23	1.133529E-22	1.426087E-22	1.750553E-22	2.095448E-22
3.000000E+02	2.465229E-22	2.860432E-22	3.280899E-22	3.719480E-22	4.176157E-22
4.000000E+02	4.652063E-22	5.147205E-22	5.654674E-22	6.170208E-22	6.699412E-22
5.000000E+02	7.242070E-22	7.796175E-22	8.353016E-22	8.918874E-22	9.493748E-22
6.000000E+02	1.007764E-21	1.065993E-21	1.124582E-21	1.183623E-21	1.243115E-21
7.000000E+02	1.302789E-21	1.362595E-21	1.422672E-21	1.483019E-21	1.543636E-21
8.000000E+02	1.604524E-21	1.665683E-21	1.727112E-21	1.788012E-21	1.850782E-21
9.000000E+02	1.913023E-21	1.975534E-21	2.038316E-21	2.101360E-21	2.164691E-21
1.000000E+03	2.228284E-21				

A21 SIGVL T+7BE => P(4204)+N(4204)+A(1051)+A(1051)

REF 5

T(J) IN KEV SIGVM(J) IN M3/SEC

1.000000E+00	4.894371E-57	8.891207E-55	1.161917E-52	4.729856E-51	4.212684E-49
2.000000E+00	2.515273E-48	2.903389E-47	1.723260E-46	1.912340E-45	2.433056E-44
3.000000E+00	6.001550E-44	1.089672E-43	1.711856E-43	1.872630E-42	4.701471E-42
4.000000E+00	8.337184E-42	1.277977E-41	4.408794E-41	1.180544E-40	2.143626E-40
5.000000E+00	3.338127E-40	6.040461E-40	1.572799E-39	2.846876E-39	4.425876E-39
6.000000E+00	6.306201E-39	1.373844E-38	2.414411E-38	3.788051E-38	5.254767E-38
7.000000E+00	8.872968E-38	1.490778E-37	2.241869E-37	3.140570E-37	4.543809E-37
8.000000E+00	7.230415E-37	1.056950E-36	1.456107E-36	1.923377E-36	2.910075E-36
9.000000E+00	4.134013E-36	5.595191E-36	7.293610E-36	1.009613E-35	1.390993E-35
1.000000E+01	1.844962E-35	2.153241E-34	1.643181E-33	8.737362E-33	4.081835E-32
2.000000E+01	1.348286E-31	3.472225E-31	9.202734E-31	1.833977E-30	4.142537E-30
3.000000E+01	7.436489E-30	1.449821E-29	2.452169E-29	4.203962E-29	6.707775E-29
4.000000E+01	1.053376E-28	1.596123E-28	2.396688E-28	3.587845E-28	5.096164E-28
5.000000E+01	6.921645E-28	9.243501E-28	1.281327E-27	1.708907E-27	2.207092E-27
6.000000E+01	2.775881E-27	3.596502E-27	4.579938E-27	5.710895E-27	6.989371E-27
7.000000E+01	8.592873E-27	1.055509E-26	1.278421E-26	1.520024E-26	1.816813E-26
8.000000E+01	2.172051E-26	2.571653E-26	3.015619E-26	3.504531E-26	4.129923E-26
9.000000E+01	4.834563E-26	5.618450E-26	6.481586E-26	7.423960E-26	8.445599E-26
1.000000E+02	9.546477E-26	2.842141E-25	6.723794E-25	1.365985E-24	2.501160E-24
2.000000E+02	4.225873E-24	6.579142E-24	9.830941E-24	1.389701E-23	1.917392E-23
3.000000E+02	2.550763E-23	3.317533E-23	4.209671E-23	5.261170E-23	6.472224E-23
4.000000E+02	7.837170E-23	9.356009E-23	1.104329E-22	1.290703E-22	1.493828E-22
5.000000E+02	1.713465E-22	1.950773E-22	2.210285E-22	2.408732E-22	2.786115E-22
6.000000E+02	3.102435E-22	3.437690E-22	3.791801E-22	4.165000E-22	4.557072E-22
7.000000E+02	4.966730E-22	5.393729E-22	5.838763E-22	6.301831E-22	6.782933E-22
8.000000E+02	7.282069E-22	7.799240E-22	8.334445E-22	8.807004E-22	9.458957E-22
9.000000E+02	1.004826E-21	1.065561E-21	1.128090E-21	1.192439E-21	1.258584E-21
1.000000E+03	1.326532E-21				

A22 SIGVM 3HE+7BE => P(4510)+P(4510)+A(1127)+A(1127)

REF 5

Table I (continued)

T(J) IN KEY SIGVN(J) IN M3/SEC

1.000000E+00	1.091796E-37	1.369555E-36	1.112464E-35	6.237082E-35	3.104831E-34
2.000000E+00	1.061651E-33	2.818156E-33	7.726766E-33	1.639698E-32	4.804935E-32
3.000000E+00	9.521830E-32	1.579041E-31	2.361065E-31	4.614269E-31	7.924391E-31
4.000000E+00	1.203201E-30	1.693711E-30	2.546310E-30	3.932107E-30	5.630978E-30
5.000000E+00	7.642924E-30	1.022758E-29	1.447373E-29	1.959635E-29	2.559544E-29
6.000000E+00	3.247099E-29	4.278527E-29	5.527972E-29	6.973810E-29	8.616042E-29
7.000000E+00	1.072709E-28	1.335866E-28	1.636986E-28	1.976067E-28	2.372107E-28
8.000000E+00	2.866559E-28	3.425844E-28	4.049962E-28	4.739561E-28	5.596621E-28
9.000000E+00	6.557377E-28	7.621830E-28	8.789980E-28	1.014021E-27	1.168727E-27
1.000000E+01	1.337872E-27	4.331661E-27	1.113474E-26	2.457872E-26	4.922616E-26
2.000000E+01	9.175201E-26	1.572544E-25	2.689178E-25	4.207625E-25	6.626209E-25
3.000000E+01	9.751375E-25	1.413800E-24	1.962534E-24	2.655824E-24	3.493872E-24
4.000000E+01	4.479042E-24	5.614910E-24	6.890622E-24	8.297260E-24	9.839756E-24
5.000000E+01	1.151011E-23	1.331958E-23	1.519072E-23	1.717007E-23	1.925762E-23
6.000000E+01	2.145338E-23	2.362350E-23	2.583372E-23	2.809533E-23	3.040034E-23
7.000000E+01	3.274996E-23	3.511586E-23	3.751783E-23	3.995586E-23	4.241722E-23
8.000000E+01	4.487407E-23	4.734896E-23	4.984188E-23	5.235267E-23	5.485565E-23
9.000000E+01	5.736686E-23	5.988633E-23	6.241483E-23	6.494999E-23	6.749418E-23
1.000000E+02	7.004662E-23	9.527840E-23	1.191029E-22	1.403319E-22	1.584423E-22
2.000000E+02	1.737420E-22	1.865077E-22	1.979563E-22	2.075696E-22	2.153997E-22
3.000000E+02	2.214263E-22	2.261826E-22	2.295140E-22	2.324006E-22	2.348478E-22
4.000000E+02	2.366939E-22	2.379388E-22	2.386553E-22	2.388875E-22	2.385787E-22
5.000000E+02	2.377289E-22	2.365458E-22	2.359007E-22	2.351655E-22	2.343401E-22
6.000000E+02	2.334246E-22	2.322064E-22	2.307900E-22	2.291932E-22	2.274160E-22
7.000000E+02	2.257267E-22	2.241760E-22	2.226253E-22	2.210747E-22	2.195240E-22
8.000000E+02	2.179733E-22	2.164227E-22	2.148720E-22	2.133213E-22	2.117707E-22
9.000000E+02	2.102200E-22	2.086693E-22	2.071187E-22	2.055680E-22	2.040173E-22
1.000000E+03	2.024667E-22				

A23 SIGVN P+9BE => D(326)+A(163)+A(163)

REF 5

T(J) IN KEY SIGVO(J) IN M3/SEC

1.000000E+00	1.091796E-37	1.369555E-36	1.112464E-35	6.237082E-35	3.104831E-34
2.000000E+00	1.061651E-33	2.818156E-33	7.726766E-33	1.639698E-32	4.804935E-32
3.000000E+00	9.521830E-32	1.579041E-31	2.361065E-31	4.614269E-31	7.924391E-31
4.000000E+00	1.203201E-30	1.693711E-30	2.546310E-30	3.932107E-30	5.630978E-30
5.000000E+00	7.642924E-30	1.022758E-29	1.447373E-29	1.959635E-29	2.559544E-29
6.000000E+00	3.247099E-29	4.278527E-29	5.527972E-29	6.973810E-29	8.616042E-29
7.000000E+00	1.072709E-28	1.335866E-28	1.636986E-28	1.976067E-28	2.372107E-28
8.000000E+00	2.866559E-28	3.425844E-28	4.049962E-28	4.739561E-28	5.596621E-28
9.000000E+00	6.557377E-28	7.621830E-28	8.789980E-28	1.014021E-27	1.168727E-27
1.000000E+01	1.337872E-27	4.331661E-27	1.112470E-26	2.436139E-26	4.853444E-26
2.000000E+01	8.939142E-26	1.511429E-25	2.530390E-25	3.900983E-25	6.034913E-25
3.000000E+01	8.772270E-25	1.256985E-24	1.729533E-24	2.315572E-24	3.015226E-24
4.000000E+01	3.836451E-24	4.784253E-24	5.848257E-24	7.021332E-24	8.307420E-24
5.000000E+01	9.706524E-24	1.120811E-23	1.276805E-23	1.441815E-23	1.615842E-23
6.000000E+01	1.798887E-23	1.981176E-23	2.167509E-23	2.358711E-23	2.554782E-23
7.000000E+01	2.753846E-23	2.955546E-23	3.160853E-23	3.369766E-23	3.581012E-23
8.000000E+01	3.791807E-23	4.004406E-23	4.218808E-23	4.435009E-23	4.652333E-23
9.000000E+01	4.071204E-23	5.091620E-23	5.313581E-23	5.537089E-23	5.762142E-23
1.000000E+02	5.988741E-23	8.242107E-23	1.036500E-22	1.224027E-22	1.384609E-22
2.000000E+02	1.518673E-22	1.627959E-22	1.719224E-22	1.790360E-22	1.851280E-22
3.000000E+02	1.898133E-22	1.935716E-22	1.965640E-22	1.983020E-22	1.996800E-22
4.000000E+02	2.003526E-22	2.002959E-22	2.000633E-22	1.999056E-22	1.996374E-22
5.000000E+02	1.998186E-22	1.981709E-22	1.972685E-22	1.961857E-22	1.949226E-22
6.000000E+02	1.934792E-22	1.920579E-22	1.905043E-22	1.890106E-22	1.873467E-22
7.000000E+02	1.857267E-22	1.841700E-22	1.826253E-22	1.810747E-22	1.795240E-22
8.000000E+02	1.779733E-22	1.764227E-22	1.748720E-22	1.733213E-22	1.717707E-22
9.000000E+02	1.702200E-22	1.686693E-22	1.671187E-22	1.655680E-22	1.640173E-22
1.000000E+03	1.624667E-22				

A24 SIGVO P+9BE => A(1275)+6LI(850)

REF 5

Table I (continued)

T(J) IN KEY SIGVP(J) IN M3/SEC

1.000000E+00	6.626243E-61	1.994537E-58	4.074947E-56	2.058616E-54	4.721399E-52
2.000000E+00	2.876817E-51	5.781602E-50	3.701962E-49	2.297540E-47	3.456768E-46
3.000000E+00	8.605723E-46	1.567662E-45	2.466946E-45	7.203775E-44	1.887237E-43
4.000000E+00	3.390256E-43	5.229433E-43	2.276442E-42	6.530378E-42	1.208725E-41
5.000000E+00	1.894707E-41	3.531799E-41	9.562143E-41	1.750390E-40	2.735707E-40
6.000000E+00	3.912166E-40	8.953681E-40	1.605565E-39	2.490802E-39	3.551000E-39
7.000000E+00	6.258567E-39	1.089267E-38	1.669196E-38	2.365645E-38	3.497916E-38
8.000000E+00	5.762741E-38	8.595735E-38	1.199690E-37	1.599107E-37	2.440920E-37
9.000000E+00	3.504593E-37	4.766128E-37	6.233524E-37	9.583916E-37	1.174401E-36
1.000000E+01	1.549327E-36	1.519485E-35	1.053525E-34	8.473806E-34	1.007804E-32
2.000000E+01	4.777062E-32	1.668071E-31	5.889919E-31	1.305678E-30	3.405197E-30
3.000000E+01	6.464860E-30	1.291791E-29	2.205948E-29	3.656734E-29	5.645682E-29
4.000000E+01	8.359951E-29	1.189994E-28	1.635131E-28	2.189686E-28	2.843558E-28
5.000000E+01	3.596722E-28	4.455215E-28	5.444237E-28	6.545613E-28	7.759343E-28
6.000000E+01	9.085426E-28	1.053109E-27	1.209277E-27	1.376988E-27	1.556241E-27
7.000000E+01	1.754946E-27	1.974603E-27	2.211123E-27	2.464505E-27	2.750750E-27
8.000000E+01	3.104772E-27	3.498289E-27	3.931301E-27	4.405532E-27	5.192409E-27
9.000000E+01	6.122220E-27	7.194965E-27	8.410645E-27	9.769259E-27	1.127001E-26
1.000000E+02	1.291529E-26	5.414255E-26	1.739711E-25	4.407705E-25	9.314333E-25
2.000000E+02	1.707510E-24	2.773185E-24	4.194851E-24	5.943686E-24	8.015516E-24
3.000000E+02	1.041196E-23	1.306373E-23	1.599090E-23	1.900808E-23	2.357809E-23
4.000000E+02	2.581285E-23	2.945616E-23	3.318665E-23	3.694347E-23	4.080498E-23
5.000000E+02	4.477092E-23	4.879749E-23	5.269989E-23	5.661131E-23	6.053175E-23
6.000000E+02	6.446121E-23	6.835719E-23	7.224056E-23	7.611492E-23	7.998027E-23
7.000000E+02	8.376956E-23	8.747008E-23	9.111649E-23	9.470881E-23	9.824702E-23
8.000000E+02	1.017311E-22	1.051611E-22	1.085370E-22	1.118508E-22	1.151265E-22
9.000000E+02	1.183481E-22	1.214996E-22	1.246050E-22	1.276563E-22	1.306535E-22
1.000000E+03	1.335966E-22				

A25 SIGVP A+9BE -> N(5263)+12C(439)

REF 5

T(J) IN KEY SIGVQ(J) IN M3/SEC 6LI6LI -> P-11B

0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+02	0.130000E-29	0.238000E-29	0.365000E-29	0.560000E-29	0.840000E-29
0.500000E+02	0.120000E-28	0.170000E-28	0.240000E-28	0.320000E-28	0.440000E-28
0.600000E+02	0.580000E-28	0.780000E-28	0.100000E-27	0.130000E-27	0.165000E-27
0.700000E+02	0.208000E-27	0.222764E-27	0.254525E-27	0.305097E-27	0.376297E-27
0.800000E+02	0.469939E-27	0.587838E-27	0.731810E-27	0.903669E-27	0.110523E-26
0.900000E+02	0.133831E-26	0.160472E-26	0.190628E-26	0.224400E-26	0.262211E-26
0.100000E+03	0.304000E-26	0.102925E-25	0.262502E-25	0.553777E-25	0.102140E-24
0.200000E+03	0.171000E-24	0.265711E-24	0.387176E-24	0.535585E-24	0.711130E-24
0.300000E+03	0.914000E-24	0.114403E-23	0.139960E-23	0.167877E-23	0.197956E-23
0.400000E+03	0.230000E-23	0.263815E-23	0.299211E-23	0.335999E-23	0.373992E-23
0.500000E+03	0.413000E-23	0.452854E-23	0.493450E-23	0.534735E-23	0.576608E-23
0.600000E+03	0.619000E-23	0.661809E-23	0.704836E-23	0.747850E-23	0.790655E-23
0.700000E+03	0.833000E-23	0.874751E-23	0.916078E-23	0.957229E-23	0.998453E-23
0.800000E+03	0.104000E-22	0.109203E-22	0.112433E-22	0.116663E-22	0.120861E-22
0.900000E+03	0.125000E-22	0.129052E-22	0.132996E-22	0.136814E-22	0.140480E-22
0.100000E+04	0.144000E-22				

A25 SIGVQ 6LI+6LI -> P(11200)+11B(1018)

REF 7

Table I (continued)

T(J) IN KEY SIGVR(J) IN M3/SEC 6LI6LI -> ALPHA-N-7BE

0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+02	0.020000E-29	0.146000E-28	0.240000E-28	0.370000E-28	0.540000E-28	0.700000E-28
0.500000E+02	0.770000E-28	0.110000E-27	0.152000E-27	0.206000E-27	0.280000E-27	0.360000E-27
0.600000E+02	0.370000E-27	0.490000E-27	0.630000E-27	0.810000E-27	0.104000E-26	0.134000E-26
0.700000E+02	0.130000E-26	0.141966E-26	0.163752E-26	0.196412E-26	0.241000E-26	0.290000E-26
0.800000E+02	0.298569E-26	0.370173E-26	0.456865E-26	0.559698E-26	0.679727E-26	0.819727E-26
0.900000E+02	0.818005E-26	0.975585E-26	0.115352E-25	0.135287E-25	0.157468E-25	0.182000E-25
0.100000E+03	0.182000E-25	0.602841E-25	0.151272E-24	0.315498E-24	0.577296E-24	0.900000E-24
0.200000E+03	0.961000E-24	0.143719E-23	0.216139E-23	0.298541E-23	0.396102E-23	0.500000E-23
0.300000E+03	0.509000E-23	0.637176E-23	0.779615E-23	0.935067E-23	0.110228E-22	0.134000E-22
0.400000E+03	0.128000E-22	0.146712E-22	0.166308E-22	0.186749E-22	0.207993E-22	0.230000E-22
0.500000E+03	0.230000E-22	0.252720E-22	0.276871E-22	0.299962E-22	0.324302E-22	0.349000E-22
0.600000E+03	0.349000E-22	0.373976E-22	0.399192E-22	0.424619E-22	0.450231E-22	0.476000E-22
0.700000E+03	0.476000E-22	0.501896E-22	0.527802E-22	0.553921E-22	0.579973E-22	0.606000E-22
0.800000E+03	0.606000E-22	0.631968E-22	0.657863E-22	0.683673E-22	0.709389E-22	0.735000E-22
0.900000E+03	0.735000E-22	0.760495E-22	0.785658E-22	0.811074E-22	0.836127E-22	0.861000E-22
0.100000E+04	0.861000E-22					

A27 SIGVR 6LI+6LI => A(342)+N(1370)+7BE(196)

REF 7

T(J) IN KEY SIGVS(J) IN M3/SEC 6LI6LI -> 3-ALPHA

0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.227000E-30	0.360000E-37	0.525000E-36	0.505000E-35	0.350000E-34	0.220000E-33
0.200000E+02	0.159000E-33	0.520000E-33	0.180000E-32	0.525000E-32	0.150000E-31	0.450000E-30
0.300000E+02	0.345000E-31	0.690940E-31	0.147370E-30	0.305898E-30	0.581251E-30	0.900000E-30
0.400000E+02	0.101000E-29	0.166364E-29	0.275335E-29	0.452525E-29	0.722543E-29	0.100000E-28
0.500000E+02	0.111000E-28	0.164894E-28	0.241118E-28	0.347794E-28	0.493047E-28	0.680000E-28
0.600000E+02	0.685000E-28	0.934021E-28	0.125945E-27	0.168287E-27	0.222586E-27	0.290000E-27
0.700000E+02	0.291000E-27	0.375909E-27	0.480578E-27	0.608493E-27	0.763134E-27	0.940000E-27
0.800000E+02	0.940000E-27	0.116730E-26	0.142823E-26	0.173871E-26	0.210666E-26	0.250000E-26
0.900000E+02	0.254000E-26	0.304606E-26	0.362976E-26	0.429543E-26	0.504740E-26	0.580000E-26
0.100000E+03	0.580000E-26	0.222066E-25	0.640710E-25	0.147612E-24	0.290710E-24	0.440000E-24
0.200000E+03	0.513000E-24	0.832621E-24	0.126143E-23	0.180960E-23	0.248435E-23	0.320000E-23
0.300000E+03	0.329000E-23	0.422919E-23	0.529832E-23	0.649229E-23	0.780713E-23	0.920000E-23
0.400000E+03	0.924000E-23	0.107867E-22	0.124373E-22	0.141006E-22	0.160052E-22	0.180000E-22
0.500000E+03	0.179000E-22	0.198549E-22	0.218656E-22	0.239287E-22	0.260412E-22	0.280000E-22
0.600000E+03	0.282000E-22	0.304012E-22	0.326307E-22	0.349056E-22	0.371950E-22	0.395000E-22
0.700000E+03	0.395000E-22	0.418145E-22	0.441340E-22	0.464570E-22	0.487805E-22	0.511000E-22
0.800000E+03	0.511000E-22	0.534136E-22	0.557207E-22	0.580209E-22	0.603141E-22	0.626000E-22
0.900000E+03	0.626000E-22	0.648783E-22	0.671402E-22	0.694090E-22	0.716599E-22	0.739000E-22
0.100000E+04	0.739000E-22					

A29 SIGVS 6LI+6LI => A(6967)+A(6967)+A(6967)

REF 8

Table I (continued)

T(J) IN KEY SIGVT(J) IN M3/SEC 6LI6LI -> N-11C

0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+02	0.126000E-29	0.210000E-29	0.370000E-29	0.505000E-29	0.750000E-29
0.500000E+02	0.110000E-28	0.155000E-28	0.218000E-28	0.300000E-28	0.405000E-28
0.600000E+02	0.550000E-28	0.720000E-28	0.950000E-28	0.122000E-27	0.155000E-27
0.700000E+02	0.199000E-27	0.280724E-27	0.217183E-27	0.250856E-27	0.304222E-27
0.800000E+02	0.379760E-27	0.479950E-27	0.607269E-27	0.764198E-27	0.953216E-27
0.900000E+02	0.117680E-26	0.143743E-26	0.173759E-26	0.207975E-26	0.246639E-26
0.100000E+03	0.290000E-26	0.105064E-25	0.263883E-25	0.538770E-25	0.963838E-25
0.200000E+03	0.157000E-24	0.238328E-24	0.338774E-24	0.455857E-24	0.587093E-24
0.300000E+03	0.730000E-24	0.882075E-24	0.104072E-23	0.128334E-23	0.136730E-23
0.400000E+03	0.153000E-23	0.168920E-23	0.184416E-23	0.199452E-23	0.213992E-23
0.500000E+03	0.228000E-23	0.241433E-23	0.254224E-23	0.266299E-23	0.277582E-23
0.600000E+03	0.288000E-23	0.297507E-23	0.306167E-23	0.314074E-23	0.321321E-23
0.700000E+03	0.328000E-23	0.334188E-23	0.339892E-23	0.345102E-23	0.349808E-23
0.800000E+03	0.354000E-23	0.357677E-23	0.360874E-23	0.363631E-23	0.365992E-23
0.900000E+03	0.368000E-23	0.369695E-23	0.371110E-23	0.372278E-23	0.373231E-23
0.100000E+04	0.374000E-23				

A29 SIGVT 6LI+6LI -> N(8665)+11C(788)

REF 7

T(J) IN KEY SIGVU(J) IN M3/SEC 6LI6LI -> D-10B

0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+02	0.341000E-29	0.680000E-29	0.120000E-28	0.185000E-28	0.275000E-28
0.500000E+02	0.400000E-28	0.560000E-28	0.770000E-28	0.105000E-27	0.140000E-27
0.600000E+02	0.190000E-27	0.245000E-27	0.318000E-27	0.405000E-27	0.526000E-27
0.700000E+02	0.548000E-27	0.680710E-27	0.698994E-27	0.846903E-27	0.104851E-26
0.800000E+02	0.130786E-26	0.162901E-26	0.201603E-26	0.247296E-26	0.300386E-26
0.900000E+02	0.361280E-26	0.430383E-26	0.508101E-26	0.594839E-26	0.691004E-26
0.100000E+03	0.797000E-26	0.262459E-25	0.670732E-25	0.142766E-24	0.265637E-24
0.200000E+03	0.448000E-24	0.700624E-24	0.102810E-23	0.143345E-23	0.191974E-23
0.300000E+03	0.249000E-23	0.314625E-23	0.388644E-23	0.470751E-23	0.560639E-23
0.400000E+03	0.658000E-23	0.762479E-23	0.873522E-23	0.990525E-23	0.111289E-22
0.500000E+03	0.124000E-22	0.137130E-22	0.150635E-22	0.164475E-22	0.178610E-22
0.600000E+03	0.193000E-22	0.207610E-22	0.222425E-22	0.237435E-22	0.252630E-22
0.700000E+03	0.268000E-22	0.283526E-22	0.299153E-22	0.314817E-22	0.330454E-22
0.800000E+03	0.346000E-22	0.361406E-22	0.376683E-22	0.391857E-22	0.406954E-22
0.900000E+03	0.422000E-22	0.437018E-22	0.452019E-22	0.467011E-22	0.482002E-22
0.100000E+04	0.497000E-22				

A30 SIGVU 6LI+6LI -> D(2489)+10B(498)

REF 7

Table I (continued)

T(J) IN KEY SIGVV(J) IN M3/SEC 6LI6LI -> T-9B

0.100000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.500000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.600000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.700000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.800000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.900000E+01	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.100000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.200000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.300000E+02	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00
0.400000E+02	0.106000E-30	0.200000E-30	0.335000E-30	0.520000E-30	0.760000E-30
0.500000E+02	0.110000E-29	0.154000E-29	0.210000E-29	0.295000E-29	0.360000E-29
0.600000E+02	0.500000E-29	0.650000E-29	0.840000E-29	0.109000E-28	0.130000E-28
0.700000E+02	0.171000E-28	0.183022E-28	0.210619E-28	0.252061E-28	0.312019E-28
0.800000E+02	0.389565E-28	0.486970E-28	0.605705E-28	0.747241E-28	0.913050E-28
0.900000E+02	0.110460E-27	0.132337E-27	0.157082E-27	0.184843E-27	0.215766E-27
0.100000E+03	0.250000E-27	0.843201E-27	0.214859E-26	0.453226E-26	0.836062E-26
0.200000E+03	0.140000E-25	0.217569E-25	0.316982E-25	0.430311E-25	0.581626E-25
0.300000E+03	0.747000E-25	0.934205E-25	0.114246E-24	0.137030E-24	0.161656E-24
0.400000E+03	0.180000E-24	0.215930E-24	0.245275E-24	0.275855E-24	0.307490E-24
0.500000E+03	0.340000E-24	0.373226E-24	0.407093E-24	0.441547E-24	0.476534E-24
0.600000E+03	0.512000E-24	0.547086E-24	0.584112E-24	0.620596E-24	0.657253E-24
0.700000E+03	0.694000E-24	0.730751E-24	0.767410E-24	0.803900E-24	0.840133E-24
0.800000E+03	0.876000E-24	0.911445E-24	0.946505E-24	0.981242E-24	0.101572E-23
0.900000E+03	0.105000E-23	0.108414E-23	0.111810E-23	0.115215E-23	0.118600E-23
0.100000E+04	0.122000E-23				

A31 SIGVV 6LI+6LI -> T(606)+9B(202)

REF 7

Table II. Summary of reactions, $\langle \sigma v \rangle$, tabular references, and selected energy releases in keV (usually inversely proportional to mass)

A01	SIGV1	D+D $\rightarrow$ 3HE(817)+N(2450)	REF 1
A02	SIGV2	D+D $\rightarrow$ T(1008)+P(3024)	REF 1
A03	SIGV3	D+T $\rightarrow$ A(3517)+N(14069)	REF 1
A04	SIGV4	T+T $\rightarrow$ A(1259)+N(5034)+N(5034)	REF 1
A05	SIGV5	T+3HE $\rightarrow$ D(9546)+A(4773) 41% of SIGV5	REF 2
		P(5374)+A(1344)+N(5374) 55% of SIGV5	REF 2
		P(10077)+A(403)+N(1612) 4% of SIGV5	REF 2
A06	SIGV6	D+3HE $\rightarrow$ P(14681)+A(3670)	REF 1
A07	SIGV7	D+6LI $\rightarrow$ 7BE(423)+N(2957)	REF 3
A08	SIGV8	D+6LI $\rightarrow$ 7LI(628)+P(4398)	REF 3
A09	SIGV9	D+6LI $\rightarrow$ P(1618)+A(404)+T(539)	REF 3
A10	SIGVA	D+6LI $\rightarrow$ A(11187)+A(11187)	REF 3
A11	SIGVB	D+6LI $\rightarrow$ 3HE(378)+A(284)+N(1134)	REF 3
A12	SIGVC	3HE+6LI $\rightarrow$ P(12390)+A(2245)+A(2245)	REF 4
A13	SIGVD	P+6LI $\rightarrow$ 3HE(2298)+A(1724)	REF 4
A14	SIGVE	3HE+3HE $\rightarrow$ P(5716)+P(5716)+A(1429)	REF 5
A15	SIGVF	P+11B $\rightarrow$ A(2888)+A(2888)+A(2888)	REF 6
A16	SIGVG	P+7LI $\rightarrow$ A(8674)+A(8674)	REF 5
A17	SIGVH	D+7LI $\rightarrow$ N(10082)+A(2521)+A(2521)	REF 5
A18	SIGVI	T+7LI $\rightarrow$ N(6049)+N(6049)+A(1512)+A(1512)	REF 5
A19	SIGVJ	3HE+7LI $\rightarrow$ P(3852)+A(1512)+A(1512)+N(3852)	REF 5
A20	SIGVK	D+7BE $\rightarrow$ P(11179)+A(2795)+A(2795)	REF 5
A21	SIGVL	T+7BE $\rightarrow$ P(4204)+N(4204)+A(1051)+A(1051)	REF 5
A22	SIGVM	3HE+7BE $\rightarrow$ P(4510)+P(4510)+A(1127)+A(1127)	REF 5
A23	SIGVN	P+9BE $\rightarrow$ D(326)+A(163)+A(163)	REF 5
A24	SIGVO	P+9BE $\rightarrow$ A(1275)+6LI(850)	REF 5
A25	SIGVP	A+9BE $\rightarrow$ N(5263)+12C(439)	REF 5
A26	SIGVQ	6LI+6LI $\rightarrow$ P(11200)+11B(1018)	REF 7
A27	SIGVR	6LI+6LI $\rightarrow$ A(342)+N(1370)+7BE(196)	REF 7
A28	SIGVS	6LI+6LI $\rightarrow$ A(6967)+A(6967)+A(6967)	REF 8
A29	SIGVT	6LI+6LI $\rightarrow$ N(8665)+11C(788)	REF 7
A30	SIGVU	6LI+6LI $\rightarrow$ D(2489)+10B(498)	REF 7
A31	SIGVV	6LI+6LI $\rightarrow$ T(606)+9B(202)	REF 7

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NOTE: The $\langle \Sigma v \rangle$ for P6LI is up to 48% higher in Ref. 7 than in Ref. 4, but Gould's data involves more recent data.

Fig. 1(a)

Fig. 1(b)

Fig. 1(c)

Fig. 1(d)

Fig. 1(e)

Fig. 1(f)

Fig. 2(a)

Fig. 2(b)

Fig. 2(c)

Fig. 2(d)

Fig. 2(e)

Fig. 2(f)

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