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CROSS SECTIONS AND RATE COEFFICIENTS FOR EXCITATION OF THE $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ FINE-STRUCTURE TRANSITIONS IN BERYLLIUM-LIKE IONS BY HEAVY PARTICLE IMPACT

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Cross sections for excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ fine-structure transitions in beryllium-like ions by proton, deuteron, triton, and α-particle impact have been calculated using a close-coupled impact-parameter method. This technique includes the effects of dipole coupling to the nearby triplet $2p^2$, $2s3s$, and $2s3d$ configurations by means of a polarization potential. We consider the ions C III, N IV, O V, Ne VII, Mg IX, Al X, Si XI, S XIII, Ar XV, Ca XVII, Ti XIX, Cr XXI, Fe XXIII, and Ni XXV. Excitation rate coefficients have also been calculated from the cross sections for a range of temperatures.

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CONTENTS

INTRODUCTION

A number of important diagnostic emission lines arise from transitions in beryllium-like ions in both astrophysical and laboratory plasmas. Models of emission line ratios are then used to gain information on parameters such as electron density and temperature [1–6]. In most cases, line ratios for collisionally induced transitions are dominated by electron impacts [7]. However, Seaton [8] showed that heavy particle collisions can be significant for fine-structure transitions, where the energy of the impacting particle exceeds the excitation energy. For example, Doyle et al. [9] found that in solar-type plasmas, the predicted strength of the electron density sensitive line ratio $I(2s2p\ ^3P \rightarrow 2p^2\ ^3P)/I(2s^2\ ^1S \rightarrow 2s2p\ ^1P)$ in Be-like ions was decreased by up to 25% when proton rates were included for the $2s2p\ ^3P_J \rightarrow 2s2p\ ^3P_{J'}$ fine-structure transitions.

We have previously [10–12] demonstrated the importance of including the effects of higher-lying states in the calculation of ground term fine-structure transitions in F-like and B-like ions, via a polarization potential technique. We have extended this work to Be-like ions and

calculated proton, deuteron, triton, and α-particle excitation cross sections and rate coefficients for transitions among the $1s^2 2s2p\ ^3P^o_J$ fine-structure levels for 14 ions in the beryllium isoelectronic sequence. These ions (C III, N IV, O V, Ne VII, Mg IX, Al X, Si XI, S XIII, Ar XV, Ca XVII, Ti XIX, Cr XXI, Fe XXIII, and Ni XXV) have been selected on the basis of their astrophysical and laboratory interest.

Calculation

The cross sections for transitions $2s2p\ ^3P^o_J \rightarrow 2s2p\ ^3P^o_{J'}$ were calculated by the same symmetrized close-coupled semiclassical treatment that we have used previously for F-like and B-like ions [13, 14]. This formulation is basically similar to that described by Alder and Winther [15] for Coulomb excitation of nuclei, except that the interaction matrix elements are modified to have the correct short-range forms. Also, the effects of dipole coupling to nearby terms are included by means of a polarization potential.

It turns out that inclusion of polarization in the interaction, the importance of which was first noted by Heil et al. [16, 17], is especially significant in the current calculation. We incorporate it using the method of Alder and Winther [15]. The effect of polarization is to replace the factor R^{-3} that appears in the asymptotic forms of all the quadrupole-coupling matrix elements by the factor $R^{-3}(1 + C_{pol}/R)$, where R is the perturber–ion separation and C_{pol} is independent of R. In general, C_{pol} depends on J and J'. Also, it is proportional to Z_p, the charge of the perturber. In the present case of excitation within the $2s2p\ ^3P^o$ multiplet, dipole coupling to the $2p^2\ ^3P$, $2s3s\ ^3S$, and $2s3d\ ^3D$ terms were included in the polarization potential. For the $J = 0 \rightarrow 1$ transition, the polarization contribution, like the original quadrupole matrix element, is zero.

The atomic data required as input for our calculations are the ionic masses, excitation energies, and line strengths (quadrupole or dipole) for transitions between the included levels. Line strengths are used to determine the magnitudes of the interaction matrix elements, including those involved in the polarization potential. The sources of the data are listed in Table I. For some of the ions, the quadrupole line strengths were not available in the literature, and for these we have calculated the line strengths in pure LS coupling using the code CIV3 [18]. Our calculated values of $\langle r^2 \rangle_{2p}$ are shown in Table I.

The derived values of C_{pol}/Z_p are also shown in Table I. The major contribution to C_{pol} comes, not surprisingly, from the $2p^2\ ^3P$ term. Since C_{pol} is negative, the effect of polarization is to reduce the cross sections. Regarding the dependence on Z (the nuclear charge of the ion) we note that the radial-integral factor $\langle nl|r|2p\rangle^2/\langle r^2\rangle_{2p}$ contained in C_{pol} is roughly independent of Z, so that C_{pol} takes its Z dependence from the dipole transition energies in its denominator. This explains why the values in the Table are roughly proportional to Z^{-1}.

However, a truer measure of the significance of polarization is given by the dimensionless quantity C_{pol}/R_{min}, where R_{min} is the minimum R that can occur in a collision. Because $R_{min} = Z_p Z_i/E$, where E is the barycentric impact energy, Z_p is the projectile charge, and Z_i is the net ionic charge ($Z_i = Z - 4$ in the present case), therefore $C_{pol}/R_{min} = C_{pol}E/(Z_i Z_p)$. This shows that, for a given ion-perturber pair, the effect of polarization increases with E. To illustrate the Z dependence of C_{pol}/R_{min}, we show in Table I its value for proton collisions at the impact energy at which the $J = 0 \rightarrow 2$ cross section is maximum. This shows that the effect of polarization increases with Z, roughly as $Z_i^{0.6}$ for $Z \geq 10$.

Excitation rate coefficients were obtained from the calculated cross sections by the usual Maxwellian averaging. At low impact energies the close-coupled cross sections were supplemented by first-order cross sections, modified to take account of the polarization potential [19].

Regarding the accuracy of our results, the uncertainties in our calculated cross sections arise from the following: our use of the symmetrized semiclassical (rather than the fully quantal) treatment of the collision; the numerical accuracy of the solution of the differential equations; and the sensitivity of the cross sections to features that we treat only approximately, such as the polarization potential and the short-range modification of the matrix elements. In our previous work on F-like ions [13] and B-like ions [14] we have estimated the accuracy of our calculated cross sections and rates to be about 10%. However, in the present case where the effects of the polarization potential are larger, we place the error more conservatively at about 20%.

Conclusions

We have presented new atomic data on collisionally induced fine-structure transitions in Be-like ions. These calculations provide significantly reduced collisional cross sections and excitation rate coefficients in comparison to previous work [9, 20]. For example, proton collisional excitation rate coefficients for the $0 \rightarrow 1$ transition in O V are reduced by up to 25%, in Mg IX by approximately 50%, in S XIII by 80%, and in Fe XXIII by up to 95%. A similar pattern is observed for the $0 \rightarrow 2$ and $1 \rightarrow 2$ transitions, and although the magnitude of the effect is smaller, it is still significant. Therefore we anticipate that these data will be of immediate use in the modelling and analysis of solar-type and laboratory plasmas, complementing data (summarized by Berrington [21]) on electron impact excitations of some Be-like species.

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EXPLANATION OF TABLES

TABLE I **Input Data for Calculation of Be-like Cross Sections and Derived Values of C_{pol} for a Singly Charged Perturber**

In addition to the sources of atomic data for each of the ions considered in this paper, we list derived C_{pol} values and illustrate the Z dependence of C_{pol}/R_{min} (see under Calculation).

Ion	Ion, in spectroscopic notation
Energy levels	Source of energy level data
BFS	Bhatia et al. [22]
CH	Chianti database
NIST	NIST database
Wiese	Wiese et al. [23]
Dipole line strengths	Source of dipole line strength data
CH	Chianti database
interpolated	Interpolated from nearest available data
NIST	NIST database
Wiese	Wiese et al. [23]
Quadrupole line strengths	Source of quadrupole line strength data
Wiese	Wiese et al. [23]
CIV3 ($\langle r^2\rangle_{2p}$)	Calculated using CIV3 code [18]; the calculated value of $\langle r^2\rangle_{2p}$, in units of a_0^2, is shown in brackets
C_{pol}/Z_p	Derived C_{pol} value (in atomic units) for each of the transitions considered per unit perturber charge Z_p. We label the transitions as

$0 \rightarrow 2$ $1s^2 2s2p\ {}^3P_0^o \rightarrow 1s^2 2s2p\ {}^3P_2^o$ transition

$1 \rightarrow 2$ $1s^2 2s2p\ {}^3P_1^o \rightarrow 1s^2 2s2p\ {}^3P_2^o$ transition

$(C_{pol}/R_{min})^*$	$(C_{pol})_{0\rightarrow 2}/R_{min}$, with R_{min} equal to the minimum proton–ion separation that can occur for proton collisions at the impact energy at which the $J = 0 \rightarrow 2$ cross section is maximum.

TABLE II **Cross Sections for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by Proton Impact**

TABLE III **Cross Sections for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact**

TABLE IV **Cross Sections for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact**

TABLE V **Cross Sections for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by α Impact**

TABLE VI **Rate Coefficients for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by Proton Impact**

TABLE VII **Rate Coefficients for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact**

TABLE VIII **Rate Coefficients for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact**

TABLE IX **Rate Coefficients for Excitation of the $1s^2 2s2p\ {}^3P_J^o \rightarrow 1s^2 2s2p\ {}^3P_{J'}^o$ Transitions in Be-like Ions by α Impact**

Tables II–IX contain data for the 14 Be-like ions C III, N IV, O V, Ne VII, Mg IX, Al X, Si XI, S XIII, Ar XV, Ca XVII, Ti XIX, Cr XXI, Fe XXIII, and Ni XXV. In each case the target ion and impacting projectile are given at the start of the data block. We label the impacting projectiles as

p	proton	d	deuteron
t	triton	α	alpha particle

The transitions are labeled $0 \rightarrow 1$, $0 \rightarrow 2$, and $1 \rightarrow 2$:

$0 \rightarrow 1$ $1s^2 2s2p\ {}^3P_0^o \rightarrow 1s^2 2s2p\ {}^3P_1^o$ transition
$0 \rightarrow 2$ $1s^2 2s2p\ {}^3P_0^o \rightarrow 1s^2 2s2p\ {}^3P_2^o$ transition
$1 \rightarrow 2$ $1s^2 2s2p\ {}^3P_1^o \rightarrow 1s^2 2s2p\ {}^3P_2^o$ transition

All numbers are given in standard mantissa-exponent form, where $1.23\text{E}{+}04 = 1.23 \times 10^4$.

In Tables II–V, E (eV) gives the center-of-mass impact energy in eV. Cross sections are given in atomic units (a.u., where 1 a.u. $= a_0^2$ with a_0 being the Bohr radius).

In Tables VI–IX, T (K) indicates the temperature in kelvin. Excitation rate coefficients are given in units of $\text{cm}^3\ \text{s}^{-1}$.

TABLE I. Input Data for Calculation of Be-like Cross Sections and Derived Values of C_{pol} for a Singly Charged Perturber

See page 183 for Explanation of Tables

Ion	Energy levels	Dipole line strengths	Quadrupole line strengths	C_{pol}/Z_p		$(C_{pol}/R_{min})^*$
				0→2	1→2	
C III	Wiese	Wiese	Wiese	-0.898	-0.898	-0.13
N IV	Wiese	Wiese	Wiese	-0.750	-0.750	-0.17
O V	Wiese	Wiese	Wiese	-0.654	-0.654	-0.21
Ne VII	CH	CH	CIV3 (0.485)	-0.586	-0.585	-0.35
Mg IX	CH	CH	CIV3 (0.307)	-0.470	-0.469	-0.42
Al X	NIST	interpolated	CIV3 (0.253)	-0.426	-0.424	-0.46
Si XI	CH	CH	CIV3 (0.212)	-0.390	-0.388	-0.49
S XIII	NIST	interpolated	CIV3 (0.155)	-0.330	-0.328	-0.54
Ar XV	BFS	interpolated	CIV3 (0.118)	-0.286	-0.284	-0.59
Ca XVII	BFS	interpolated	CIV3 (0.0934)	-0.249	-0.246	-0.63
Ti XIX	BFS	NIST	CIV3 (0.0756)	-0.220	-0.217	-0.68
Cr XXI	BFS	NIST	CIV3 (0.0625)	-0.195	-0.193	-0.72
Fe XXIII	CH	CH	CIV3 (0.0524)	-0.182	-0.179	-0.79
Ni XXV	BFS	NIST	CIV3 (0.0446)	-0.156	-0.154	-0.79

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

C III + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+00	1.59E-05	3.29E-01	4.23E-01
1.50E+00	1.18E-03	2.30E+00	4.95E+00
2.00E+00	1.14E-02	1.10E+01	1.44E+01
2.50E+00	4.79E-02	2.42E+01	2.48E+01
3.00E+00	1.33E-01	3.83E+01	3.45E+01
3.50E+00	2.90E-01	5.15E+01	4.29E+01
4.00E+00	5.43E-01	6.32E+01	5.02E+01
4.50E+00	9.14E-01	7.31E+01	5.65E+01
5.00E+00	1.42E+00	8.13E+01	6.18E+01
6.00E+00	2.90E+00	9.30E+01	6.97E+01
7.00E+00	5.01E+00	9.90E+01	7.42E+01
8.00E+00	7.67E+00	1.00E+02	7.59E+01
9.00E+00	1.07E+01	9.77E+01	7.54E+01
1.00E+01	1.38E+01	9.30E+01	7.35E+01
1.20E+01	1.93E+01	8.21E+01	6.84E+01
1.40E+01	2.26E+01	7.43E+01	6.45E+01
1.60E+01	2.37E+01	7.07E+01	6.25E+01
1.80E+01	2.35E+01	6.86E+01	6.10E+01
2.00E+01	2.31E+01	6.63E+01	5.92E+01
2.50E+01	2.21E+01	6.03E+01	5.45E+01
3.00E+01	2.09E+01	5.60E+01	5.08E+01
3.50E+01	1.97E+01	5.28E+01	4.79E+01
4.00E+01	1.83E+01	5.04E+01	4.56E+01
5.00E+01	1.56E+01	4.72E+01	4.20E+01
6.00E+01	1.38E+01	4.44E+01	3.91E+01
7.00E+01	1.27E+01	4.18E+01	3.67E+01
8.00E+01	1.18E+01	3.96E+01	3.47E+01
9.00E+01	1.08E+01	3.78E+01	3.30E+01
1.00E+02	9.94E+00	3.63E+01	3.15E+01
1.20E+02	8.29E+00	3.35E+01	2.87E+01
1.40E+02	6.90E+00	3.12E+01	2.63E+01
1.60E+02	5.78E+00	2.91E+01	2.43E+01
1.80E+02	4.89E+00	2.72E+01	2.25E+01
2.00E+02	4.17E+00	2.55E+01	2.09E+01
2.40E+02	3.12E+00	2.27E+01	1.83E+01
2.80E+02	2.42E+00	2.03E+01	1.63E+01
3.20E+02	1.92E+00	1.84E+01	1.47E+01
3.60E+02	1.57E+00	1.69E+01	1.33E+01
4.00E+02	1.30E+00	1.55E+01	1.22E+01
5.00E+02	8.70E-01	1.29E+01	1.01E+01
6.00E+02	6.22E-01	1.11E+01	8.58E+00
7.00E+02	4.66E-01	9.70E+00	7.48E+00
8.00E+02	3.62E-01	8.62E+00	6.62E+00
9.00E+02	2.89E-01	7.76E+00	5.94E+00
1.00E+03	2.36E-01	7.05E+00	5.39E+00

N IV + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.00E+00	8.04E-05	2.77E-01	7.25E-01
3.20E+00	1.58E-04	4.13E-01	1.06E+00
3.40E+00	2.86E-04	5.35E-01	1.47E+00
3.60E+00	4.86E-04	8.22E-01	1.96E+00
3.80E+00	7.86E-04	1.19E+00	2.52E+00
4.00E+00	1.22E-03	1.65E+00	3.13E+00
4.50E+00	3.12E-03	3.16E+00	4.84E+00
5.00E+00	6.65E-03	5.10E+00	6.69E+00
5.50E+00	1.25E-02	7.36E+00	8.57E+00
6.00E+00	2.15E-02	9.81E+00	1.04E+01
6.50E+00	3.45E-02	1.23E+01	1.22E+01
7.00E+00	5.20E-02	1.49E+01	1.39E+01
7.50E+00	7.49E-02	1.73E+01	1.55E+01
8.00E+00	1.04E-01	1.97E+01	1.71E+01
9.00E+00	1.84E-01	2.41E+01	1.98E+01
1.00E+01	2.98E-01	2.80E+01	2.22E+01
1.20E+01	6.43E-01	3.41E+01	2.60E+01
1.40E+01	1.17E+00	3.82E+01	2.87E+01
1.60E+01	1.87E+00	4.05E+01	3.04E+01
1.80E+01	2.74E+00	4.13E+01	3.12E+01
2.20E+01	4.76E+00	3.97E+01	3.08E+01
2.60E+01	6.76E+00	3.60E+01	2.91E+01
3.00E+01	8.31E+00	3.24E+01	2.74E+01
3.50E+01	9.38E+00	2.95E+01	2.59E+01
4.00E+01	9.67E+00	2.80E+01	2.50E+01
4.50E+01	9.57E+00	2.70E+01	2.42E+01
5.00E+01	9.33E+00	2.62E+01	2.35E+01
6.00E+01	8.77E+00	2.46E+01	2.21E+01
7.00E+01	8.27E+00	2.32E+01	2.09E+01
8.00E+01	7.88E+00	2.20E+01	1.99E+01
9.00E+01	7.56E+00	2.10E+01	1.89E+01
1.00E+02	7.22E+00	2.01E+01	1.82E+01
1.20E+02	6.35E+00	1.88E+01	1.68E+01
1.40E+02	5.39E+00	1.78E+01	1.57E+01
1.60E+02	4.52E+00	1.69E+01	1.46E+01
1.80E+02	3.80E+00	1.60E+01	1.37E+01
2.00E+02	3.21E+00	1.52E+01	1.28E+01
2.50E+02	2.19E+00	1.33E+01	1.10E+01
3.00E+02	1.57E+00	1.18E+01	9.59E+00
3.50E+02	1.18E+00	1.06E+01	8.49E+00
4.00E+02	9.11E-01	9.61E+00	7.62E+00
5.00E+02	5.92E-01	8.05E+00	6.31E+00
6.00E+02	4.17E-01	6.93E+00	5.39E+00
8.00E+02	2.40E-01	5.41E+00	4.17E+00
1.00E+03	1.56E-01	4.44E+00	3.40E+00

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

O V + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+00	4.55E-05	1.41E-01	3.58E-01
6.50E+00	1.05E-04	1.77E-01	5.73E-01
7.00E+00	2.15E-04	3.25E-01	8.57E-01
7.50E+00	4.04E-04	5.36E-01	1.20E+00
8.00E+00	6.98E-04	8.11E-01	1.58E+00
9.00E+00	1.80E-03	1.57E+00	2.45E+00
1.00E+01	3.84E-03	2.55E+00	3.39E+00
1.20E+01	1.24E-02	4.92E+00	5.29E+00
1.40E+01	2.99E-02	7.47E+00	7.05E+00
1.60E+01	5.95E-02	9.91E+00	8.61E+00
1.80E+01	1.05E-01	1.21E+01	9.95E+00
2.00E+01	1.68E-01	1.40E+01	1.11E+01
2.20E+01	2.51E-01	1.56E+01	1.21E+01
2.40E+01	3.56E-01	1.69E+01	1.29E+01
2.60E+01	4.84E-01	1.79E+01	1.36E+01
2.80E+01	6.34E-01	1.87E+01	1.41E+01
3.00E+01	8.05E-01	1.93E+01	1.45E+01
3.50E+01	1.31E+00	1.98E+01	1.50E+01
4.00E+01	1.90E+00	1.95E+01	1.49E+01
4.50E+01	2.50E+00	1.85E+01	1.45E+01
5.00E+01	3.07E+00	1.74E+01	1.40E+01
6.00E+01	3.95E+00	1.53E+01	1.29E+01
7.00E+01	4.42E+00	1.39E+01	1.21E+01
8.00E+01	4.60E+00	1.30E+01	1.16E+01
9.00E+01	4.63E+00	1.23E+01	1.12E+01
1.00E+02	4.58E+00	1.18E+01	1.08E+01
1.20E+02	4.38E+00	1.09E+01	1.01E+01
1.60E+02	3.60E+00	9.91E+00	9.00E+00
2.00E+02	2.68E+00	9.16E+00	8.06E+00
2.50E+02	1.83E+00	8.26E+00	7.02E+00
3.00E+02	1.29E+00	7.44E+00	6.18E+00
3.50E+02	9.45E-01	6.74E+00	5.50E+00
4.00E+02	7.16E-01	6.14E+00	4.94E+00
5.00E+02	4.45E-01	5.19E+00	4.11E+00
6.00E+02	3.01E-01	4.48E+00	3.51E+00
7.00E+02	2.17E-01	3.94E+00	3.06E+00
8.00E+02	1.64E-01	3.52E+00	2.72E+00
9.00E+02	1.28E-01	3.18E+00	2.45E+00
1.00E+03	1.04E-01	2.89E+00	2.22E+00
1.50E+03	4.60E-02	2.01E+00	1.53E+00
2.00E+03	2.60E-02	1.54E+00	1.17E+00
2.50E+03	1.66E-02	1.25E+00	9.45E-01
3.00E+03	1.15E-02	1.05E+00	7.93E-01
4.00E+03	6.47E-03	7.97E-01	6.01E-01
5.00E+03	4.13E-03	6.42E-01	4.84E-01

Ne VII + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.40E+01			3.63E-02
1.60E+01			7.40E-02
1.80E+01			1.52E-01
2.00E+01	7.82E-05	1.13E-01	2.70E-01
2.20E+01	1.85E-04	1.91E-01	4.26E-01
2.40E+01	3.80E-04	3.27E-01	6.07E-01
2.60E+01	7.11E-04	5.05E-01	8.07E-01
2.80E+01	1.21E-03	7.16E-01	1.02E+00
3.00E+01	1.94E-03	9.54E-01	1.23E+00
3.20E+01	2.94E-03	1.21E+00	1.44E+00
3.40E+01	4.25E-03	1.48E+00	1.64E+00
3.80E+01	8.02E-03	2.04E+00	2.04E+00
4.00E+01	1.06E-02	2.31E+00	2.22E+00
4.50E+01	1.92E-02	2.96E+00	2.63E+00
5.00E+01	3.14E-02	3.55E+00	2.98E+00
5.50E+01	4.75E-02	4.05E+00	3.28E+00
6.00E+01	6.80E-02	4.48E+00	3.53E+00
6.50E+01	9.26E-02	4.82E+00	3.74E+00
7.00E+01	1.21E-01	5.10E+00	3.90E+00
7.50E+01	1.54E-01	5.31E+00	4.03E+00
8.00E+01	1.91E-01	5.47E+00	4.13E+00
8.50E+01	2.30E-01	5.57E+00	4.20E+00
9.00E+01	2.72E-01	5.63E+00	4.24E+00
9.50E+01	3.16E-01	5.66E+00	4.27E+00
1.00E+02	3.62E-01	5.65E+00	4.27E+00
1.20E+02	5.44E-01	5.41E+00	4.17E+00
1.40E+02	7.01E-01	5.03E+00	3.98E+00
1.60E+02	8.14E-01	4.65E+00	3.77E+00
1.80E+02	8.77E-01	4.33E+00	3.57E+00
2.00E+02	8.98E-01	4.06E+00	3.40E+00
2.20E+02	8.87E-01	3.83E+00	3.24E+00
2.40E+02	8.53E-01	3.64E+00	3.09E+00
2.60E+02	8.05E-01	3.47E+00	2.95E+00
2.80E+02	7.50E-01	3.32E+00	2.82E+00
3.00E+02	6.92E-01	3.18E+00	2.70E+00
3.50E+02	5.58E-01	2.88E+00	2.42E+00
4.00E+02	4.48E-01	2.63E+00	2.19E+00
6.00E+02	2.05E-01	1.95E+00	1.57E+00
8.00E+02	1.07E-01	1.54E+00	1.22E+00
9.00E+02	8.03E-02	1.40E+00	1.09E+00
1.00E+03	6.15E-02	1.28E+00	9.93E-01
1.50E+03	2.21E-02	8.88E-01	6.81E-01
2.00E+03	1.13E-02	6.83E-01	5.20E-01
2.50E+03	6.97E-03	5.55E-01	4.22E-01
3.00E+03	4.77E-03	4.69E-01	3.55E-01

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Mg IX + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.40E+01			2.48E-02
3.80E+01			5.34E-02
4.00E+01	1.78E-05	1.86E-02	7.35E-02
4.20E+01	2.93E-05	2.90E-02	9.74E-02
4.40E+01	4.60E-05	4.25E-02	1.25E-01
4.60E+01	6.96E-05	5.98E-02	1.54E-01
4.80E+01	1.02E-04	8.10E-02	1.89E-01
5.00E+01	1.44E-04	1.06E-01	2.25E-01
5.50E+01	3.14E-04	1.87E-01	3.27E-01
6.00E+01	5.99E-04	2.90E-01	4.36E-01
6.50E+01	1.04E-03	4.12E-01	5.48E-01
7.00E+01	1.67E-03	5.46E-01	6.60E-01
7.50E+01	2.54E-03	6.88E-01	7.68E-01
8.00E+01	3.68E-03	8.32E-01	8.71E-01
8.50E+01	5.12E-03	9.75E-01	9.68E-01
9.00E+01	6.88E-03	1.12E+00	1.06E+00
9.50E+01	8.99E-03	1.25E+00	1.14E+00
1.00E+02	1.15E-02	1.38E+00	1.22E+00
1.20E+02	2.53E-02	1.80E+00	1.47E+00
1.40E+02	4.54E-02	2.09E+00	1.63E+00
1.60E+02	7.09E-02	2.27E+00	1.73E+00
1.80E+02	1.00E-01	2.35E+00	1.78E+00
2.00E+02	1.31E-01	2.36E+00	1.79E+00
2.20E+02	1.61E-01	2.33E+00	1.77E+00
2.40E+02	1.88E-01	2.27E+00	1.74E+00
2.60E+02	2.11E-01	2.20E+00	1.70E+00
2.80E+02	2.29E-01	2.12E+00	1.65E+00
3.00E+02	2.42E-01	2.04E+00	1.60E+00
3.40E+02	2.52E-01	1.89E+00	1.50E+00
3.80E+02	2.48E-01	1.75E+00	1.41E+00
4.00E+02	2.42E-01	1.69E+00	1.36E+00
5.00E+02	1.95E-01	1.42E+00	1.16E+00
6.00E+02	1.49E-01	1.23E+00	9.96E-01
7.00E+02	1.14E-01	1.08E+00	8.71E-01
8.00E+02	8.83E-02	9.63E-01	7.72E-01
9.00E+02	6.96E-02	8.70E-01	6.93E-01
1.00E+03	5.55E-02	7.94E-01	6.29E-01
1.50E+03	2.07E-02	5.51E-01	4.28E-01
2.00E+03	9.61E-03	4.23E-01	3.25E-01
2.50E+03	5.37E-03	3.44E-01	2.63E-01
3.00E+03	3.44E-03	2.90E-01	2.21E-01
4.00E+03	1.80E-03	2.22E-01	1.69E-01
5.00E+03	1.12E-03	1.80E-01	1.37E-01
6.00E+03	7.71E-04	1.52E-01	1.15E-01
7.00E+03	5.62E-04	1.31E-01	9.91E-02

Al X + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+01	3.01E-05		7.80E-02
6.50E+01	6.33E-05	4.68E-02	1.18E-01
7.00E+01	1.21E-04	7.79E-02	1.64E-01
7.50E+01	2.13E-04	1.18E-01	2.16E-01
8.00E+01	3.48E-04	1.67E-01	2.72E-01
8.50E+01	5.41E-04	2.24E-01	3.30E-01
9.00E+01	7.99E-04	2.87E-01	3.88E-01
1.00E+02	1.56E-03	4.27E-01	5.03E-01
1.20E+02	4.36E-03	7.23E-01	7.12E-01
1.40E+02	9.24E-03	9.94E-01	8.80E-01
1.60E+02	1.65E-02	1.22E+00	1.01E+00
1.80E+02	2.60E-02	1.38E+00	1.10E+00
2.00E+02	3.75E-02	1.50E+00	1.17E+00
2.20E+02	5.06E-02	1.57E+00	1.21E+00
2.40E+02	6.47E-02	1.61E+00	1.23E+00
2.80E+02	9.28E-02	1.62E+00	1.23E+00
3.00E+02	1.06E-01	1.60E+00	1.22E+00
3.20E+02	1.17E-01	1.56E+00	1.20E+00
3.40E+02	1.27E-01	1.53E+00	1.17E+00
3.60E+02	1.34E-01	1.48E+00	1.15E+00
3.80E+02	1.40E-01	1.44E+00	1.12E+00
4.00E+02	1.43E-01	1.40E+00	1.09E+00
4.40E+02	1.45E-01	1.31E+00	1.04E+00
4.60E+02	1.44E-01	1.27E+00	1.01E+00
5.00E+02	1.39E-01	1.20E+00	9.52E-01
5.50E+02	1.29E-01	1.11E+00	8.88E-01
6.00E+02	1.17E-01	1.03E+00	8.29E-01
6.50E+02	1.06E-01	9.66E-01	7.75E-01
7.00E+02	9.47E-02	9.06E-01	7.27E-01
7.50E+02	8.47E-02	8.53E-01	6.84E-01
8.00E+02	7.58E-02	8.06E-01	6.46E-01
9.00E+02	6.11E-02	7.26E-01	5.80E-01
1.00E+03	4.98E-02	6.60E-01	5.25E-01
1.20E+03	3.40E-02	5.60E-01	4.42E-01
1.60E+03	1.72E-02	4.30E-01	3.35E-01
1.80E+03	1.27E-02	3.85E-01	2.99E-01
2.00E+03	9.59E-03	3.49E-01	2.70E-01
2.50E+03	5.23E-03	2.83E-01	2.17E-01
3.00E+03	3.23E-03	2.38E-01	1.83E-01
3.50E+03	2.20E-03	2.06E-01	1.58E-01
4.00E+03	1.60E-03	1.82E-01	1.39E-01
5.00E+03	9.75E-04	1.48E-01	1.12E-01
6.00E+03	6.62E-04	1.25E-01	9.46E-02
8.00E+03	3.65E-04	9.49E-02	7.19E-02
1.00E+04	2.31E-04	7.67E-02	5.81E-02

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Si XI + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
7.50E+01	1.10E-05	9.04E-03	3.59E-02
8.00E+01	2.13E-05	1.62E-02	5.29E-02
9.00E+01	6.42E-05	4.06E-02	9.70E-02
1.00E+02	1.55E-04	7.99E-02	1.52E-01
1.20E+02	5.95E-04	2.00E-01	2.76E-01
1.40E+02	1.57E-03	3.54E-01	4.01E-01
1.60E+02	3.28E-03	5.15E-01	5.14E-01
1.80E+02	5.86E-03	6.65E-01	6.09E-01
2.00E+02	9.38E-03	7.96E-01	6.86E-01
2.20E+02	1.38E-02	9.04E-01	7.47E-01
2.40E+02	1.92E-02	9.89E-01	7.94E-01
2.60E+02	2.52E-02	1.05E+00	8.28E-01
2.80E+02	3.18E-02	1.10E+00	8.51E-01
3.00E+02	3.87E-02	1.13E+00	8.66E-01
3.20E+02	4.57E-02	1.14E+00	8.73E-01
3.40E+02	5.26E-02	1.15E+00	8.74E-01
3.60E+02	5.91E-02	1.14E+00	8.70E-01
3.80E+02	6.51E-02	1.13E+00	8.62E-01
4.00E+02	7.05E-02	1.11E+00	8.51E-01
4.50E+02	8.04E-02	1.06E+00	8.17E-01
5.00E+02	8.53E-02	1.00E+00	7.76E-01
5.50E+02	8.59E-02	9.38E-01	7.33E-01
6.00E+02	8.34E-02	8.79E-01	6.91E-01
6.50E+02	7.89E-02	8.24E-01	6.51E-01
7.00E+02	7.35E-02	7.75E-01	6.14E-01
7.50E+02	6.77E-02	7.30E-01	5.79E-01
8.00E+02	6.20E-02	6.89E-01	5.47E-01
8.50E+02	5.67E-02	6.52E-01	5.18E-01
9.00E+02	5.17E-02	6.19E-01	4.92E-01
9.50E+02	4.72E-02	5.89E-01	4.68E-01
1.00E+03	4.32E-02	5.62E-01	4.46E-01
1.20E+03	3.06E-02	4.74E-01	3.75E-01
1.40E+03	2.23E-02	4.11E-01	3.23E-01
1.60E+03	1.65E-02	3.62E-01	2.84E-01
1.80E+03	1.24E-02	3.24E-01	2.53E-01
2.00E+03	9.53E-03	2.93E-01	2.28E-01
2.50E+03	5.24E-03	2.37E-01	1.83E-01
3.00E+03	3.18E-03	1.99E-01	1.53E-01
4.00E+03	1.49E-03	1.52E-01	1.16E-01
5.00E+03	8.75E-04	1.23E-01	9.40E-02
6.00E+03	5.82E-04	1.04E-01	7.91E-02
7.00E+03	4.19E-04	8.99E-02	6.83E-02
8.00E+03	3.16E-04	7.92E-02	6.02E-02
1.00E+04	1.99E-04	6.41E-02	4.86E-02
1.50E+04	8.66E-05	4.34E-02	3.29E-02

S XIII + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.10E+02	1.51E-06		8.36E-03
1.20E+02	4.05E-06	2.77E-03	1.42E-02
1.30E+02	9.51E-06	6.17E-03	2.31E-02
1.40E+02	2.01E-05	1.19E-02	3.56E-02
1.50E+02	3.79E-05	2.03E-02	5.09E-02
1.60E+02	6.68E-05	3.19E-02	6.86E-02
1.70E+02	1.11E-04	4.66E-02	8.82E-02
1.80E+02	1.73E-04	6.44E-02	1.09E-01
1.90E+02	2.56E-04	8.45E-02	1.31E-01
2.00E+02	3.66E-04	1.07E-01	1.53E-01
2.20E+02	6.81E-04	1.58E-01	1.97E-01
2.40E+02	1.14E-03	2.12E-01	2.39E-01
2.60E+02	1.78E-03	2.67E-01	2.78E-01
2.80E+02	2.59E-03	3.20E-01	3.13E-01
3.00E+02	3.60E-03	3.70E-01	3.44E-01
3.20E+02	4.80E-03	4.16E-01	3.71E-01
3.30E+02	5.47E-03	4.37E-01	3.83E-01
3.40E+02	6.18E-03	4.56E-01	3.94E-01
3.50E+02	6.94E-03	4.75E-01	4.04E-01
3.60E+02	7.74E-03	4.92E-01	4.14E-01
3.70E+02	8.57E-03	5.07E-01	4.22E-01
3.80E+02	9.44E-03	5.22E-01	4.30E-01
4.00E+02	1.13E-02	5.47E-01	4.43E-01
4.20E+02	1.32E-02	5.67E-01	4.53E-01
4.40E+02	1.51E-02	5.83E-01	4.61E-01
4.80E+02	1.91E-02	6.04E-01	4.70E-01
5.00E+02	2.11E-02	6.09E-01	4.72E-01
5.20E+02	2.30E-02	6.12E-01	4.72E-01
5.40E+02	2.47E-02	6.12E-01	4.71E-01
5.60E+02	2.64E-02	6.10E-01	4.69E-01
5.80E+02	2.79E-02	6.07E-01	4.66E-01
6.00E+02	2.92E-02	6.02E-01	4.62E-01
7.00E+02	3.34E-02	5.65E-01	4.35E-01
8.00E+02	3.40E-02	5.18E-01	4.02E-01
9.00E+02	3.22E-02	4.73E-01	3.68E-01
1.00E+03	2.93E-02	4.31E-01	3.38E-01
1.50E+03	1.57E-02	2.93E-01	2.30E-01
2.00E+03	8.75E-03	2.21E-01	1.73E-01
3.00E+03	3.23E-03	1.48E-01	1.15E-01
4.00E+03	1.46E-03	1.12E-01	8.63E-02
6.00E+03	5.03E-04	7.61E-02	5.83E-02
8.00E+03	2.58E-04	5.81E-02	4.43E-02
1.00E+04	1.59E-04	4.71E-02	3.58E-02
1.50E+04	6.84E-05	3.20E-02	2.43E-02
2.00E+04	3.78E-05	2.43E-02	1.84E-02

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Ar XV + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.80E+02	1.65E-06		5.81E-03
2.00E+02	5.26E-06		1.15E-02
2.20E+02	1.37E-05	6.88E-03	2.08E-02
2.40E+02	3.13E-05	1.48E-02	3.29E-02
2.60E+02	6.14E-05	2.35E-02	4.73E-02
2.80E+02	1.11E-04	3.64E-02	6.33E-02
3.00E+02	1.84E-04	5.21E-02	8.03E-02
3.60E+02	6.02E-04	1.11E-01	1.32E-01
3.80E+02	8.21E-04	1.32E-01	1.48E-01
4.00E+02	1.09E-03	1.53E-01	1.63E-01
4.20E+02	1.40E-03	1.74E-01	1.78E-01
4.60E+02	2.16E-03	2.13E-01	2.03E-01
5.00E+02	3.10E-03	2.48E-01	2.24E-01
5.20E+02	3.64E-03	2.63E-01	2.32E-01
5.60E+02	4.79E-03	2.90E-01	2.47E-01
6.00E+02	6.05E-03	3.10E-01	2.57E-01
6.50E+02	7.67E-03	3.29E-01	2.66E-01
7.00E+02	9.27E-03	3.40E-01	2.71E-01
7.50E+02	1.07E-02	3.45E-01	2.72E-01
8.00E+02	1.20E-02	3.46E-01	2.71E-01
8.50E+02	1.31E-02	3.43E-01	2.67E-01
9.00E+02	1.39E-02	3.38E-01	2.62E-01
9.50E+02	1.44E-02	3.31E-01	2.56E-01
1.00E+03	1.48E-02	3.22E-01	2.50E-01
1.40E+03	1.25E-02	2.49E-01	1.94E-01
2.00E+03	7.32E-03	1.76E-01	1.38E-01
2.40E+03	5.16E-03	1.46E-01	1.15E-01
3.00E+03	3.16E-03	1.17E-01	9.10E-02
3.50E+03	2.17E-03	9.98E-02	7.76E-02
4.00E+03	1.52E-03	8.72E-02	6.77E-02
5.00E+03	8.21E-04	6.98E-02	5.40E-02
6.00E+03	4.95E-04	5.85E-02	4.51E-02
6.50E+03	3.99E-04	5.41E-02	4.17E-02
7.00E+03	3.28E-04	5.04E-02	3.88E-02
7.50E+03	2.75E-04	4.72E-02	3.63E-02
8.00E+03	2.34E-04	4.44E-02	3.41E-02
9.00E+03	1.76E-04	3.97E-02	3.05E-02
1.00E+04	1.38E-04	3.60E-02	2.75E-02
1.50E+04	5.72E-05	2.45E-02	1.87E-02
2.00E+04	3.14E-05	1.87E-02	1.42E-02
3.00E+04	1.36E-05	1.26E-02	9.61E-03
4.00E+04	7.53E-06	9.54E-03	7.26E-03
5.00E+04	4.76E-06	7.67E-03	5.83E-03
6.00E+04	3.28E-06	6.41E-03	4.88E-03
7.00E+04	2.39E-06	5.51E-03	4.19E-03

Ca XVII + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.60E+02	8.60E-07		2.48E-03
2.80E+02	2.02E-06	1.80E-03	4.52E-03
3.00E+02	4.26E-06	2.81E-03	7.86E-03
3.40E+02	1.48E-05	6.03E-03	1.61E-02
3.80E+02	3.96E-05	1.35E-02	2.79E-02
4.00E+02	6.02E-05	1.87E-02	3.47E-02
4.40E+02	1.24E-04	3.16E-02	4.95E-02
4.60E+02	1.69E-04	3.91E-02	5.71E-02
4.80E+02	2.25E-04	4.73E-02	6.49E-02
5.00E+02	2.93E-04	5.60E-02	7.25E-02
5.40E+02	4.66E-04	7.42E-02	8.75E-02
5.80E+02	6.94E-04	9.29E-02	1.01E-01
6.00E+02	8.29E-04	1.02E-01	1.08E-01
6.50E+02	1.22E-03	1.24E-01	1.23E-01
7.00E+02	1.70E-03	1.44E-01	1.35E-01
7.50E+02	2.25E-03	1.62E-01	1.45E-01
8.00E+02	2.84E-03	1.76E-01	1.53E-01
8.50E+02	3.45E-03	1.88E-01	1.59E-01
9.00E+02	4.07E-03	1.96E-01	1.64E-01
9.50E+02	4.67E-03	2.03E-01	1.66E-01
1.00E+03	5.23E-03	2.07E-01	1.68E-01
1.20E+03	6.84E-03	2.07E-01	1.64E-01
1.40E+03	7.35E-03	1.95E-01	1.52E-01
1.80E+03	6.43E-03	1.61E-01	1.26E-01
2.00E+03	5.69E-03	1.46E-01	1.14E-01
2.20E+03	4.97E-03	1.34E-01	1.04E-01
2.40E+03	4.33E-03	1.23E-01	9.57E-02
2.60E+03	3.77E-03	1.13E-01	8.83E-02
2.80E+03	3.29E-03	1.05E-01	8.18E-02
3.00E+03	2.88E-03	9.75E-02	7.62E-02
3.50E+03	2.08E-03	8.31E-02	6.49E-02
4.00E+03	1.53E-03	7.23E-02	5.64E-02
4.50E+03	1.14E-03	6.40E-02	4.98E-02
5.00E+03	8.64E-04	5.74E-02	4.46E-02
5.50E+03	6.67E-04	5.21E-02	4.04E-02
6.00E+03	5.24E-04	4.77E-02	3.70E-02
7.00E+03	3.41E-04	4.09E-02	3.16E-02
8.00E+03	2.36E-04	3.59E-02	2.77E-02
9.00E+03	1.73E-04	3.20E-02	2.47E-02
1.00E+04	1.32E-04	2.90E-02	2.23E-02
1.50E+04	5.15E-05	1.97E-02	1.51E-02
2.00E+04	2.78E-05	1.50E-02	1.15E-02
3.00E+04	1.20E-05	1.02E-02	7.80E-03
4.00E+04	6.61E-06	7.73E-03	5.90E-03
5.00E+04	4.17E-06	6.22E-03	4.75E-03

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Ti XIX + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
4.00E+02	1.54E-06	1.28E-03	3.09E-03
4.50E+02	5.44E-06	2.68E-03	6.82E-03
5.00E+02	1.48E-05	5.07E-03	1.22E-02
5.50E+02	3.37E-05	9.92E-03	1.95E-02
6.00E+02	6.74E-05	1.68E-02	2.79E-02
6.50E+02	1.20E-04	2.53E-02	3.69E-02
7.00E+02	1.96E-04	3.51E-02	4.61E-02
7.50E+02	2.98E-04	4.56E-02	5.51E-02
8.00E+02	4.29E-04	5.65E-02	6.36E-02
8.50E+02	5.88E-04	6.73E-02	7.15E-02
9.00E+02	7.75E-04	7.76E-02	7.86E-02
9.50E+02	9.86E-04	8.72E-02	8.48E-02
1.00E+03	1.22E-03	9.59E-02	9.02E-02
1.20E+03	2.22E-03	1.21E-01	1.04E-01
1.40E+03	3.10E-03	1.30E-01	1.07E-01
1.60E+03	3.64E-03	1.30E-01	1.05E-01
1.80E+03	3.84E-03	1.25E-01	9.95E-02
2.00E+03	3.78E-03	1.18E-01	9.32E-02
2.20E+03	3.57E-03	1.10E-01	8.66E-02
2.40E+03	3.29E-03	1.03E-01	8.05E-02
2.60E+03	3.00E-03	9.55E-02	7.48E-02
2.80E+03	2.71E-03	8.91E-02	6.97E-02
3.00E+03	2.44E-03	8.33E-02	6.51E-02
3.50E+03	1.88E-03	7.12E-02	5.57E-02
4.00E+03	1.45E-03	6.20E-02	4.84E-02
4.50E+03	1.13E-03	5.47E-02	4.27E-02
5.00E+03	8.84E-04	4.90E-02	3.82E-02
5.50E+03	6.99E-04	4.43E-02	3.45E-02
6.00E+03	5.58E-04	4.04E-02	3.15E-02
6.50E+03	4.50E-04	3.72E-02	2.89E-02
7.00E+03	3.68E-04	3.44E-02	2.68E-02
7.50E+03	3.04E-04	3.21E-02	2.49E-02
8.00E+03	2.53E-04	3.01E-02	2.33E-02
8.50E+03	2.14E-04	2.83E-02	2.19E-02
9.00E+03	1.83E-04	2.67E-02	2.07E-02
9.50E+03	1.57E-04	2.53E-02	1.96E-02
1.00E+04	1.37E-04	2.41E-02	1.86E-02
1.20E+04	8.49E-05	2.02E-02	1.56E-02
1.40E+04	5.80E-05	1.74E-02	1.34E-02
1.60E+04	4.25E-05	1.53E-02	1.18E-02
1.80E+04	3.26E-05	1.37E-02	1.06E-02
2.00E+04	2.59E-05	1.24E-02	9.55E-03
2.50E+04	1.61E-05	1.00E-02	7.72E-03
3.00E+04	1.09E-05	8.45E-03	6.48E-03
3.50E+04	7.94E-06	7.29E-03	5.59E-03

Cr XXI + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
5.00E+02	3.96E-07		9.17E-04
5.50E+02	1.17E-06		1.91E-03
6.00E+02	2.98E-06		3.43E-03
6.50E+02	6.65E-06	2.18E-03	5.78E-03
7.50E+02	2.40E-05	6.45E-03	1.25E-02
8.00E+02	4.05E-05	9.68E-03	1.66E-02
9.00E+02	9.53E-05	1.80E-02	2.56E-02
9.50E+02	1.36E-04	2.30E-02	3.03E-02
1.00E+03	1.87E-04	2.82E-02	3.49E-02
1.20E+03	4.90E-04	4.95E-02	5.12E-02
1.40E+03	9.15E-04	6.70E-02	6.24E-02
1.60E+03	1.36E-03	7.83E-02	6.85E-02
1.80E+03	1.73E-03	8.38E-02	7.06E-02
2.00E+03	1.98E-03	8.52E-02	7.01E-02
2.40E+03	2.13E-03	8.12E-02	6.51E-02
2.80E+03	1.99E-03	7.39E-02	5.86E-02
3.00E+03	1.88E-03	7.01E-02	5.54E-02
3.50E+03	1.56E-03	6.13E-02	4.82E-02
4.00E+03	1.28E-03	5.39E-02	4.22E-02
4.50E+03	1.04E-03	4.78E-02	3.74E-02
5.00E+03	8.46E-04	4.28E-02	3.35E-02
5.50E+03	6.91E-04	3.87E-02	3.02E-02
6.00E+03	5.67E-04	3.53E-02	2.75E-02
6.50E+03	4.68E-04	3.24E-02	2.53E-02
7.00E+03	3.88E-04	2.99E-02	2.33E-02
7.50E+03	3.24E-04	2.78E-02	2.17E-02
8.00E+03	2.73E-04	2.60E-02	2.02E-02
8.50E+03	2.31E-04	2.44E-02	1.90E-02
9.00E+03	1.97E-04	2.30E-02	1.79E-02
9.50E+03	1.70E-04	2.18E-02	1.69E-02
1.00E+04	1.47E-04	2.07E-02	1.60E-02
1.20E+04	8.92E-05	1.72E-02	1.33E-02
1.40E+04	5.94E-05	1.48E-02	1.14E-02
1.60E+04	4.24E-05	1.30E-02	1.00E-02
1.80E+04	3.20E-05	1.16E-02	8.96E-03
2.00E+04	2.50E-05	1.05E-02	8.10E-03
2.50E+04	1.53E-05	8.49E-03	6.54E-03
3.00E+04	1.03E-05	7.14E-03	5.50E-03
3.50E+04	7.45E-06	6.16E-03	4.74E-03
4.00E+04	5.63E-06	5.44E-03	4.18E-03
5.00E+04	3.54E-06	4.39E-03	3.37E-03
6.00E+04	2.42E-06	3.68E-03	2.82E-03
7.00E+04	1.76E-06	3.17E-03	2.43E-03
8.00E+04	1.33E-06	2.79E-03	2.13E-03
9.00E+04	1.05E-06	2.49E-03	1.90E-03

TABLE II. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Fe XXIII + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
8.00E+02	2.15E-06		2.20E-03
9.00E+02	6.87E-06	1.99E-03	4.77E-03
1.00E+03	1.74E-05	4.35E-03	8.16E-03
1.10E+03	3.68E-05	7.82E-03	1.25E-02
1.20E+03	6.82E-05	1.23E-02	1.72E-02
1.30E+03	1.13E-04	1.74E-02	2.20E-02
1.40E+03	1.73E-04	2.28E-02	2.66E-02
1.50E+03	2.48E-04	2.83E-02	3.08E-02
1.60E+03	3.33E-04	3.34E-02	3.45E-02
1.65E+03	3.78E-04	3.58E-02	3.62E-02
1.70E+03	4.26E-04	3.81E-02	3.77E-02
1.75E+03	4.75E-04	4.02E-02	3.91E-02
1.80E+03	5.24E-04	4.22E-02	4.03E-02
1.85E+03	5.74E-04	4.40E-02	4.15E-02
1.90E+03	6.22E-04	4.57E-02	4.24E-02
1.95E+03	6.70E-04	4.72E-02	4.33E-02
2.00E+03	7.16E-04	4.85E-02	4.40E-02
2.10E+03	8.05E-04	5.08E-02	4.51E-02
2.20E+03	8.85E-04	5.25E-02	4.59E-02
2.30E+03	9.55E-04	5.38E-02	4.63E-02
2.40E+03	1.01E-03	5.46E-02	4.65E-02
2.50E+03	1.06E-03	5.50E-02	4.64E-02
2.60E+03	1.10E-03	5.52E-02	4.61E-02
2.80E+03	1.15E-03	5.48E-02	4.51E-02
3.00E+03	1.17E-03	5.38E-02	4.38E-02
4.00E+03	1.01E-03	4.53E-02	3.59E-02
5.00E+03	7.64E-04	3.72E-02	2.92E-02
5.50E+03	6.55E-04	3.38E-02	2.66E-02
6.00E+03	5.59E-04	3.10E-02	2.43E-02
6.50E+03	4.77E-04	2.85E-02	2.23E-02
7.00E+03	4.07E-04	2.63E-02	2.06E-02
7.50E+03	3.48E-04	2.44E-02	1.91E-02
8.00E+03	2.98E-04	2.28E-02	1.78E-02
8.50E+03	2.56E-04	2.14E-02	1.67E-02
9.00E+03	2.21E-04	2.01E-02	1.57E-02
9.50E+03	1.91E-04	1.90E-02	1.48E-02
1.00E+04	1.66E-04	1.80E-02	1.40E-02
1.20E+04	1.00E-04	1.49E-02	1.15E-02
1.60E+04	4.56E-05	1.11E-02	8.61E-03
2.00E+04	2.58E-05	8.94E-03	6.92E-03
2.50E+04	1.53E-05	7.22E-03	5.58E-03
3.00E+04	1.02E-05	6.07E-03	4.69E-03
4.00E+04	5.48E-06	4.63E-03	3.56E-03
5.00E+04	3.42E-06	3.74E-03	2.87E-03
6.00E+04	2.33E-06	3.14E-03	2.41E-03

Ni XXV + p			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+03	1.11E-06		1.02E-03
1.10E+03	2.95E-06	8.19E-04	2.07E-03
1.20E+03	6.75E-06	1.73E-03	3.61E-03
1.30E+03	1.36E-05	3.13E-03	5.61E-03
1.40E+03	2.48E-05	5.03E-03	7.96E-03
1.50E+03	4.12E-05	7.38E-03	1.05E-02
1.60E+03	6.36E-05	1.01E-02	1.32E-02
1.70E+03	9.27E-05	1.30E-02	1.59E-02
1.80E+03	1.28E-04	1.61E-02	1.86E-02
1.90E+03	1.69E-04	1.92E-02	2.10E-02
2.00E+03	2.16E-04	2.21E-02	2.33E-02
2.10E+03	2.65E-04	2.49E-02	2.53E-02
2.20E+03	3.18E-04	2.75E-02	2.70E-02
2.30E+03	3.71E-04	2.98E-02	2.85E-02
2.40E+03	4.23E-04	3.18E-02	2.98E-02
2.50E+03	4.73E-04	3.35E-02	3.08E-02
2.55E+03	4.96E-04	3.42E-02	3.12E-02
2.60E+03	5.19E-04	3.49E-02	3.16E-02
2.65E+03	5.41E-04	3.56E-02	3.19E-02
2.70E+03	5.63E-04	3.62E-02	3.22E-02
2.80E+03	6.02E-04	3.71E-02	3.26E-02
2.90E+03	6.36E-04	3.79E-02	3.29E-02
3.00E+03	6.65E-04	3.84E-02	3.31E-02
3.20E+03	7.10E-04	3.90E-02	3.30E-02
3.40E+03	7.36E-04	3.90E-02	3.26E-02
3.60E+03	7.48E-04	3.87E-02	3.20E-02
4.00E+03	7.38E-04	3.74E-02	3.04E-02
4.40E+03	7.01E-04	3.55E-02	2.86E-02
4.80E+03	6.50E-04	3.35E-02	2.67E-02
5.00E+03	6.22E-04	3.24E-02	2.58E-02
6.00E+03	4.86E-04	2.77E-02	2.19E-02
7.00E+03	3.72E-04	2.38E-02	1.87E-02
8.00E+03	2.84E-04	2.07E-02	1.62E-02
9.00E+03	2.17E-04	1.83E-02	1.43E-02
1.00E+04	1.68E-04	1.64E-02	1.27E-02
1.40E+04	6.86E-05	1.15E-02	8.89E-03
1.60E+04	4.77E-05	9.99E-03	7.74E-03
2.00E+04	2.65E-05	8.00E-03	6.18E-03
2.50E+04	1.53E-05	6.44E-03	4.98E-03
3.00E+04	1.00E-05	5.40E-03	4.17E-03
4.00E+04	5.33E-06	4.11E-03	3.16E-03
5.00E+04	3.31E-06	3.32E-03	2.56E-03
6.00E+04	2.25E-06	2.79E-03	2.14E-03
8.00E+04	1.23E-06	2.13E-03	1.63E-03
1.00E+05	7.73E-07	1.71E-03	1.31E-03

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

C III + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+00	9.09E-06	2.42E-01	1.84E-01
1.50E+00	1.23E-03	1.00E+00	3.57E+00
2.00E+00	1.87E-02	9.03E+00	1.59E+01
2.50E+00	9.98E-02	2.72E+01	3.36E+01
3.00E+00	3.20E-01	5.13E+01	5.20E+01
3.50E+00	7.63E-01	7.64E+01	6.85E+01
4.00E+00	1.51E+00	9.91E+01	8.25E+01
4.50E+00	2.62E+00	1.18E+02	9.39E+01
5.00E+00	4.14E+00	1.33E+02	1.03E+02
6.00E+00	8.43E+00	1.50E+02	1.13E+02
7.00E+00	1.41E+01	1.53E+02	1.16E+02
8.00E+00	2.05E+01	1.46E+02	1.14E+02
9.00E+00	2.66E+01	1.36E+02	1.09E+02
1.00E+01	3.17E+01	1.26E+02	1.04E+02
1.20E+01	3.70E+01	1.13E+02	9.89E+01
1.40E+01	3.77E+01	1.09E+02	9.60E+01
1.60E+01	3.72E+01	1.03E+02	9.22E+01
1.80E+01	3.68E+01	9.77E+01	8.82E+01
2.00E+01	3.61E+01	9.39E+01	8.49E+01
2.50E+01	3.33E+01	8.68E+01	7.90E+01
3.00E+01	3.08E+01	8.07E+01	7.35E+01
3.50E+01	2.85E+01	7.61E+01	6.92E+01
4.00E+01	2.66E+01	7.23E+01	6.55E+01
5.00E+01	2.43E+01	6.49E+01	5.91E+01
6.00E+01	2.24E+01	5.95E+01	5.43E+01
7.00E+01	2.01E+01	5.60E+01	5.06E+01
8.00E+01	1.80E+01	5.33E+01	4.77E+01
9.00E+01	1.64E+01	5.10E+01	4.53E+01
1.00E+02	1.52E+01	4.90E+01	4.33E+01
1.20E+02	1.35E+01	4.57E+01	4.00E+01
1.40E+02	1.21E+01	4.30E+01	3.74E+01
1.60E+02	1.09E+01	4.08E+01	3.52E+01
1.80E+02	9.75E+00	3.88E+01	3.33E+01
2.00E+02	8.77E+00	3.70E+01	3.15E+01
2.40E+02	7.13E+00	3.39E+01	2.85E+01
2.80E+02	5.87E+00	3.12E+01	2.59E+01
3.20E+02	4.89E+00	2.88E+01	2.37E+01
3.60E+02	4.12E+00	2.68E+01	2.19E+01
4.00E+02	3.52E+00	2.50E+01	2.02E+01
5.00E+02	2.47E+00	2.14E+01	1.71E+01
6.00E+02	1.82E+00	1.86E+01	1.48E+01
7.00E+02	1.40E+00	1.65E+01	1.30E+01
8.00E+02	1.11E+00	1.48E+01	1.16E+01
9.00E+02	8.95E-01	1.34E+01	1.05E+01
1.00E+03	7.39E-01	1.23E+01	9.55E+00

N IV + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.00E+00	5.67E-05	1.33E-01	3.51E-01
3.20E+00	1.27E-04	1.67E-01	5.68E-01
3.40E+00	2.50E-04	2.42E-01	8.90E-01
3.60E+00	4.82E-04	3.22E-01	1.33E+00
3.80E+00	8.62E-04	5.46E-01	1.90E+00
4.00E+00	1.48E-03	9.20E-01	2.59E+00
4.50E+00	4.47E-03	2.14E+00	4.77E+00
5.00E+00	1.11E-02	4.22E+00	7.51E+00
5.50E+00	2.34E-02	7.09E+00	1.06E+01
6.00E+00	4.40E-02	1.06E+01	1.39E+01
6.50E+00	7.56E-02	1.46E+01	1.72E+01
7.00E+00	1.21E-01	1.89E+01	2.05E+01
7.50E+00	1.83E-01	2.34E+01	2.37E+01
8.00E+00	2.66E-01	2.79E+01	2.67E+01
9.00E+00	4.98E-01	3.65E+01	3.21E+01
1.00E+01	8.37E-01	4.41E+01	3.66E+01
1.20E+01	1.88E+00	5.55E+01	4.32E+01
1.40E+01	3.42E+00	6.17E+01	4.69E+01
1.60E+01	5.38E+00	6.35E+01	4.81E+01
1.80E+01	7.57E+00	6.21E+01	4.76E+01
2.00E+01	9.77E+00	5.88E+01	4.62E+01
2.20E+01	1.17E+01	5.50E+01	4.46E+01
2.40E+01	1.33E+01	5.16E+01	4.30E+01
2.60E+01	1.45E+01	4.89E+01	4.18E+01
2.80E+01	1.52E+01	4.71E+01	4.09E+01
3.00E+01	1.55E+01	4.59E+01	4.03E+01
3.50E+01	1.54E+01	4.39E+01	3.89E+01
4.00E+01	1.51E+01	4.17E+01	3.72E+01
4.50E+01	1.47E+01	3.95E+01	3.56E+01
5.00E+01	1.43E+01	3.77E+01	3.42E+01
6.00E+01	1.34E+01	3.50E+01	3.19E+01
7.00E+01	1.25E+01	3.30E+01	3.00E+01
8.00E+01	1.15E+01	3.15E+01	2.86E+01
9.00E+01	1.05E+01	3.04E+01	2.73E+01
1.00E+02	9.73E+00	2.94E+01	2.62E+01
1.20E+02	8.65E+00	2.75E+01	2.44E+01
1.60E+02	7.26E+00	2.46E+01	2.16E+01
2.00E+02	6.01E+00	2.24E+01	1.95E+01
2.50E+02	4.70E+00	2.03E+01	1.73E+01
3.00E+02	3.71E+00	1.85E+01	1.55E+01
4.00E+02	2.42E+00	1.56E+01	1.28E+01
5.00E+02	1.68E+00	1.34E+01	1.08E+01
6.00E+02	1.23E+00	1.18E+01	9.38E+00
8.00E+02	7.42E-01	9.40E+00	7.39E+00
1.00E+03	4.95E-01	7.82E+00	6.09E+00

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

O V + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+00	3.21E-05		1.75E-01
7.00E+00	1.95E-04	1.48E-01	5.38E-01
7.50E+00	4.21E-04	2.60E-01	8.62E-01
8.00E+00	8.36E-04	4.41E-01	1.28E+00
9.00E+00	2.55E-03	1.04E+00	2.38E+00
1.00E+01	6.34E-03	2.07E+00	3.77E+00
1.20E+01	2.53E-02	5.26E+00	7.00E+00
1.40E+01	6.97E-02	9.45E+00	1.03E+01
1.60E+01	1.52E-01	1.39E+01	1.34E+01
1.80E+01	2.84E-01	1.82E+01	1.61E+01
2.00E+01	4.74E-01	2.19E+01	1.83E+01
2.20E+01	7.27E-01	2.50E+01	2.00E+01
2.40E+01	1.05E+00	2.74E+01	2.14E+01
2.60E+01	1.43E+00	2.90E+01	2.23E+01
2.80E+01	1.86E+00	3.01E+01	2.29E+01
3.00E+01	2.35E+00	3.05E+01	2.32E+01
3.50E+01	3.67E+00	2.99E+01	2.30E+01
4.00E+01	4.98E+00	2.79E+01	2.21E+01
4.50E+01	6.07E+00	2.56E+01	2.11E+01
5.00E+01	6.84E+00	2.38E+01	2.02E+01
6.00E+01	7.46E+00	2.17E+01	1.91E+01
7.00E+01	7.40E+00	2.06E+01	1.84E+01
8.00E+01	7.15E+00	1.97E+01	1.77E+01
9.00E+01	6.85E+00	1.89E+01	1.70E+01
1.00E+02	6.56E+00	1.82E+01	1.63E+01
1.20E+02	6.03E+00	1.69E+01	1.52E+01
1.40E+02	5.63E+00	1.59E+01	1.43E+01
1.60E+02	5.31E+00	1.50E+01	1.36E+01
1.80E+02	4.97E+00	1.43E+01	1.29E+01
2.00E+02	4.59E+00	1.38E+01	1.23E+01
2.50E+02	3.63E+00	1.26E+01	1.11E+01
3.00E+02	2.85E+00	1.16E+01	1.00E+01
3.50E+02	2.25E+00	1.08E+01	9.12E+00
4.00E+02	1.81E+00	9.99E+00	8.34E+00
5.00E+02	1.23E+00	8.69E+00	7.10E+00
6.00E+02	8.78E-01	7.66E+00	6.17E+00
7.00E+02	6.56E-01	6.84E+00	5.45E+00
8.00E+02	5.09E-01	6.16E+00	4.87E+00
1.00E+03	3.33E-01	5.14E+00	4.02E+00
1.50E+03	1.54E-01	3.64E+00	2.80E+00
2.00E+03	8.81E-02	2.81E+00	2.15E+00
3.00E+03	3.98E-02	1.94E+00	1.47E+00
4.00E+03	2.25E-02	1.48E+00	1.12E+00
5.00E+03	1.44E-02	1.19E+00	9.04E-01
7.00E+03	7.37E-03	8.64E-01	6.52E-01

Ne VII + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.60E+01			4.24E-02
1.80E+01			9.06E-02
2.00E+01	6.88E-05	4.45E-02	1.71E-01
2.20E+01	1.97E-04	9.49E-02	3.13E-01
2.40E+01	4.72E-04	1.76E-01	5.20E-01
2.60E+01	9.99E-04	3.26E-01	7.80E-01
2.80E+01	1.91E-03	5.37E-01	1.08E+00
3.00E+01	3.35E-03	8.11E-01	1.42E+00
3.20E+01	5.48E-03	1.14E+00	1.77E+00
3.40E+01	8.48E-03	1.52E+00	2.14E+00
3.60E+01	1.26E-02	1.95E+00	2.51E+00
3.80E+01	1.79E-02	2.40E+00	2.88E+00
4.00E+01	2.46E-02	2.87E+00	3.24E+00
4.50E+01	4.86E-02	4.07E+00	4.06E+00
5.00E+01	8.44E-02	5.21E+00	4.78E+00
5.50E+01	1.33E-01	6.23E+00	5.38E+00
6.00E+01	1.96E-01	7.08E+00	5.85E+00
6.50E+01	2.72E-01	7.76E+00	6.22E+00
7.00E+01	3.60E-01	8.27E+00	6.49E+00
7.50E+01	4.60E-01	8.63E+00	6.67E+00
8.00E+01	5.68E-01	8.84E+00	6.78E+00
8.50E+01	6.83E-01	8.93E+00	6.83E+00
9.00E+01	8.01E-01	8.94E+00	6.84E+00
9.50E+01	9.21E-01	8.86E+00	6.80E+00
1.00E+02	1.04E+00	8.73E+00	6.74E+00
1.20E+02	1.47E+00	7.94E+00	6.35E+00
1.40E+02	1.77E+00	7.15E+00	5.94E+00
1.60E+02	1.94E+00	6.53E+00	5.61E+00
1.80E+02	2.01E+00	6.07E+00	5.34E+00
2.00E+02	2.02E+00	5.73E+00	5.12E+00
2.20E+02	1.98E+00	5.45E+00	4.92E+00
2.40E+02	1.91E+00	5.23E+00	4.74E+00
2.60E+02	1.82E+00	5.05E+00	4.57E+00
2.80E+02	1.72E+00	4.88E+00	4.42E+00
3.00E+02	1.61E+00	4.74E+00	4.27E+00
4.00E+02	1.11E+00	4.14E+00	3.64E+00
5.00E+02	7.71E-01	3.67E+00	3.13E+00
6.00E+02	5.53E-01	3.28E+00	2.74E+00
7.00E+02	4.09E-01	2.96E+00	2.44E+00
8.00E+02	3.10E-01	2.69E+00	2.19E+00
9.00E+02	2.40E-01	2.47E+00	1.99E+00
1.00E+03	1.89E-01	2.28E+00	1.82E+00
1.50E+03	7.36E-02	1.63E+00	1.27E+00
2.00E+03	3.90E-02	1.27E+00	9.75E-01
3.00E+03	1.68E-02	8.77E-01	6.69E-01

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Mg IX + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
4.50E+01	5.12E-05		8.42E-02
4.80E+01	1.04E-04		1.32E-01
5.00E+01	1.59E-04	4.75E-02	1.71E-01
5.50E+01	4.04E-04	1.06E-01	2.91E-01
6.00E+01	8.92E-04	2.01E-01	4.40E-01
6.40E+01	1.53E-03	3.03E-01	5.75E-01
6.80E+01	2.47E-03	4.28E-01	7.20E-01
7.20E+01	3.78E-03	5.74E-01	8.72E-01
7.60E+01	5.53E-03	7.38E-01	1.02E+00
8.00E+01	7.80E-03	9.15E-01	1.18E+00
8.50E+01	1.15E-02	1.15E+00	1.37E+00
9.00E+01	1.62E-02	1.39E+00	1.55E+00
9.50E+01	2.20E-02	1.64E+00	1.72E+00
1.00E+02	2.91E-02	1.88E+00	1.88E+00
1.20E+02	7.05E-02	2.73E+00	2.38E+00
1.40E+02	1.32E-01	3.32E+00	2.70E+00
1.60E+02	2.10E-01	3.64E+00	2.85E+00
1.80E+02	2.97E-01	3.76E+00	2.90E+00
2.00E+02	3.84E-01	3.73E+00	2.88E+00
2.20E+02	4.65E-01	3.62E+00	2.83E+00
2.40E+02	5.35E-01	3.48E+00	2.75E+00
2.60E+02	5.92E-01	3.33E+00	2.67E+00
2.80E+02	6.34E-01	3.18E+00	2.59E+00
3.00E+02	6.63E-01	3.05E+00	2.51E+00
3.20E+02	6.81E-01	2.93E+00	2.44E+00
3.40E+02	6.87E-01	2.82E+00	2.37E+00
3.60E+02	6.85E-01	2.72E+00	2.30E+00
3.80E+02	6.76E-01	2.63E+00	2.24E+00
4.00E+02	6.62E-01	2.55E+00	2.18E+00
4.50E+02	6.10E-01	2.38E+00	2.05E+00
5.00E+02	5.48E-01	2.23E+00	1.92E+00
6.00E+02	4.29E-01	1.98E+00	1.70E+00
7.00E+02	3.34E-01	1.79E+00	1.51E+00
8.00E+02	2.63E-01	1.63E+00	1.36E+00
1.00E+03	1.70E-01	1.38E+00	1.14E+00
1.50E+03	6.79E-02	1.00E+00	7.98E-01
2.00E+03	3.29E-02	7.84E-01	6.13E-01
3.00E+03	1.23E-02	5.46E-01	4.21E-01
4.00E+03	6.52E-03	4.20E-01	3.21E-01
5.00E+03	4.09E-03	3.42E-01	2.61E-01
6.00E+03	2.81E-03	2.88E-01	2.19E-01
7.00E+03	2.05E-03	2.49E-01	1.89E-01
8.00E+03	1.56E-03	2.20E-01	1.67E-01
9.00E+03	1.23E-03	1.96E-01	1.49E-01
1.00E+04	9.93E-04	1.78E-01	1.35E-01

Al X + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+01	2.45E-05		4.45E-02
6.50E+01	5.99E-05	2.23E-02	7.58E-02
7.00E+01	1.33E-04	3.96E-02	1.23E-01
7.50E+01	2.64E-04	6.29E-02	1.82E-01
8.00E+01	4.78E-04	1.03E-01	2.54E-01
8.50E+01	8.17E-04	1.58E-01	3.34E-01
9.00E+01	1.31E-03	2.26E-01	4.23E-01
9.50E+01	2.00E-03	3.07E-01	5.17E-01
1.00E+02	2.94E-03	4.01E-01	6.14E-01
1.10E+02	5.68E-03	6.16E-01	8.12E-01
1.20E+02	9.85E-03	8.57E-01	1.00E+00
1.30E+02	1.57E-02	1.11E+00	1.18E+00
1.40E+02	2.34E-02	1.35E+00	1.35E+00
1.50E+02	3.31E-02	1.58E+00	1.49E+00
1.60E+02	4.49E-02	1.79E+00	1.61E+00
1.70E+02	5.85E-02	1.98E+00	1.71E+00
1.80E+02	7.40E-02	2.14E+00	1.80E+00
1.90E+02	9.11E-02	2.27E+00	1.87E+00
2.00E+02	1.10E-01	2.38E+00	1.92E+00
2.20E+02	1.50E-01	2.52E+00	1.99E+00
2.40E+02	1.92E-01	2.59E+00	2.01E+00
2.60E+02	2.34E-01	2.59E+00	2.01E+00
2.80E+02	2.74E-01	2.56E+00	1.99E+00
3.00E+02	3.10E-01	2.51E+00	1.96E+00
3.40E+02	3.67E-01	2.37E+00	1.88E+00
3.80E+02	4.02E-01	2.23E+00	1.80E+00
4.00E+02	4.12E-01	2.16E+00	1.76E+00
4.40E+02	4.18E-01	2.03E+00	1.68E+00
4.80E+02	4.11E-01	1.92E+00	1.60E+00
5.00E+02	4.03E-01	1.87E+00	1.57E+00
6.00E+02	3.48E-01	1.66E+00	1.40E+00
7.00E+02	2.86E-01	1.49E+00	1.25E+00
8.00E+02	2.32E-01	1.35E+00	1.13E+00
9.00E+02	1.90E-01	1.23E+00	1.03E+00
1.00E+03	1.56E-01	1.14E+00	9.44E-01
1.40E+03	7.78E-02	8.71E-01	7.05E-01
1.80E+03	4.28E-02	7.06E-01	5.61E-01
2.00E+03	3.28E-02	6.44E-01	5.09E-01
2.50E+03	1.84E-02	5.29E-01	4.13E-01
3.00E+03	1.16E-02	4.49E-01	3.48E-01
4.00E+03	5.84E-03	3.46E-01	2.66E-01
4.50E+03	4.49E-03	3.10E-01	2.38E-01
5.00E+03	3.57E-03	2.81E-01	2.15E-01
6.00E+03	2.43E-03	2.38E-01	1.81E-01
7.00E+03	1.77E-03	2.06E-01	1.57E-01

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Si XI + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
8.00E+01	1.67E-05		2.69E-02
9.00E+01	6.35E-05		6.44E-02
9.50E+01	1.12E-04	2.56E-02	9.12E-02
1.00E+02	1.86E-04	4.03E-02	1.23E-01
1.20E+02	9.50E-04	1.51E-01	2.93E-01
1.40E+02	3.04E-03	3.45E-01	5.02E-01
1.60E+02	7.26E-03	5.95E-01	7.13E-01
1.80E+02	1.43E-02	8.63E-01	9.04E-01
2.00E+02	2.45E-02	1.12E+00	1.06E+00
2.20E+02	3.78E-02	1.34E+00	1.19E+00
2.40E+02	5.41E-02	1.52E+00	1.29E+00
2.60E+02	7.28E-02	1.65E+00	1.35E+00
2.80E+02	9.32E-02	1.74E+00	1.40E+00
3.00E+02	1.14E-01	1.80E+00	1.42E+00
3.10E+02	1.25E-01	1.82E+00	1.43E+00
3.20E+02	1.36E-01	1.83E+00	1.43E+00
3.30E+02	1.46E-01	1.83E+00	1.44E+00
3.40E+02	1.57E-01	1.84E+00	1.43E+00
3.50E+02	1.67E-01	1.83E+00	1.43E+00
3.60E+02	1.76E-01	1.83E+00	1.42E+00
3.70E+02	1.85E-01	1.82E+00	1.42E+00
3.80E+02	1.94E-01	1.81E+00	1.41E+00
3.90E+02	2.02E-01	1.79E+00	1.40E+00
4.00E+02	2.10E-01	1.78E+00	1.39E+00
4.50E+02	2.39E-01	1.69E+00	1.34E+00
5.00E+02	2.54E-01	1.59E+00	1.28E+00
5.50E+02	2.57E-01	1.50E+00	1.22E+00
6.00E+02	2.51E-01	1.41E+00	1.16E+00
7.00E+02	2.25E-01	1.27E+00	1.05E+00
8.00E+02	1.93E-01	1.15E+00	9.52E-01
9.00E+02	1.63E-01	1.05E+00	8.68E-01
1.00E+03	1.37E-01	9.61E-01	7.96E-01
1.60E+03	5.48E-02	6.52E-01	5.27E-01
2.00E+03	3.25E-02	5.38E-01	4.29E-01
2.50E+03	1.83E-02	4.41E-01	3.47E-01
3.00E+03	1.13E-02	3.74E-01	2.92E-01
4.00E+03	5.45E-03	2.88E-01	2.23E-01
5.00E+03	3.22E-03	2.35E-01	1.80E-01
6.00E+03	2.15E-03	1.98E-01	1.52E-01
8.00E+03	1.17E-03	1.52E-01	1.16E-01
1.00E+04	7.40E-04	1.23E-01	9.36E-02
1.50E+04	3.22E-04	8.35E-02	6.34E-02
2.00E+04	1.79E-04	6.32E-02	4.79E-02
2.50E+04	1.13E-04	5.09E-02	3.85E-02
3.00E+04	7.81E-05	4.26E-02	3.22E-02

S XIII + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.20E+02	2.59E-06		6.60E-03
1.60E+02	7.03E-05	1.31E-02	4.82E-02
2.00E+02	5.58E-04	7.63E-02	1.54E-01
2.40E+02	2.21E-03	2.06E-01	2.95E-01
2.80E+02	5.83E-03	3.76E-01	4.35E-01
3.00E+02	8.56E-03	4.66E-01	4.98E-01
3.20E+02	1.20E-02	5.52E-01	5.55E-01
3.40E+02	1.60E-02	6.32E-01	6.04E-01
3.60E+02	2.06E-02	7.05E-01	6.46E-01
3.80E+02	2.57E-02	7.68E-01	6.82E-01
4.00E+02	3.13E-02	8.23E-01	7.11E-01
4.20E+02	3.73E-02	8.68E-01	7.34E-01
4.40E+02	4.35E-02	9.05E-01	7.51E-01
4.60E+02	4.98E-02	9.34E-01	7.65E-01
4.80E+02	5.60E-02	9.55E-01	7.74E-01
5.00E+02	6.22E-02	9.70E-01	7.79E-01
5.20E+02	6.81E-02	9.80E-01	7.82E-01
5.40E+02	7.38E-02	9.85E-01	7.82E-01
5.60E+02	7.90E-02	9.86E-01	7.80E-01
5.80E+02	8.39E-02	9.83E-01	7.77E-01
6.00E+02	8.83E-02	9.78E-01	7.72E-01
6.50E+02	9.72E-02	9.57E-01	7.56E-01
7.00E+02	1.03E-01	9.29E-01	7.35E-01
7.50E+02	1.06E-01	8.96E-01	7.13E-01
8.00E+02	1.06E-01	8.63E-01	6.89E-01
8.50E+02	1.05E-01	8.29E-01	6.65E-01
9.00E+02	1.02E-01	7.97E-01	6.41E-01
9.50E+02	9.84E-02	7.65E-01	6.17E-01
1.00E+03	9.42E-02	7.35E-01	5.95E-01
1.50E+03	5.27E-02	5.20E-01	4.23E-01
2.00E+03	3.01E-02	4.02E-01	3.24E-01
3.00E+03	1.15E-02	2.77E-01	2.19E-01
4.00E+03	5.35E-03	2.12E-01	1.66E-01
5.00E+03	2.97E-03	1.72E-01	1.34E-01
6.00E+03	1.88E-03	1.45E-01	1.12E-01
7.00E+03	1.31E-03	1.26E-01	9.71E-02
8.00E+03	9.69E-04	1.11E-01	8.56E-02
9.00E+03	7.50E-04	9.97E-02	7.65E-02
1.00E+04	5.99E-04	9.04E-02	6.93E-02
1.50E+04	2.57E-04	6.16E-02	4.71E-02
2.00E+04	1.42E-04	4.69E-02	3.57E-02
2.50E+04	9.00E-05	3.78E-02	2.87E-02
3.00E+04	6.19E-05	3.16E-02	2.41E-02
4.00E+04	3.43E-05	2.39E-02	1.81E-02
6.00E+04	1.50E-05	1.60E-02	1.22E-02

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Ar XV + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.00E+02	3.57E-06		4.73E-03
2.20E+02	1.10E-05		1.05E-02
2.40E+02	2.88E-05	6.37E-03	2.01E-02
2.60E+02	6.66E-05	1.18E-02	3.36E-02
2.80E+02	1.36E-04	1.91E-02	5.15E-02
3.00E+02	2.55E-04	3.23E-02	7.30E-02
3.40E+02	7.05E-04	7.15E-02	1.24E-01
3.80E+02	1.57E-03	1.26E-01	1.79E-01
4.20E+02	2.97E-03	1.90E-01	2.34E-01
4.60E+02	4.98E-03	2.57E-01	2.85E-01
5.00E+02	7.60E-03	3.22E-01	3.28E-01
5.20E+02	9.13E-03	3.52E-01	3.47E-01
5.40E+02	1.08E-02	3.81E-01	3.65E-01
5.60E+02	1.26E-02	4.07E-01	3.80E-01
5.80E+02	1.45E-02	4.31E-01	3.94E-01
6.00E+02	1.64E-02	4.53E-01	4.05E-01
6.50E+02	2.15E-02	4.97E-01	4.28E-01
7.00E+02	2.67E-02	5.28E-01	4.42E-01
7.50E+02	3.15E-02	5.47E-01	4.50E-01
8.00E+02	3.59E-02	5.56E-01	4.52E-01
8.50E+02	3.96E-02	5.59E-01	4.51E-01
9.00E+02	4.25E-02	5.56E-01	4.46E-01
9.50E+02	4.47E-02	5.49E-01	4.39E-01
1.00E+03	4.62E-02	5.40E-01	4.31E-01
1.40E+03	4.16E-02	4.37E-01	3.51E-01
1.80E+03	3.01E-02	3.52E-01	2.83E-01
2.20E+03	2.14E-02	2.92E-01	2.35E-01
2.60E+03	1.54E-02	2.49E-01	2.00E-01
3.00E+03	1.13E-02	2.18E-01	1.74E-01
3.50E+03	7.86E-03	1.88E-01	1.49E-01
4.00E+03	5.60E-03	1.65E-01	1.31E-01
4.50E+03	4.09E-03	1.47E-01	1.16E-01
5.00E+03	3.07E-03	1.33E-01	1.05E-01
6.00E+03	1.87E-03	1.12E-01	8.74E-02
7.00E+03	1.25E-03	9.68E-02	7.53E-02
8.00E+03	8.94E-04	8.54E-02	6.62E-02
9.00E+03	6.74E-04	7.65E-02	5.92E-02
1.00E+04	5.28E-04	6.93E-02	5.36E-02
1.50E+04	2.19E-04	4.74E-02	3.64E-02
2.00E+04	1.20E-04	3.62E-02	2.77E-02
3.00E+04	5.20E-05	2.45E-02	1.87E-02
4.00E+04	2.87E-05	1.86E-02	1.41E-02
5.00E+04	1.82E-05	1.49E-02	1.14E-02
6.00E+04	1.25E-05	1.25E-02	9.50E-03
7.00E+04	9.13E-06	1.07E-02	8.16E-03

Ca XVII + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.00E+02	2.88E-06		2.98E-03
3.20E+02	6.18E-06	2.42E-03	5.21E-03
3.60E+02	2.32E-05	4.46E-03	1.26E-02
4.00E+02	6.77E-05	8.59E-03	2.52E-02
4.20E+02	1.07E-04	1.29E-02	3.33E-02
4.40E+02	1.63E-04	1.84E-02	4.23E-02
4.60E+02	2.40E-04	2.53E-02	5.24E-02
4.80E+02	3.41E-04	3.34E-02	6.32E-02
5.00E+02	4.69E-04	4.27E-02	7.45E-02
5.20E+02	6.29E-04	5.31E-02	8.63E-02
5.40E+02	8.26E-04	6.47E-02	9.84E-02
5.60E+02	1.06E-03	7.70E-02	1.11E-01
5.80E+02	1.33E-03	9.00E-02	1.23E-01
6.00E+02	1.65E-03	1.04E-01	1.34E-01
6.50E+02	2.65E-03	1.39E-01	1.63E-01
7.00E+02	3.92E-03	1.74E-01	1.88E-01
7.50E+02	5.44E-03	2.07E-01	2.11E-01
8.00E+02	7.17E-03	2.37E-01	2.29E-01
8.50E+02	9.03E-03	2.63E-01	2.44E-01
9.00E+02	1.10E-02	2.84E-01	2.56E-01
9.50E+02	1.29E-02	3.01E-01	2.64E-01
1.00E+03	1.47E-02	3.14E-01	2.71E-01
1.20E+03	2.05E-02	3.35E-01	2.76E-01
1.40E+03	2.30E-02	3.27E-01	2.65E-01
1.80E+03	2.12E-02	2.84E-01	2.28E-01
2.20E+03	1.70E-02	2.41E-01	1.93E-01
2.60E+03	1.32E-02	2.07E-01	1.66E-01
3.00E+03	1.02E-02	1.81E-01	1.45E-01
4.00E+03	5.57E-03	1.36E-01	1.08E-01
5.00E+03	3.21E-03	1.09E-01	8.63E-02
5.50E+03	2.50E-03	9.92E-02	7.84E-02
6.00E+03	1.98E-03	9.11E-02	7.18E-02
6.50E+03	1.59E-03	8.42E-02	6.62E-02
7.00E+03	1.30E-03	7.84E-02	6.15E-02
7.50E+03	1.08E-03	7.34E-02	5.75E-02
8.00E+03	9.05E-04	6.90E-02	5.39E-02
9.00E+03	6.65E-04	6.16E-02	4.81E-02
1.00E+04	5.10E-04	5.58E-02	4.34E-02
1.50E+04	1.99E-04	3.81E-02	2.94E-02
2.00E+04	1.07E-04	2.91E-02	2.24E-02
3.00E+04	4.60E-05	1.98E-02	1.52E-02
4.00E+04	2.53E-05	1.50E-02	1.15E-02
5.00E+04	1.60E-05	1.21E-02	9.25E-03
6.00E+04	1.10E-05	1.01E-02	7.74E-03
7.00E+04	7.99E-06	8.71E-03	6.65E-03

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Ti XIX + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
4.00E+02	9.54E-07	1.45E-03	1.25E-03
4.50E+02	3.88E-06	1.55E-03	2.99E-03
5.00E+02	1.30E-05	2.39E-03	6.31E-03
5.50E+02	3.48E-05	4.67E-03	1.25E-02
6.00E+02	8.09E-05	8.48E-03	2.11E-02
6.50E+02	1.64E-04	1.55E-02	3.20E-02
7.00E+02	2.99E-04	2.51E-02	4.45E-02
7.50E+02	5.00E-04	3.70E-02	5.82E-02
8.00E+02	7.80E-04	5.10E-02	7.22E-02
8.50E+02	1.15E-03	6.63E-02	8.60E-02
9.00E+02	1.60E-03	8.23E-02	9.94E-02
9.50E+02	2.14E-03	9.83E-02	1.12E-01
1.00E+03	2.76E-03	1.14E-01	1.23E-01
1.20E+03	5.73E-03	1.66E-01	1.56E-01
1.40E+03	8.66E-03	1.96E-01	1.72E-01
1.60E+03	1.07E-02	2.07E-01	1.75E-01
1.80E+03	1.18E-02	2.07E-01	1.72E-01
2.00E+03	1.20E-02	2.01E-01	1.65E-01
2.20E+03	1.16E-02	1.91E-01	1.56E-01
2.40E+03	1.09E-02	1.81E-01	1.47E-01
2.60E+03	1.01E-02	1.71E-01	1.38E-01
2.80E+03	9.28E-03	1.61E-01	1.30E-01
3.00E+03	8.46E-03	1.52E-01	1.22E-01
3.50E+03	6.66E-03	1.32E-01	1.06E-01
4.00E+03	5.22E-03	1.16E-01	9.27E-02
4.50E+03	4.12E-03	1.03E-01	8.23E-02
5.00E+03	3.26E-03	9.27E-02	7.39E-02
5.50E+03	2.60E-03	8.42E-02	6.70E-02
6.00E+03	2.10E-03	7.71E-02	6.12E-02
6.50E+03	1.71E-03	7.11E-02	5.63E-02
7.00E+03	1.40E-03	6.60E-02	5.22E-02
7.50E+03	1.16E-03	6.17E-02	4.86E-02
8.00E+03	9.77E-04	5.78E-02	4.55E-02
8.50E+03	8.28E-04	5.45E-02	4.28E-02
9.00E+03	7.09E-04	5.15E-02	4.04E-02
9.50E+03	6.13E-04	4.89E-02	3.83E-02
1.00E+04	5.34E-04	4.65E-02	3.64E-02
1.20E+04	3.33E-04	3.90E-02	3.04E-02
1.40E+04	2.28E-04	3.37E-02	2.62E-02
1.60E+04	1.67E-04	2.97E-02	2.31E-02
1.80E+04	1.28E-04	2.66E-02	2.06E-02
2.00E+04	1.01E-04	2.41E-02	1.86E-02
2.50E+04	6.27E-05	1.95E-02	1.51E-02
3.00E+04	4.27E-05	1.64E-02	1.27E-02
3.50E+04	3.09E-05	1.42E-02	1.09E-02

Cr XXI + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+02	2.06E-06		1.29E-03
7.00E+02	1.16E-05	1.18E-03	4.47E-03
7.50E+02	2.37E-05	2.39E-03	7.40E-03
8.00E+02	4.48E-05	4.34E-03	1.13E-02
8.50E+02	7.87E-05	7.18E-03	1.60E-02
9.00E+02	1.28E-04	1.09E-02	2.15E-02
9.50E+02	1.98E-04	1.55E-02	2.76E-02
1.00E+03	2.94E-04	2.11E-02	3.41E-02
1.20E+03	9.61E-04	4.93E-02	6.12E-02
1.40E+03	2.07E-03	7.94E-02	8.45E-02
1.60E+03	3.39E-03	1.04E-01	1.00E-01
1.80E+03	4.63E-03	1.20E-01	1.10E-01
2.00E+03	5.58E-03	1.29E-01	1.14E-01
2.20E+03	6.19E-03	1.33E-01	1.14E-01
2.40E+03	6.47E-03	1.33E-01	1.12E-01
2.60E+03	6.51E-03	1.30E-01	1.09E-01
2.80E+03	6.37E-03	1.27E-01	1.05E-01
3.00E+03	6.12E-03	1.22E-01	1.00E-01
3.50E+03	5.30E-03	1.10E-01	8.94E-02
4.00E+03	4.44E-03	9.86E-02	7.96E-02
4.50E+03	3.69E-03	8.87E-02	7.13E-02
5.00E+03	3.05E-03	8.02E-02	6.42E-02
5.50E+03	2.53E-03	7.30E-02	5.84E-02
6.00E+03	2.10E-03	6.69E-02	5.34E-02
6.50E+03	1.75E-03	6.17E-02	4.91E-02
7.00E+03	1.46E-03	5.72E-02	4.55E-02
7.50E+03	1.23E-03	5.33E-02	4.23E-02
8.00E+03	1.04E-03	4.99E-02	3.95E-02
8.50E+03	8.89E-04	4.69E-02	3.71E-02
9.00E+03	7.63E-04	4.43E-02	3.50E-02
9.50E+03	6.60E-04	4.19E-02	3.31E-02
1.00E+04	5.74E-04	3.98E-02	3.14E-02
1.20E+04	3.52E-04	3.33E-02	2.61E-02
1.40E+04	2.35E-04	2.86E-02	2.24E-02
1.60E+04	1.69E-04	2.52E-02	1.97E-02
1.80E+04	1.27E-04	2.25E-02	1.75E-02
2.00E+04	9.95E-05	2.04E-02	1.59E-02
2.50E+04	6.05E-05	1.65E-02	1.28E-02
3.00E+04	4.08E-05	1.39E-02	1.08E-02
3.50E+04	2.94E-05	1.20E-02	9.28E-03
4.00E+04	2.21E-05	1.06E-02	8.16E-03
4.50E+04	1.73E-05	9.44E-03	7.29E-03
5.00E+04	1.39E-05	8.54E-03	6.58E-03
6.00E+04	9.46E-06	7.16E-03	5.52E-03
7.00E+04	6.86E-06	6.17E-03	4.75E-03

TABLE III. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Fe XXIII + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
8.00E+02	1.46E-06		8.85E-04
9.00E+02	5.52E-06		2.06E-03
1.00E+03	1.66E-05	1.54E-03	4.62E-03
1.10E+03	4.15E-05	3.66E-03	8.42E-03
1.20E+03	8.88E-05	7.10E-03	1.36E-02
1.30E+03	1.66E-04	1.19E-02	1.97E-02
1.40E+03	2.82E-04	1.79E-02	2.64E-02
1.50E+03	4.39E-04	2.49E-02	3.32E-02
1.60E+03	6.36E-04	3.22E-02	3.99E-02
1.70E+03	8.66E-04	3.97E-02	4.61E-02
1.80E+03	1.12E-03	4.69E-02	5.17E-02
1.90E+03	1.40E-03	5.37E-02	5.67E-02
2.00E+03	1.67E-03	5.98E-02	6.09E-02
2.10E+03	1.95E-03	6.53E-02	6.45E-02
2.20E+03	2.21E-03	7.00E-02	6.73E-02
2.30E+03	2.46E-03	7.40E-02	6.96E-02
2.40E+03	2.68E-03	7.72E-02	7.14E-02
2.50E+03	2.87E-03	7.98E-02	7.26E-02
2.60E+03	3.03E-03	8.18E-02	7.35E-02
2.70E+03	3.17E-03	8.34E-02	7.40E-02
2.80E+03	3.28E-03	8.44E-02	7.41E-02
2.90E+03	3.37E-03	8.51E-02	7.40E-02
3.00E+03	3.44E-03	8.54E-02	7.37E-02
3.50E+03	3.49E-03	8.36E-02	7.02E-02
4.00E+03	3.28E-03	7.88E-02	6.51E-02
5.00E+03	2.62E-03	6.75E-02	5.48E-02
6.00E+03	1.99E-03	5.75E-02	4.63E-02
7.00E+03	1.49E-03	4.96E-02	3.97E-02
8.00E+03	1.11E-03	4.33E-02	3.46E-02
9.00E+03	8.35E-04	3.84E-02	3.06E-02
1.00E+04	6.38E-04	3.45E-02	2.74E-02
1.20E+04	3.93E-04	2.86E-02	2.26E-02
1.40E+04	2.59E-04	2.46E-02	1.93E-02
1.60E+04	1.82E-04	2.15E-02	1.69E-02
1.80E+04	1.35E-04	1.92E-02	1.50E-02
2.00E+04	1.04E-04	1.74E-02	1.36E-02
2.50E+04	6.13E-05	1.40E-02	1.09E-02
3.00E+04	4.07E-05	1.18E-02	9.18E-03
4.00E+04	2.18E-05	8.99E-03	6.97E-03
5.00E+04	1.35E-05	7.28E-03	5.63E-03
6.00E+04	9.21E-06	6.11E-03	4.72E-03
7.00E+04	6.66E-06	5.27E-03	4.06E-03
8.00E+04	5.03E-06	4.63E-03	3.57E-03
9.00E+04	3.93E-06	4.13E-03	3.19E-03
1.00E+05	3.16E-06	3.73E-03	2.87E-03

Ni XXV + d			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.10E+03	2.16E-06		7.65E-04
1.20E+03	5.57E-06	4.47E-04	1.60E-03
1.30E+03	1.28E-05	1.06E-03	2.88E-03
1.40E+03	2.63E-05	2.12E-03	4.83E-03
1.50E+03	4.92E-05	3.76E-03	7.35E-03
1.60E+03	8.38E-05	5.96E-03	1.04E-02
1.70E+03	1.34E-04	8.74E-03	1.37E-02
1.80E+03	2.00E-04	1.20E-02	1.74E-02
1.90E+03	2.84E-04	1.57E-02	2.11E-02
2.00E+03	3.84E-04	1.96E-02	2.48E-02
2.10E+03	4.99E-04	2.37E-02	2.84E-02
2.20E+03	6.26E-04	2.77E-02	3.18E-02
2.30E+03	7.62E-04	3.17E-02	3.49E-02
2.40E+03	9.04E-04	3.54E-02	3.78E-02
2.50E+03	1.05E-03	3.90E-02	4.04E-02
2.60E+03	1.19E-03	4.22E-02	4.27E-02
2.70E+03	1.33E-03	4.51E-02	4.46E-02
2.80E+03	1.45E-03	4.77E-02	4.63E-02
2.90E+03	1.57E-03	5.00E-02	4.77E-02
3.00E+03	1.68E-03	5.20E-02	4.89E-02
3.20E+03	1.87E-03	5.52E-02	5.06E-02
3.40E+03	2.01E-03	5.73E-02	5.15E-02
3.60E+03	2.10E-03	5.86E-02	5.18E-02
3.80E+03	2.16E-03	5.93E-02	5.17E-02
4.00E+03	2.18E-03	5.95E-02	5.12E-02
4.20E+03	2.18E-03	5.92E-02	5.05E-02
4.60E+03	2.11E-03	5.78E-02	4.86E-02
5.00E+03	2.00E-03	5.57E-02	4.64E-02
6.00E+03	1.65E-03	4.96E-02	4.05E-02
7.00E+03	1.31E-03	4.37E-02	3.54E-02
8.00E+03	1.02E-03	3.87E-02	3.11E-02
9.00E+03	8.01E-04	3.45E-02	2.76E-02
1.00E+04	6.31E-04	3.11E-02	2.48E-02
1.40E+04	2.69E-04	2.21E-02	1.74E-02
1.80E+04	1.40E-04	1.72E-02	1.35E-02
2.00E+04	1.07E-04	1.55E-02	1.21E-02
2.50E+04	6.19E-05	1.25E-02	9.75E-03
3.00E+04	4.06E-05	1.05E-02	8.17E-03
4.00E+04	2.14E-05	7.99E-03	6.20E-03
5.00E+04	1.33E-05	6.47E-03	5.01E-03
6.00E+04	8.99E-06	5.44E-03	4.20E-03
7.00E+04	6.48E-06	4.69E-03	3.62E-03
8.00E+04	4.89E-06	4.13E-03	3.18E-03
9.00E+04	3.81E-06	3.68E-03	2.84E-03
1.00E+05	3.06E-06	3.33E-03	2.56E-03

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

C III + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+00	6.29E-06	3.92E-01	1.51E-01
1.50E+00	1.08E-03	6.93E-01	2.50E+00
2.00E+00	2.15E-02	6.91E+00	1.50E+01
2.50E+00	1.36E-01	2.61E+01	3.67E+01
3.00E+00	4.82E-01	5.57E+01	6.14E+01
3.50E+00	1.22E+00	8.91E+01	8.46E+01
4.00E+00	2.51E+00	1.21E+02	1.04E+02
4.50E+00	4.44E+00	1.47E+02	1.20E+02
5.00E+00	7.10E+00	1.67E+02	1.31E+02
6.00E+00	1.44E+01	1.87E+02	1.42E+02
7.00E+00	2.35E+01	1.85E+02	1.42E+02
8.00E+00	3.27E+01	1.73E+02	1.37E+02
9.00E+00	4.02E+01	1.59E+02	1.31E+02
1.00E+01	4.52E+01	1.49E+02	1.27E+02
1.20E+01	4.83E+01	1.40E+02	1.23E+02
1.40E+01	4.82E+01	1.32E+02	1.17E+02
1.60E+01	4.78E+01	1.24E+02	1.12E+02
1.80E+01	4.66E+01	1.19E+02	1.08E+02
2.00E+01	4.51E+01	1.14E+02	1.04E+02
2.50E+01	4.16E+01	1.04E+02	9.57E+01
3.00E+01	3.83E+01	9.72E+01	8.91E+01
3.50E+01	3.56E+01	9.11E+01	8.35E+01
4.00E+01	3.32E+01	8.61E+01	7.88E+01
5.00E+01	2.85E+01	7.95E+01	7.19E+01
6.00E+01	2.60E+01	7.31E+01	6.61E+01
7.00E+01	2.48E+01	6.73E+01	6.12E+01
8.00E+01	2.33E+01	6.30E+01	5.73E+01
9.00E+01	2.15E+01	5.97E+01	5.41E+01
1.00E+02	1.98E+01	5.71E+01	5.14E+01
1.20E+02	1.73E+01	5.30E+01	4.72E+01
1.40E+02	1.55E+01	4.98E+01	4.40E+01
1.60E+02	1.41E+01	4.73E+01	4.15E+01
1.80E+02	1.29E+01	4.52E+01	3.94E+01
2.00E+02	1.19E+01	4.33E+01	3.76E+01
2.40E+02	1.01E+01	4.02E+01	3.44E+01
2.80E+02	8.66E+00	3.75E+01	3.18E+01
3.20E+02	7.45E+00	3.51E+01	2.95E+01
3.60E+02	6.44E+00	3.30E+01	2.75E+01
4.00E+02	5.62E+00	3.11E+01	2.57E+01
5.00E+02	4.10E+00	2.71E+01	2.21E+01
6.00E+02	3.11E+00	2.40E+01	1.93E+01
7.00E+02	2.43E+00	2.15E+01	1.72E+01
8.00E+02	1.95E+00	1.94E+01	1.54E+01
9.00E+02	1.60E+00	1.77E+01	1.40E+01
1.00E+03	1.33E+00	1.63E+01	1.28E+01

N IV + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.00E+00	4.18E-05	1.71E-01	2.22E-01
3.20E+00	9.60E-05	1.85E-01	4.20E-01
3.40E+00	2.05E-04	1.87E-01	6.13E-01
3.60E+00	4.16E-04	2.40E-01	9.42E-01
3.80E+00	7.84E-04	3.74E-01	1.36E+00
4.00E+00	1.37E-03	5.77E-01	1.97E+00
4.50E+00	4.70E-03	1.43E+00	4.11E+00
5.00E+00	1.29E-02	3.23E+00	7.12E+00
5.50E+00	2.96E-02	6.05E+00	1.08E+01
6.00E+00	5.90E-02	9.83E+00	1.49E+01
6.50E+00	1.07E-01	1.45E+01	1.93E+01
7.00E+00	1.79E-01	1.98E+01	2.37E+01
7.50E+00	2.80E-01	2.55E+01	2.81E+01
8.00E+00	4.16E-01	3.14E+01	3.23E+01
9.00E+00	8.13E-01	4.31E+01	3.99E+01
1.00E+01	1.40E+00	5.37E+01	4.63E+01
1.20E+01	3.24E+00	6.94E+01	5.50E+01
1.40E+01	5.89E+00	7.68E+01	5.90E+01
1.60E+01	9.09E+00	7.74E+01	5.95E+01
1.80E+01	1.24E+01	7.40E+01	5.80E+01
2.00E+01	1.53E+01	6.91E+01	5.59E+01
2.20E+01	1.76E+01	6.47E+01	5.41E+01
2.40E+01	1.91E+01	6.15E+01	5.27E+01
2.60E+01	1.99E+01	5.95E+01	5.18E+01
2.80E+01	2.01E+01	5.83E+01	5.11E+01
3.00E+01	2.01E+01	5.71E+01	5.03E+01
4.00E+01	1.95E+01	5.02E+01	4.55E+01
5.00E+01	1.82E+01	4.61E+01	4.21E+01
6.00E+01	1.68E+01	4.29E+01	3.93E+01
7.00E+01	1.57E+01	4.01E+01	3.68E+01
8.00E+01	1.49E+01	3.77E+01	3.47E+01
9.00E+01	1.40E+01	3.58E+01	3.29E+01
1.00E+02	1.30E+01	3.44E+01	3.14E+01
1.20E+02	1.12E+01	3.24E+01	2.92E+01
1.40E+02	9.91E+00	3.07E+01	2.73E+01
1.60E+02	9.04E+00	2.92E+01	2.58E+01
1.80E+02	8.36E+00	2.79E+01	2.46E+01
2.00E+02	7.78E+00	2.68E+01	2.35E+01
2.50E+02	6.49E+00	2.45E+01	2.12E+01
3.00E+02	5.41E+00	2.26E+01	1.93E+01
3.50E+02	4.53E+00	2.10E+01	1.77E+01
4.00E+02	3.82E+00	1.95E+01	1.63E+01
6.00E+02	2.11E+00	1.52E+01	1.24E+01
8.00E+02	1.32E+00	1.24E+01	9.90E+00
1.00E+03	9.01E-01	1.05E+01	8.25E+00

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

O V + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
7.00E+00	1.62E-04		3.62E-01
7.50E+00	3.73E-04	1.70E-01	5.93E-01
8.00E+00	7.78E-04	2.78E-01	9.57E-01
8.50E+00	1.48E-03	4.53E-01	1.44E+00
9.00E+00	2.67E-03	6.72E-01	2.03E+00
9.50E+00	4.51E-03	1.05E+00	2.73E+00
1.00E+01	7.28E-03	1.55E+00	3.53E+00
1.20E+01	3.39E-02	4.82E+00	7.47E+00
1.40E+01	1.03E-01	9.78E+00	1.19E+01
1.60E+01	2.39E-01	1.56E+01	1.62E+01
1.80E+01	4.65E-01	2.14E+01	2.00E+01
2.00E+01	7.97E-01	2.66E+01	2.30E+01
2.20E+01	1.24E+00	3.09E+01	2.54E+01
2.40E+01	1.80E+00	3.40E+01	2.71E+01
2.60E+01	2.47E+00	3.61E+01	2.82E+01
2.80E+01	3.21E+00	3.72E+01	2.87E+01
3.00E+01	4.01E+00	3.75E+01	2.89E+01
3.50E+01	6.04E+00	3.58E+01	2.81E+01
4.00E+01	7.78E+00	3.28E+01	2.69E+01
4.50E+01	8.96E+00	3.04E+01	2.58E+01
5.00E+01	9.57E+00	2.89E+01	2.51E+01
6.00E+01	9.71E+00	2.72E+01	2.41E+01
7.00E+01	9.43E+00	2.57E+01	2.29E+01
8.00E+01	9.11E+00	2.42E+01	2.18E+01
9.00E+01	8.75E+00	2.30E+01	2.08E+01
1.00E+02	8.37E+00	2.20E+01	2.00E+01
1.20E+02	7.55E+00	2.07E+01	1.87E+01
1.40E+02	6.81E+00	1.96E+01	1.76E+01
1.60E+02	6.25E+00	1.87E+01	1.67E+01
1.80E+02	5.85E+00	1.78E+01	1.59E+01
2.00E+02	5.50E+00	1.71E+01	1.52E+01
3.00E+02	3.95E+00	1.45E+01	1.26E+01
4.00E+02	2.77E+00	1.26E+01	1.08E+01
5.00E+02	2.00E+00	1.12E+01	9.32E+00
6.00E+02	1.49E+00	9.99E+00	8.20E+00
8.00E+02	9.12E-01	8.20E+00	6.59E+00
1.00E+03	6.13E-01	6.93E+00	5.49E+00
1.50E+03	2.92E-01	4.98E+00	3.88E+00
2.00E+03	1.70E-01	3.88E+00	3.00E+00
2.50E+03	1.11E-01	3.18E+00	2.44E+00
3.00E+03	7.78E-02	2.70E+00	2.06E+00
4.00E+03	4.44E-02	2.07E+00	1.57E+00
5.00E+03	2.86E-02	1.68E+00	1.27E+00
6.00E+03	1.99E-02	1.41E+00	1.07E+00
7.00E+03	1.47E-02	1.22E+00	9.19E-01

Ne VII + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.20E+01	1.72E-04	6.07E-02	2.15E-01
2.40E+01	4.53E-04	1.19E-01	3.99E-01
2.60E+01	1.04E-03	2.05E-01	6.56E-01
2.80E+01	2.12E-03	3.77E-01	9.78E-01
3.00E+01	3.98E-03	6.24E-01	1.36E+00
3.20E+01	6.90E-03	9.49E-01	1.79E+00
3.40E+01	1.12E-02	1.35E+00	2.25E+00
3.60E+01	1.72E-02	1.82E+00	2.72E+00
3.80E+01	2.54E-02	2.34E+00	3.21E+00
4.00E+01	3.60E-02	2.91E+00	3.70E+00
4.50E+01	7.55E-02	4.45E+00	4.86E+00
5.00E+01	1.37E-01	6.01E+00	5.88E+00
5.50E+01	2.23E-01	7.43E+00	6.74E+00
6.00E+01	3.34E-01	8.63E+00	7.40E+00
6.50E+01	4.70E-01	9.59E+00	7.90E+00
7.00E+01	6.27E-01	1.03E+01	8.25E+00
7.50E+01	8.02E-01	1.07E+01	8.47E+00
8.00E+01	9.89E-01	1.10E+01	8.57E+00
8.50E+01	1.18E+00	1.10E+01	8.59E+00
9.00E+01	1.38E+00	1.10E+01	8.55E+00
9.50E+01	1.57E+00	1.08E+01	8.47E+00
1.00E+02	1.75E+00	1.06E+01	8.36E+00
1.20E+02	2.34E+00	9.45E+00	7.82E+00
1.40E+02	2.67E+00	8.54E+00	7.37E+00
1.60E+02	2.81E+00	7.91E+00	7.02E+00
1.80E+02	2.83E+00	7.44E+00	6.72E+00
2.00E+02	2.78E+00	7.08E+00	6.46E+00
2.20E+02	2.71E+00	6.78E+00	6.22E+00
2.40E+02	2.62E+00	6.52E+00	6.01E+00
2.60E+02	2.51E+00	6.30E+00	5.81E+00
2.80E+02	2.39E+00	6.11E+00	5.63E+00
3.00E+02	2.27E+00	5.94E+00	5.46E+00
3.50E+02	1.95E+00	5.58E+00	5.08E+00
4.00E+02	1.65E+00	5.28E+00	4.74E+00
4.50E+02	1.40E+00	5.00E+00	4.43E+00
5.00E+02	1.20E+00	4.75E+00	4.15E+00
6.00E+02	8.87E-01	4.31E+00	3.68E+00
7.00E+02	6.76E-01	3.93E+00	3.30E+00
8.00E+02	5.26E-01	3.61E+00	2.99E+00
9.00E+02	4.17E-01	3.33E+00	2.73E+00
1.00E+03	3.36E-01	3.09E+00	2.51E+00
1.50E+03	1.40E-01	2.25E+00	1.78E+00
2.00E+03	7.62E-02	1.77E+00	1.37E+00
2.50E+03	4.84E-02	1.45E+00	1.12E+00
3.00E+03	3.36E-02	1.23E+00	9.48E-01

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Mg IX + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
4.60E+01	5.33E-05	2.09E-02	6.10E-02
5.00E+01	1.43E-04	3.46E-02	1.19E-01
5.40E+01	3.28E-04	6.20E-02	2.02E-01
5.80E+01	6.81E-04	9.85E-02	3.14E-01
6.20E+01	1.30E-03	1.71E-01	4.49E-01
6.60E+01	2.30E-03	2.72E-01	6.08E-01
7.00E+01	3.79E-03	4.02E-01	7.84E-01
7.20E+01	4.78E-03	4.78E-01	8.77E-01
7.40E+01	5.94E-03	5.60E-01	9.72E-01
7.60E+01	7.29E-03	6.50E-01	1.07E+00
7.80E+01	8.87E-03	7.45E-01	1.17E+00
8.00E+01	1.07E-02	8.46E-01	1.27E+00
8.50E+01	1.64E-02	1.12E+00	1.52E+00
9.00E+01	2.39E-02	1.42E+00	1.76E+00
9.50E+01	3.35E-02	1.73E+00	2.00E+00
1.00E+02	4.53E-02	2.04E+00	2.22E+00
1.20E+02	1.17E-01	3.21E+00	2.95E+00
1.40E+02	2.27E-01	4.05E+00	3.40E+00
1.60E+02	3.65E-01	4.49E+00	3.60E+00
1.80E+02	5.14E-01	4.62E+00	3.65E+00
2.00E+02	6.59E-01	4.55E+00	3.61E+00
2.40E+02	8.93E-01	4.20E+00	3.42E+00
2.80E+02	1.03E+00	3.83E+00	3.23E+00
3.20E+02	1.09E+00	3.53E+00	3.06E+00
3.40E+02	1.10E+00	3.40E+00	2.98E+00
3.60E+02	1.09E+00	3.30E+00	2.91E+00
3.80E+02	1.08E+00	3.20E+00	2.84E+00
4.00E+02	1.06E+00	3.11E+00	2.78E+00
4.50E+02	9.85E-01	2.93E+00	2.62E+00
5.00E+02	8.96E-01	2.77E+00	2.49E+00
6.00E+02	7.17E-01	2.52E+00	2.24E+00
7.00E+02	5.69E-01	2.31E+00	2.03E+00
8.00E+02	4.54E-01	2.13E+00	1.84E+00
9.00E+02	3.68E-01	1.98E+00	1.69E+00
1.00E+03	3.01E-01	1.85E+00	1.56E+00
1.50E+03	1.27E-01	1.38E+00	1.12E+00
2.00E+03	6.41E-02	1.10E+00	8.69E-01
2.50E+03	3.76E-02	9.06E-01	7.10E-01
3.00E+03	2.48E-02	7.72E-01	6.00E-01
4.00E+03	1.33E-02	5.97E-01	4.60E-01
5.00E+03	8.38E-03	4.87E-01	3.73E-01
6.00E+03	5.78E-03	4.12E-01	3.14E-01
7.00E+03	4.23E-03	3.56E-01	2.72E-01
8.00E+03	3.23E-03	3.14E-01	2.39E-01
1.00E+04	2.05E-03	2.55E-01	1.93E-01

Al X + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+01	1.87E-05		2.67E-02
8.00E+01	4.85E-04	6.19E-02	2.08E-01
1.00E+02	3.69E-03	3.28E-01	6.10E-01
1.40E+02	3.65E-02	1.46E+00	1.59E+00
1.80E+02	1.25E-01	2.55E+00	2.24E+00
2.00E+02	1.89E-01	2.89E+00	2.41E+00
2.20E+02	2.60E-01	3.09E+00	2.50E+00
2.40E+02	3.34E-01	3.17E+00	2.54E+00
2.60E+02	4.06E-01	3.18E+00	2.53E+00
2.80E+02	4.72E-01	3.14E+00	2.50E+00
3.00E+02	5.31E-01	3.06E+00	2.46E+00
3.20E+02	5.81E-01	2.97E+00	2.41E+00
3.40E+02	6.21E-01	2.88E+00	2.36E+00
3.60E+02	6.51E-01	2.79E+00	2.31E+00
3.80E+02	6.74E-01	2.71E+00	2.27E+00
4.00E+02	6.88E-01	2.63E+00	2.22E+00
4.20E+02	6.96E-01	2.55E+00	2.17E+00
4.40E+02	6.99E-01	2.48E+00	2.13E+00
4.60E+02	6.96E-01	2.42E+00	2.09E+00
4.80E+02	6.89E-01	2.36E+00	2.05E+00
5.00E+02	6.78E-01	2.31E+00	2.01E+00
5.50E+02	6.41E-01	2.18E+00	1.91E+00
6.00E+02	5.94E-01	2.08E+00	1.82E+00
7.00E+02	4.97E-01	1.90E+00	1.66E+00
7.50E+02	4.51E-01	1.82E+00	1.59E+00
8.00E+02	4.09E-01	1.75E+00	1.52E+00
9.00E+02	3.38E-01	1.62E+00	1.40E+00
9.50E+02	3.07E-01	1.56E+00	1.34E+00
1.00E+03	2.81E-01	1.51E+00	1.29E+00
1.20E+03	1.99E-01	1.33E+00	1.12E+00
1.40E+03	1.45E-01	1.19E+00	9.83E-01
1.60E+03	1.08E-01	1.07E+00	8.78E-01
1.80E+03	8.20E-02	9.78E-01	7.92E-01
2.00E+03	6.36E-02	8.98E-01	7.21E-01
2.50E+03	3.66E-02	7.45E-01	5.89E-01
3.00E+03	2.34E-02	6.36E-01	4.98E-01
3.50E+03	1.62E-02	5.55E-01	4.32E-01
4.00E+03	1.20E-02	4.92E-01	3.81E-01
4.50E+03	9.26E-03	4.43E-01	3.42E-01
5.00E+03	7.39E-03	4.02E-01	3.10E-01
6.00E+03	5.04E-03	3.40E-01	2.61E-01
7.00E+03	3.67E-03	2.95E-01	2.26E-01
8.00E+03	2.80E-03	2.61E-01	1.99E-01
9.00E+03	2.20E-03	2.33E-01	1.78E-01
1.00E+04	1.77E-03	2.11E-01	1.61E-01

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Si XI + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+02	1.75E-04		9.00E-02
1.20E+02	1.06E-03	1.06E-01	2.61E-01
1.40E+02	3.89E-03	2.91E-01	5.07E-01
1.60E+02	1.02E-02	5.70E-01	7.79E-01
1.80E+02	2.16E-02	9.00E-01	1.04E+00
2.00E+02	3.88E-02	1.23E+00	1.27E+00
2.20E+02	6.20E-02	1.54E+00	1.45E+00
2.40E+02	9.08E-02	1.79E+00	1.59E+00
2.60E+02	1.24E-01	1.98E+00	1.69E+00
2.80E+02	1.60E-01	2.12E+00	1.76E+00
3.00E+02	1.98E-01	2.20E+00	1.79E+00
3.20E+02	2.36E-01	2.24E+00	1.81E+00
3.40E+02	2.72E-01	2.25E+00	1.81E+00
3.60E+02	3.06E-01	2.24E+00	1.80E+00
3.80E+02	3.36E-01	2.22E+00	1.78E+00
4.00E+02	3.62E-01	2.18E+00	1.76E+00
4.50E+02	4.11E-01	2.07E+00	1.70E+00
5.00E+02	4.37E-01	1.96E+00	1.63E+00
5.50E+02	4.44E-01	1.86E+00	1.56E+00
6.00E+02	4.36E-01	1.76E+00	1.50E+00
6.50E+02	4.19E-01	1.68E+00	1.44E+00
7.00E+02	3.96E-01	1.60E+00	1.38E+00
7.50E+02	3.71E-01	1.53E+00	1.32E+00
8.00E+02	3.45E-01	1.47E+00	1.27E+00
8.50E+02	3.19E-01	1.41E+00	1.21E+00
9.00E+02	2.94E-01	1.36E+00	1.17E+00
9.50E+02	2.71E-01	1.31E+00	1.12E+00
1.00E+03	2.50E-01	1.26E+00	1.08E+00
1.20E+03	1.83E-01	1.11E+00	9.36E-01
1.40E+03	1.36E-01	9.86E-01	8.25E-01
1.60E+03	1.04E-01	8.90E-01	7.37E-01
1.80E+03	8.01E-02	8.11E-01	6.65E-01
2.00E+03	6.29E-02	7.45E-01	6.06E-01
2.50E+03	3.64E-02	6.19E-01	4.95E-01
3.00E+03	2.29E-02	5.29E-01	4.18E-01
4.00E+03	1.12E-02	4.10E-01	3.20E-01
6.00E+03	4.48E-03	2.84E-01	2.19E-01
8.00E+03	2.45E-03	2.18E-01	1.67E-01
1.00E+04	1.55E-03	1.77E-01	1.35E-01
1.50E+04	6.75E-04	1.20E-01	9.16E-02
2.00E+04	3.75E-04	9.13E-02	6.93E-02
2.50E+04	2.37E-04	7.35E-02	5.58E-02
3.00E+04	1.64E-04	6.15E-02	4.67E-02
4.00E+04	9.12E-05	4.64E-02	3.52E-02
5.00E+04	5.80E-05	3.72E-02	2.82E-02

S XIII + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.40E+02	1.24E-05		1.05E-02
1.60E+02	6.12E-05	1.01E-02	3.22E-02
1.80E+02	2.16E-04	2.34E-02	7.18E-02
2.00E+02	6.07E-04	5.06E-02	1.32E-01
2.20E+02	1.40E-03	1.01E-01	2.08E-01
2.40E+02	2.82E-03	1.72E-01	2.94E-01
2.60E+02	5.07E-03	2.62E-01	3.85E-01
2.80E+02	8.32E-03	3.64E-01	4.76E-01
3.00E+02	1.27E-02	4.73E-01	5.63E-01
3.20E+02	1.83E-02	5.84E-01	6.42E-01
3.40E+02	2.51E-02	6.90E-01	7.13E-01
3.60E+02	3.31E-02	7.90E-01	7.75E-01
3.80E+02	4.22E-02	8.79E-01	8.27E-01
4.00E+02	5.21E-02	9.58E-01	8.71E-01
4.20E+02	6.27E-02	1.02E+00	9.06E-01
4.40E+02	7.38E-02	1.08E+00	9.33E-01
4.60E+02	8.51E-02	1.12E+00	9.54E-01
4.80E+02	9.65E-02	1.16E+00	9.70E-01
5.00E+02	1.08E-01	1.18E+00	9.80E-01
5.20E+02	1.18E-01	1.20E+00	9.87E-01
5.40E+02	1.29E-01	1.21E+00	9.90E-01
5.60E+02	1.38E-01	1.21E+00	9.90E-01
5.80E+02	1.47E-01	1.22E+00	9.88E-01
6.00E+02	1.55E-01	1.21E+00	9.85E-01
6.50E+02	1.72E-01	1.19E+00	9.70E-01
7.00E+02	1.83E-01	1.16E+00	9.49E-01
7.50E+02	1.89E-01	1.13E+00	9.25E-01
8.00E+02	1.91E-01	1.09E+00	9.00E-01
8.50E+02	1.90E-01	1.06E+00	8.73E-01
9.00E+02	1.86E-01	1.02E+00	8.47E-01
1.00E+03	1.73E-01	9.53E-01	7.95E-01
1.50E+03	1.01E-01	7.00E-01	5.85E-01
2.00E+03	5.87E-02	5.52E-01	4.56E-01
2.50E+03	3.61E-02	4.56E-01	3.72E-01
3.00E+03	2.32E-02	3.89E-01	3.14E-01
4.00E+03	1.10E-02	3.01E-01	2.39E-01
5.00E+03	6.20E-03	2.46E-01	1.93E-01
6.00E+03	3.96E-03	2.09E-01	1.63E-01
8.00E+03	2.05E-03	1.60E-01	1.24E-01
1.00E+04	1.27E-03	1.30E-01	1.00E-01
1.50E+04	5.45E-04	8.92E-02	6.83E-02
2.00E+04	3.01E-04	6.78E-02	5.18E-02
3.00E+04	1.31E-04	4.59E-02	3.49E-02
4.00E+04	7.27E-05	3.47E-02	2.64E-02
6.00E+04	3.18E-05	2.33E-02	1.77E-02

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Ar XV + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.40E+02	2.35E-05		1.20E-02
2.80E+02	1.29E-04	1.00E-02	3.73E-02
3.20E+02	4.76E-04	3.28E-02	8.21E-02
3.60E+02	1.30E-03	7.51E-02	1.42E-01
4.00E+02	2.89E-03	1.36E-01	2.10E-01
4.40E+02	5.49E-03	2.12E-01	2.79E-01
4.80E+02	9.20E-03	2.93E-01	3.44E-01
5.20E+02	1.41E-02	3.74E-01	4.01E-01
5.60E+02	2.00E-02	4.48E-01	4.49E-01
6.00E+02	2.68E-02	5.14E-01	4.88E-01
6.50E+02	3.60E-02	5.79E-01	5.25E-01
7.00E+02	4.54E-02	6.28E-01	5.50E-01
7.50E+02	5.45E-02	6.61E-01	5.65E-01
8.00E+02	6.27E-02	6.81E-01	5.73E-01
8.50E+02	6.99E-02	6.92E-01	5.76E-01
9.00E+02	7.57E-02	6.94E-01	5.74E-01
9.50E+02	8.03E-02	6.92E-01	5.70E-01
1.00E+03	8.35E-02	6.85E-01	5.63E-01
1.20E+03	8.60E-02	6.36E-01	5.23E-01
1.40E+03	7.88E-02	5.78E-01	4.76E-01
1.60E+03	6.86E-02	5.24E-01	4.32E-01
1.80E+03	5.86E-02	4.77E-01	3.94E-01
2.00E+03	4.98E-02	4.36E-01	3.60E-01
2.20E+03	4.23E-02	4.01E-01	3.31E-01
2.40E+03	3.61E-02	3.72E-01	3.06E-01
2.60E+03	3.09E-02	3.46E-01	2.84E-01
2.80E+03	2.66E-02	3.24E-01	2.65E-01
3.00E+03	2.29E-02	3.04E-01	2.48E-01
3.50E+03	1.61E-02	2.65E-01	2.14E-01
4.00E+03	1.16E-02	2.34E-01	1.88E-01
5.00E+03	6.46E-03	1.91E-01	1.52E-01
6.00E+03	3.98E-03	1.61E-01	1.27E-01
7.00E+03	2.67E-03	1.40E-01	1.10E-01
7.50E+03	2.25E-03	1.31E-01	1.03E-01
8.00E+03	1.92E-03	1.23E-01	9.65E-02
9.00E+03	1.45E-03	1.11E-01	8.62E-02
1.00E+04	1.14E-03	1.00E-01	7.80E-02
1.50E+04	4.71E-04	6.89E-02	5.31E-02
2.00E+04	2.58E-04	5.25E-02	4.04E-02
3.00E+04	1.12E-04	3.57E-02	2.73E-02
4.00E+04	6.16E-05	2.71E-02	2.07E-02
5.00E+04	3.90E-05	2.18E-02	1.66E-02
6.00E+04	2.68E-05	1.82E-02	1.39E-02
8.00E+04	1.49E-05	1.37E-02	1.05E-02
1.00E+05	9.46E-06	1.10E-02	8.38E-03

Ca XVII + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.40E+02	9.48E-06		4.59E-03
3.80E+02	3.48E-05		1.13E-02
4.20E+02	1.01E-04	6.72E-03	2.36E-02
4.60E+02	2.47E-04	1.54E-02	4.15E-02
5.00E+02	5.26E-04	2.96E-02	6.43E-02
5.20E+02	7.35E-04	3.90E-02	7.72E-02
5.40E+02	9.96E-04	4.97E-02	9.09E-02
5.60E+02	1.31E-03	6.17E-02	1.05E-01
5.80E+02	1.70E-03	7.49E-02	1.20E-01
6.00E+02	2.16E-03	8.92E-02	1.34E-01
6.50E+02	3.66E-03	1.29E-01	1.71E-01
7.00E+02	5.67E-03	1.71E-01	2.05E-01
7.50E+02	8.17E-03	2.13E-01	2.37E-01
8.00E+02	1.11E-02	2.53E-01	2.64E-01
8.50E+02	1.43E-02	2.89E-01	2.87E-01
9.00E+02	1.78E-02	3.20E-01	3.06E-01
9.50E+02	2.13E-02	3.46E-01	3.21E-01
1.00E+03	2.47E-02	3.68E-01	3.32E-01
1.20E+03	3.60E-02	4.12E-01	3.52E-01
1.40E+03	4.16E-02	4.15E-01	3.47E-01
1.60E+03	4.24E-02	3.99E-01	3.30E-01
1.80E+03	4.02E-02	3.75E-01	3.10E-01
2.00E+03	3.68E-02	3.50E-01	2.88E-01
2.20E+03	3.30E-02	3.26E-01	2.69E-01
2.40E+03	2.94E-02	3.04E-01	2.50E-01
2.60E+03	2.61E-02	2.84E-01	2.33E-01
2.80E+03	2.31E-02	2.66E-01	2.18E-01
3.00E+03	2.05E-02	2.50E-01	2.05E-01
3.50E+03	1.52E-02	2.17E-01	1.77E-01
4.00E+03	1.14E-02	1.92E-01	1.56E-01
4.50E+03	8.70E-03	1.72E-01	1.39E-01
5.00E+03	6.71E-03	1.55E-01	1.25E-01
5.50E+03	5.26E-03	1.42E-01	1.14E-01
6.00E+03	4.18E-03	1.30E-01	1.04E-01
6.50E+03	3.38E-03	1.21E-01	9.63E-02
7.00E+03	2.77E-03	1.13E-01	8.95E-02
7.50E+03	2.31E-03	1.06E-01	8.37E-02
8.00E+03	1.95E-03	9.94E-02	7.86E-02
9.00E+03	1.43E-03	8.89E-02	7.01E-02
1.00E+04	1.10E-03	8.06E-02	6.33E-02
1.50E+04	4.31E-04	5.53E-02	4.30E-02
2.00E+04	2.32E-04	4.22E-02	3.27E-02
3.00E+04	9.92E-05	2.88E-02	2.22E-02
5.00E+04	3.43E-05	1.76E-02	1.35E-02
7.00E+04	1.72E-05	1.27E-02	9.72E-03

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Ti XIX + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
4.50E+02	2.86E-06		1.61E-03
5.00E+02	1.02E-05		3.46E-03
5.50E+02	2.97E-05		7.53E-03
6.00E+02	7.49E-05	4.30E-03	1.44E-02
6.50E+02	1.65E-04	9.03E-03	2.42E-02
7.00E+02	3.26E-04	1.65E-02	3.65E-02
7.50E+02	5.78E-04	2.69E-02	5.11E-02
8.00E+02	9.54E-04	4.00E-02	6.69E-02
8.50E+02	1.47E-03	5.56E-02	8.34E-02
9.00E+02	2.14E-03	7.29E-02	1.00E-01
9.50E+02	2.97E-03	9.13E-02	1.17E-01
1.00E+03	3.95E-03	1.10E-01	1.32E-01
1.05E+03	5.07E-03	1.29E-01	1.47E-01
1.10E+03	6.30E-03	1.47E-01	1.60E-01
1.15E+03	7.62E-03	1.64E-01	1.71E-01
1.20E+03	9.00E-03	1.79E-01	1.82E-01
1.25E+03	1.04E-02	1.93E-01	1.90E-01
1.30E+03	1.18E-02	2.06E-01	1.98E-01
1.35E+03	1.31E-02	2.17E-01	2.04E-01
1.40E+03	1.44E-02	2.26E-01	2.10E-01
1.45E+03	1.56E-02	2.34E-01	2.14E-01
1.50E+03	1.67E-02	2.41E-01	2.17E-01
1.55E+03	1.77E-02	2.46E-01	2.20E-01
1.60E+03	1.86E-02	2.51E-01	2.21E-01
1.74E+03	2.05E-02	2.57E-01	2.23E-01
1.88E+03	2.16E-02	2.59E-01	2.21E-01
2.02E+03	2.20E-02	2.56E-01	2.17E-01
2.16E+03	2.18E-02	2.52E-01	2.11E-01
2.30E+03	2.13E-02	2.45E-01	2.05E-01
2.44E+03	2.05E-02	2.38E-01	1.98E-01
2.58E+03	1.96E-02	2.30E-01	1.91E-01
2.72E+03	1.86E-02	2.22E-01	1.84E-01
2.86E+03	1.76E-02	2.15E-01	1.77E-01
3.00E+03	1.66E-02	2.07E-01	1.71E-01
3.50E+03	1.33E-02	1.82E-01	1.50E-01
4.00E+03	1.06E-02	1.62E-01	1.32E-01
5.00E+03	6.77E-03	1.31E-01	1.07E-01
6.00E+03	4.42E-03	1.10E-01	8.89E-02
8.00E+03	2.10E-03	8.33E-02	6.65E-02
9.50E+03	1.33E-03	7.06E-02	5.61E-02
1.00E+04	1.16E-03	6.72E-02	5.33E-02
1.60E+04	3.67E-04	4.32E-02	3.38E-02
2.00E+04	2.22E-04	3.50E-02	2.73E-02
2.50E+04	1.37E-04	2.84E-02	2.21E-02
3.00E+04	9.33E-05	2.39E-02	1.85E-02

Cr XXI + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
8.00E+02	3.97E-05		7.25E-03
9.00E+02	1.29E-04	6.30E-03	1.58E-02
1.00E+03	3.25E-04	1.43E-02	2.81E-02
1.10E+03	6.82E-04	2.63E-02	4.30E-02
1.20E+03	1.24E-03	4.16E-02	5.91E-02
1.30E+03	2.00E-03	5.87E-02	7.50E-02
1.40E+03	2.95E-03	7.64E-02	8.97E-02
1.50E+03	4.04E-03	9.35E-02	1.03E-01
1.60E+03	5.20E-03	1.09E-01	1.14E-01
1.70E+03	6.35E-03	1.23E-01	1.23E-01
1.80E+03	7.47E-03	1.34E-01	1.30E-01
1.90E+03	8.48E-03	1.43E-01	1.36E-01
2.00E+03	9.37E-03	1.51E-01	1.40E-01
2.20E+03	1.07E-02	1.60E-01	1.44E-01
2.40E+03	1.15E-02	1.65E-01	1.45E-01
2.60E+03	1.18E-02	1.65E-01	1.43E-01
2.80E+03	1.18E-02	1.63E-01	1.40E-01
3.00E+03	1.15E-02	1.60E-01	1.35E-01
3.50E+03	1.02E-02	1.48E-01	1.23E-01
4.00E+03	8.76E-03	1.35E-01	1.12E-01
4.50E+03	7.40E-03	1.23E-01	1.01E-01
5.00E+03	6.20E-03	1.12E-01	9.17E-02
5.50E+03	5.19E-03	1.03E-01	8.38E-02
6.00E+03	4.35E-03	9.46E-02	7.70E-02
6.50E+03	3.65E-03	8.76E-02	7.11E-02
7.00E+03	3.08E-03	8.15E-02	6.59E-02
7.50E+03	2.61E-03	7.62E-02	6.15E-02
8.00E+03	2.22E-03	7.15E-02	5.76E-02
9.00E+03	1.64E-03	6.37E-02	5.11E-02
1.00E+04	1.25E-03	5.75E-02	4.59E-02
1.20E+04	7.72E-04	4.81E-02	3.83E-02
1.40E+04	5.20E-04	4.15E-02	3.29E-02
1.60E+04	3.73E-04	3.66E-02	2.88E-02
1.80E+04	2.81E-04	3.27E-02	2.57E-02
2.00E+04	2.20E-04	2.96E-02	2.32E-02
2.50E+04	1.34E-04	2.41E-02	1.88E-02
3.00E+04	9.00E-05	2.03E-02	1.58E-02
3.50E+04	6.47E-05	1.75E-02	1.36E-02
4.00E+04	4.87E-05	1.54E-02	1.20E-02
5.00E+04	3.04E-05	1.25E-02	9.66E-03
6.00E+04	2.07E-05	1.05E-02	8.09E-03
7.00E+04	1.50E-05	9.04E-03	6.97E-03
8.00E+04	1.14E-05	7.94E-03	6.12E-03
9.00E+04	8.90E-06	7.08E-03	5.46E-03
1.00E+05	7.15E-06	6.39E-03	4.92E-03

TABLE IV. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Fe XXIII + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+03	1.38E-05		2.43E-03
1.10E+03	3.75E-05		5.26E-03
1.20E+03	8.73E-05	3.97E-03	9.56E-03
1.30E+03	1.76E-04	7.57E-03	1.53E-02
1.40E+03	3.19E-04	1.26E-02	2.21E-02
1.50E+03	5.27E-04	1.90E-02	2.95E-02
1.60E+03	8.02E-04	2.65E-02	3.73E-02
1.70E+03	1.14E-03	3.46E-02	4.51E-02
1.80E+03	1.54E-03	4.29E-02	5.26E-02
1.90E+03	1.98E-03	5.13E-02	5.95E-02
2.00E+03	2.44E-03	5.93E-02	6.58E-02
2.10E+03	2.92E-03	6.68E-02	7.14E-02
2.20E+03	3.39E-03	7.36E-02	7.62E-02
2.30E+03	3.84E-03	7.97E-02	8.03E-02
2.40E+03	4.27E-03	8.51E-02	8.38E-02
2.50E+03	4.65E-03	8.96E-02	8.66E-02
2.60E+03	4.99E-03	9.36E-02	8.88E-02
2.70E+03	5.30E-03	9.69E-02	9.06E-02
2.80E+03	5.56E-03	9.95E-02	9.18E-02
2.90E+03	5.77E-03	1.02E-01	9.27E-02
3.00E+03	5.95E-03	1.03E-01	9.33E-02
3.50E+03	6.33E-03	1.06E-01	9.22E-02
4.00E+03	6.14E-03	1.03E-01	8.78E-02
4.50E+03	5.69E-03	9.76E-02	8.21E-02
5.00E+03	5.13E-03	9.15E-02	7.63E-02
6.00E+03	4.00E-03	7.96E-02	6.56E-02
7.00E+03	3.05E-03	6.96E-02	5.69E-02
8.00E+03	2.32E-03	6.14E-02	5.00E-02
9.00E+03	1.77E-03	5.48E-02	4.44E-02
1.00E+04	1.37E-03	4.94E-02	3.98E-02
1.20E+04	8.53E-04	4.12E-02	3.31E-02
1.40E+04	5.69E-04	3.55E-02	2.83E-02
1.60E+04	4.03E-04	3.12E-02	2.48E-02
1.80E+04	2.99E-04	2.79E-02	2.21E-02
2.00E+04	2.31E-04	2.52E-02	1.99E-02
2.50E+04	1.37E-04	2.04E-02	1.60E-02
3.00E+04	9.05E-05	1.72E-02	1.35E-02
3.50E+04	6.46E-05	1.49E-02	1.16E-02
4.00E+04	4.84E-05	1.31E-02	1.02E-02
5.00E+04	3.00E-05	1.06E-02	8.26E-03
6.00E+04	2.04E-05	8.94E-03	6.94E-03
7.00E+04	1.47E-05	7.72E-03	5.98E-03
8.00E+04	1.11E-05	6.79E-03	5.25E-03
9.00E+04	8.65E-06	6.06E-03	4.68E-03
1.00E+05	6.94E-06	5.47E-03	4.22E-03

Ni XXV + t			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.30E+03	1.06E-05		1.68E-03
1.40E+03	2.29E-05		2.88E-03
1.50E+03	4.58E-05	1.90E-03	4.68E-03
1.60E+03	8.30E-05	3.38E-03	7.19E-03
1.70E+03	1.39E-04	5.44E-03	1.03E-02
1.80E+03	2.19E-04	8.12E-03	1.38E-02
1.90E+03	3.26E-04	1.14E-02	1.77E-02
2.00E+03	4.61E-04	1.51E-02	2.18E-02
2.10E+03	6.24E-04	1.92E-02	2.60E-02
2.20E+03	8.08E-04	2.35E-02	3.02E-02
2.30E+03	1.01E-03	2.80E-02	3.42E-02
2.40E+03	1.24E-03	3.24E-02	3.81E-02
2.50E+03	1.47E-03	3.68E-02	4.17E-02
2.60E+03	1.71E-03	4.10E-02	4.51E-02
2.70E+03	1.94E-03	4.50E-02	4.82E-02
2.80E+03	2.17E-03	4.88E-02	5.09E-02
2.90E+03	2.39E-03	5.22E-02	5.34E-02
3.00E+03	2.60E-03	5.54E-02	5.56E-02
3.20E+03	2.98E-03	6.08E-02	5.91E-02
3.40E+03	3.28E-03	6.50E-02	6.17E-02
3.60E+03	3.51E-03	6.82E-02	6.34E-02
3.80E+03	3.67E-03	7.04E-02	6.44E-02
4.00E+03	3.78E-03	7.19E-02	6.48E-02
4.20E+03	3.83E-03	7.28E-02	6.48E-02
4.40E+03	3.84E-03	7.31E-02	6.44E-02
4.60E+03	3.82E-03	7.30E-02	6.38E-02
4.80E+03	3.77E-03	7.26E-02	6.29E-02
5.00E+03	3.69E-03	7.19E-02	6.19E-02
5.50E+03	3.46E-03	6.95E-02	5.90E-02
6.00E+03	3.17E-03	6.64E-02	5.58E-02
7.00E+03	2.59E-03	5.99E-02	4.97E-02
8.00E+03	2.08E-03	5.38E-02	4.42E-02
9.00E+03	1.66E-03	4.85E-02	3.96E-02
1.00E+04	1.32E-03	4.39E-02	3.57E-02
1.40E+04	5.86E-04	3.17E-02	2.54E-02
2.00E+04	2.38E-04	2.24E-02	1.78E-02
2.50E+04	1.39E-04	1.81E-02	1.43E-02
3.00E+04	9.10E-05	1.53E-02	1.20E-02
3.50E+04	6.44E-05	1.32E-02	1.03E-02
4.00E+04	4.80E-05	1.17E-02	9.10E-03
5.00E+04	2.96E-05	9.44E-03	7.34E-03
6.00E+04	2.00E-05	7.95E-03	6.17E-03
7.00E+04	1.44E-05	6.87E-03	5.32E-03
8.00E+04	1.08E-05	6.04E-03	4.67E-03
1.00E+05	6.76E-06	4.88E-03	3.77E-03

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

C III + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.50E+00	2.63E-03	1.18E+00	4.38E+00
2.75E+00	7.68E-03	2.60E+00	8.75E+00
3.00E+00	1.93E-02	5.16E+00	1.53E+01
3.50E+00	8.34E-02	1.71E+01	3.44E+01
4.00E+00	2.53E-01	3.85E+01	5.94E+01
4.50E+00	6.09E-01	6.83E+01	8.72E+01
5.00E+00	1.23E+00	1.03E+02	1.15E+02
6.00E+00	3.62E+00	1.78E+02	1.66E+02
7.00E+00	7.97E+00	2.44E+02	2.05E+02
8.00E+00	1.45E+01	2.90E+02	2.31E+02
9.00E+00	2.29E+01	3.16E+02	2.45E+02
1.00E+01	3.29E+01	3.25E+02	2.49E+02
1.10E+01	4.35E+01	3.20E+02	2.47E+02
1.20E+01	5.39E+01	3.07E+02	2.42E+02
1.30E+01	6.33E+01	2.92E+02	2.36E+02
1.40E+01	7.10E+01	2.77E+02	2.30E+02
1.50E+01	7.69E+01	2.65E+02	2.24E+02
1.60E+01	8.10E+01	2.56E+02	2.21E+02
1.70E+01	8.34E+01	2.50E+02	2.18E+02
1.80E+01	8.46E+01	2.45E+02	2.15E+02
1.90E+01	8.49E+01	2.41E+02	2.13E+02
2.00E+01	8.47E+01	2.38E+02	2.10E+02
2.50E+01	8.21E+01	2.16E+02	1.94E+02
3.00E+01	7.87E+01	2.00E+02	1.82E+02
3.50E+01	7.38E+01	1.89E+02	1.72E+02
4.00E+01	6.92E+01	1.79E+02	1.63E+02
5.00E+01	6.11E+01	1.63E+02	1.49E+02
6.00E+01	5.69E+01	1.48E+02	1.36E+02
7.00E+01	5.15E+01	1.39E+02	1.27E+02
8.00E+01	4.53E+01	1.33E+02	1.20E+02
9.00E+01	4.03E+01	1.27E+02	1.13E+02
1.00E+02	3.69E+01	1.22E+02	1.08E+02
1.20E+02	3.30E+01	1.12E+02	9.87E+01
1.40E+02	3.06E+01	1.04E+02	9.15E+01
1.60E+02	2.85E+01	9.74E+01	8.56E+01
1.80E+02	2.67E+01	9.15E+01	8.03E+01
2.00E+02	2.50E+01	8.64E+01	7.58E+01
2.40E+02	2.14E+01	7.83E+01	6.81E+01
2.80E+02	1.81E+01	7.22E+01	6.21E+01
3.20E+02	1.53E+01	6.72E+01	5.71E+01
3.60E+02	1.31E+01	6.29E+01	5.29E+01
4.00E+02	1.14E+01	5.91E+01	4.93E+01
6.00E+02	7.02E+00	4.51E+01	3.69E+01
8.00E+02	5.12E+00	3.66E+01	2.97E+01
1.00E+03	3.98E+00	3.10E+01	2.50E+01

N IV + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.50E+00	2.46E-03	7.44E-01	2.81E+00
7.00E+00	5.61E-03	1.42E+00	4.71E+00
7.50E+00	1.14E-02	2.37E+00	7.25E+00
8.00E+00	2.13E-02	4.04E+00	1.04E+01
9.00E+00	6.20E-02	9.39E+00	1.81E+01
1.00E+01	1.46E-01	1.75E+01	2.73E+01
1.10E+01	2.95E-01	2.78E+01	3.71E+01
1.20E+01	5.32E-01	3.99E+01	4.70E+01
1.30E+01	8.80E-01	5.28E+01	5.65E+01
1.40E+01	1.36E+00	6.59E+01	6.53E+01
1.50E+01	1.98E+00	7.84E+01	7.32E+01
1.60E+01	2.76E+00	9.00E+01	8.01E+01
1.70E+01	3.70E+00	1.00E+02	8.60E+01
1.80E+01	4.80E+00	1.09E+02	9.09E+01
1.90E+01	6.06E+00	1.17E+02	9.48E+01
2.00E+01	7.46E+00	1.23E+02	9.78E+01
2.20E+01	1.06E+01	1.30E+02	1.02E+02
2.40E+01	1.41E+01	1.32E+02	1.03E+02
2.60E+01	1.77E+01	1.31E+02	1.02E+02
2.80E+01	2.13E+01	1.28E+02	1.01E+02
3.00E+01	2.46E+01	1.23E+02	9.84E+01
3.50E+01	3.08E+01	1.11E+02	9.32E+01
4.00E+01	3.40E+01	1.03E+02	8.96E+01
4.50E+01	3.49E+01	9.85E+01	8.71E+01
5.00E+01	3.46E+01	9.52E+01	8.47E+01
6.00E+01	3.30E+01	8.87E+01	7.95E+01
7.00E+01	3.13E+01	8.26E+01	7.47E+01
8.00E+01	2.95E+01	7.80E+01	7.08E+01
9.00E+01	2.75E+01	7.47E+01	6.76E+01
1.00E+02	2.53E+01	7.24E+01	6.50E+01
1.20E+02	2.27E+01	6.69E+01	6.00E+01
1.40E+02	2.07E+01	6.23E+01	5.58E+01
1.60E+02	1.91E+01	5.85E+01	5.23E+01
1.80E+02	1.77E+01	5.53E+01	4.94E+01
2.00E+02	1.64E+01	5.25E+01	4.68E+01
2.50E+02	1.35E+01	4.70E+01	4.14E+01
3.00E+02	1.10E+01	4.28E+01	3.71E+01
3.50E+02	9.00E+00	3.94E+01	3.38E+01
4.00E+02	7.60E+00	3.65E+01	3.09E+01
5.00E+02	5.70E+00	3.18E+01	2.65E+01
6.00E+02	4.51E+00	2.82E+01	2.32E+01
7.00E+02	3.74E+00	2.53E+01	2.07E+01
8.00E+02	3.19E+00	2.30E+01	1.87E+01
9.00E+02	2.77E+00	2.11E+01	1.71E+01
1.00E+03	2.43E+00	1.96E+01	1.58E+01

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

O V + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+01	5.17E-05		1.69E-01
1.10E+01	1.78E-04		3.71E-01
1.20E+01	5.20E-04	2.32E-01	7.02E-01
1.30E+01	1.32E-03	3.73E-01	1.32E+00
1.40E+01	3.04E-03	6.37E-01	2.25E+00
1.50E+01	6.23E-03	1.08E+00	3.49E+00
1.60E+01	1.17E-02	1.87E+00	5.02E+00
1.70E+01	2.07E-02	2.98E+00	6.81E+00
1.80E+01	3.43E-02	4.43E+00	8.84E+00
1.90E+01	5.38E-02	6.22E+00	1.10E+01
2.00E+01	8.07E-02	8.32E+00	1.34E+01
2.20E+01	1.63E-01	1.34E+01	1.83E+01
2.40E+01	2.94E-01	1.93E+01	2.31E+01
2.60E+01	4.84E-01	2.55E+01	2.78E+01
2.80E+01	7.44E-01	3.19E+01	3.20E+01
3.00E+01	1.08E+00	3.80E+01	3.58E+01
3.50E+01	2.26E+00	5.06E+01	4.30E+01
4.00E+01	3.91E+00	5.86E+01	4.72E+01
4.50E+01	5.88E+00	6.23E+01	4.89E+01
5.00E+01	8.00E+00	6.26E+01	4.90E+01
6.00E+01	1.19E+01	5.81E+01	4.69E+01
7.00E+01	1.47E+01	5.26E+01	4.44E+01
8.00E+01	1.61E+01	4.86E+01	4.24E+01
9.00E+01	1.65E+01	4.60E+01	4.09E+01
1.00E+02	1.64E+01	4.41E+01	3.95E+01
1.20E+02	1.55E+01	4.11E+01	3.71E+01
1.40E+02	1.45E+01	3.83E+01	3.48E+01
1.60E+02	1.40E+01	3.57E+01	3.27E+01
1.80E+02	1.34E+01	3.39E+01	3.12E+01
2.00E+02	1.21E+01	3.26E+01	2.98E+01
2.50E+02	9.41E+00	2.95E+01	2.65E+01
3.00E+02	7.51E+00	2.70E+01	2.38E+01
3.50E+02	6.08E+00	2.50E+01	2.17E+01
4.00E+02	5.01E+00	2.32E+01	1.99E+01
5.00E+02	3.70E+00	2.03E+01	1.70E+01
6.00E+02	3.01E+00	1.80E+01	1.50E+01
7.00E+02	2.49E+00	1.62E+01	1.34E+01
8.00E+02	2.09E+00	1.48E+01	1.21E+01
9.00E+02	1.78E+00	1.37E+01	1.11E+01
1.00E+03	1.55E+00	1.27E+01	1.03E+01
1.50E+03	8.90E-01	9.50E+00	7.55E+00
2.00E+03	5.79E-01	7.67E+00	6.01E+00
2.50E+03	4.06E-01	6.46E+00	5.04E+00
3.00E+03	2.99E-01	5.59E+00	4.33E+00
4.00E+03	1.82E-01	4.40E+00	3.39E+00

Ne VII + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.30E+01	1.01E-04		1.47E-01
3.60E+01	2.89E-04		2.93E-01
3.80E+01	5.34E-04	1.18E-01	4.43E-01
4.00E+01	9.48E-04	1.80E-01	6.35E-01
4.20E+01	1.58E-03	2.26E-01	8.77E-01
4.40E+01	2.55E-03	3.47E-01	1.16E+00
4.60E+01	3.94E-03	5.09E-01	1.49E+00
4.80E+01	5.88E-03	7.15E-01	1.86E+00
5.00E+01	8.45E-03	9.67E-01	2.26E+00
5.20E+01	1.18E-02	1.26E+00	2.69E+00
5.40E+01	1.61E-02	1.61E+00	3.14E+00
5.60E+01	2.16E-02	2.00E+00	3.62E+00
5.80E+01	2.82E-02	2.44E+00	4.11E+00
6.00E+01	3.62E-02	2.91E+00	4.60E+00
6.50E+01	6.35E-02	4.24E+00	5.86E+00
7.00E+01	1.02E-01	5.72E+00	7.08E+00
7.50E+01	1.54E-01	7.26E+00	8.22E+00
8.00E+01	2.20E-01	8.80E+00	9.27E+00
8.50E+01	3.00E-01	1.03E+01	1.02E+01
9.00E+01	3.95E-01	1.16E+01	1.10E+01
9.50E+01	5.03E-01	1.29E+01	1.17E+01
1.00E+02	6.23E-01	1.39E+01	1.23E+01
1.20E+02	1.19E+00	1.67E+01	1.36E+01
1.40E+02	1.81E+00	1.74E+01	1.39E+01
1.60E+02	2.37E+00	1.71E+01	1.36E+01
1.80E+02	2.81E+00	1.63E+01	1.31E+01
2.00E+02	3.10E+00	1.55E+01	1.26E+01
2.20E+02	3.25E+00	1.46E+01	1.21E+01
2.40E+02	3.28E+00	1.39E+01	1.17E+01
2.60E+02	3.21E+00	1.33E+01	1.12E+01
2.80E+02	3.03E+00	1.28E+01	1.08E+01
3.00E+02	2.78E+00	1.22E+01	1.04E+01
3.50E+02	2.01E+00	1.08E+01	9.13E+00
4.00E+02	1.50E+00	9.66E+00	8.07E+00
4.50E+02	1.19E+00	8.95E+00	7.38E+00
5.00E+02	9.63E-01	8.30E+00	6.80E+00
6.00E+02	7.16E-01	7.28E+00	5.90E+00
7.00E+02	6.22E-01	6.53E+00	5.27E+00
8.00E+02	5.94E-01	5.97E+00	4.82E+00
9.00E+02	5.76E-01	5.54E+00	4.48E+00
1.00E+03	5.41E-01	5.21E+00	4.20E+00
1.50E+03	3.12E-01	3.98E+00	3.16E+00
2.00E+03	1.99E-01	3.21E+00	2.52E+00
2.50E+03	1.38E-01	2.70E+00	2.10E+00
3.00E+03	1.02E-01	2.32E+00	1.80E+00

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Mg IX + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
8.00E+01	1.71E-04		1.31E-01
8.40E+01	2.98E-04		1.87E-01
8.80E+01	5.00E-04		2.63E-01
9.20E+01	8.00E-04		3.55E-01
9.60E+01	1.24E-03	1.28E-01	4.63E-01
1.00E+02	1.84E-03	1.84E-01	5.87E-01
1.20E+02	9.14E-03	7.01E-01	1.39E+00
1.40E+02	2.82E-02	1.60E+00	2.35E+00
1.60E+02	6.43E-02	2.71E+00	3.27E+00
1.80E+02	1.20E-01	3.84E+00	4.06E+00
2.00E+02	1.93E-01	4.84E+00	4.66E+00
2.10E+02	2.36E-01	5.26E+00	4.89E+00
2.20E+02	2.81E-01	5.63E+00	5.09E+00
2.30E+02	3.29E-01	5.95E+00	5.24E+00
2.40E+02	3.77E-01	6.21E+00	5.37E+00
2.50E+02	4.26E-01	6.42E+00	5.46E+00
2.60E+02	4.75E-01	6.59E+00	5.53E+00
2.70E+02	5.23E-01	6.71E+00	5.57E+00
2.80E+02	5.70E-01	6.80E+00	5.60E+00
2.90E+02	6.14E-01	6.86E+00	5.61E+00
3.00E+02	6.56E-01	6.89E+00	5.61E+00
3.20E+02	7.31E-01	6.89E+00	5.57E+00
3.40E+02	7.91E-01	6.82E+00	5.50E+00
3.60E+02	8.36E-01	6.72E+00	5.41E+00
3.80E+02	8.66E-01	6.59E+00	5.31E+00
4.00E+02	8.79E-01	6.43E+00	5.20E+00
4.50E+02	8.49E-01	6.01E+00	4.89E+00
5.00E+02	7.49E-01	5.54E+00	4.53E+00
5.50E+02	6.18E-01	5.05E+00	4.13E+00
6.00E+02	5.01E-01	4.60E+00	3.75E+00
7.00E+02	3.60E-01	4.03E+00	3.24E+00
8.00E+02	2.78E-01	3.70E+00	2.95E+00
9.00E+02	2.23E-01	3.41E+00	2.71E+00
1.00E+03	1.94E-01	3.17E+00	2.51E+00
1.50E+03	1.84E-01	2.47E+00	1.96E+00
2.00E+03	1.32E-01	2.04E+00	1.60E+00
2.50E+03	8.97E-02	1.71E+00	1.34E+00
3.00E+03	6.53E-02	1.48E+00	1.15E+00
4.00E+03	3.94E-02	1.16E+00	8.93E-01
5.00E+03	2.63E-02	9.56E-01	7.31E-01
6.00E+03	1.87E-02	8.13E-01	6.20E-01
7.00E+03	1.40E-02	7.07E-01	5.37E-01
8.00E+03	1.08E-02	6.25E-01	4.74E-01
9.00E+03	8.64E-03	5.61E-01	4.25E-01
1.00E+04	7.05E-03	5.08E-01	3.84E-01

Al X + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.00E+02	3.54E-05		3.43E-02
1.20E+02	2.95E-04		1.50E-01
1.40E+02	1.46E-03	1.28E-01	4.09E-01
1.60E+02	4.80E-03	3.55E-01	7.94E-01
1.80E+02	1.20E-02	7.25E-01	1.25E+00
1.85E+02	1.46E-02	8.36E-01	1.37E+00
1.90E+02	1.75E-02	9.54E-01	1.49E+00
1.95E+02	2.09E-02	1.08E+00	1.61E+00
2.00E+02	2.46E-02	1.21E+00	1.73E+00
2.20E+02	4.37E-02	1.75E+00	2.19E+00
2.40E+02	6.97E-02	2.31E+00	2.59E+00
2.60E+02	1.02E-01	2.83E+00	2.93E+00
2.80E+02	1.40E-01	3.29E+00	3.20E+00
3.00E+02	1.81E-01	3.68E+00	3.41E+00
3.20E+02	2.25E-01	3.98E+00	3.56E+00
3.40E+02	2.69E-01	4.22E+00	3.67E+00
3.60E+02	3.11E-01	4.38E+00	3.74E+00
3.80E+02	3.51E-01	4.50E+00	3.77E+00
4.00E+02	3.88E-01	4.56E+00	3.79E+00
4.20E+02	4.19E-01	4.58E+00	3.78E+00
4.40E+02	4.45E-01	4.58E+00	3.75E+00
4.60E+02	4.65E-01	4.55E+00	3.71E+00
4.80E+02	4.79E-01	4.50E+00	3.67E+00
5.00E+02	4.86E-01	4.44E+00	3.61E+00
5.50E+02	4.80E-01	4.24E+00	3.45E+00
6.00E+02	4.44E-01	3.99E+00	3.25E+00
6.50E+02	3.90E-01	3.71E+00	3.03E+00
7.00E+02	3.32E-01	3.44E+00	2.80E+00
7.50E+02	2.82E-01	3.20E+00	2.59E+00
8.00E+02	2.44E-01	3.01E+00	2.42E+00
8.50E+02	2.16E-01	2.87E+00	2.29E+00
9.00E+02	1.94E-01	2.76E+00	2.19E+00
9.50E+02	1.76E-01	2.67E+00	2.11E+00
1.00E+03	1.59E-01	2.59E+00	2.04E+00
1.20E+03	1.18E-01	2.30E+00	1.81E+00
1.40E+03	1.09E-01	2.08E+00	1.64E+00
1.60E+03	1.12E-01	1.92E+00	1.51E+00
1.80E+03	1.12E-01	1.79E+00	1.41E+00
2.00E+03	1.05E-01	1.68E+00	1.32E+00
3.00E+03	5.49E-02	1.23E+00	9.56E-01
4.00E+03	3.27E-02	9.64E-01	7.44E-01
5.00E+03	2.18E-02	7.94E-01	6.09E-01
6.00E+03	1.55E-02	6.76E-01	5.16E-01
8.00E+03	8.99E-03	5.21E-01	3.95E-01
1.00E+04	5.85E-03	4.23E-01	3.20E-01

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Si XI + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.50E+02	9.48E-05	7.36E-03	5.83E-02
1.60E+02	1.97E-04	1.63E-02	9.47E-02
1.80E+02	6.81E-04	5.60E-02	2.13E-01
2.00E+02	1.85E-03	1.39E-01	3.86E-01
2.20E+02	4.18E-03	2.76E-01	6.02E-01
2.40E+02	8.15E-03	4.67E-01	8.43E-01
2.60E+02	1.42E-02	7.04E-01	1.09E+00
2.80E+02	2.27E-02	9.70E-01	1.34E+00
3.00E+02	3.36E-02	1.25E+00	1.57E+00
3.20E+02	4.71E-02	1.53E+00	1.77E+00
3.40E+02	6.27E-02	1.80E+00	1.96E+00
3.60E+02	8.04E-02	2.05E+00	2.11E+00
3.80E+02	9.95E-02	2.28E+00	2.24E+00
4.00E+02	1.19E-01	2.47E+00	2.35E+00
4.50E+02	1.70E-01	2.82E+00	2.52E+00
5.00E+02	2.14E-01	3.01E+00	2.59E+00
5.50E+02	2.48E-01	3.08E+00	2.59E+00
6.00E+02	2.67E-01	3.06E+00	2.55E+00
6.50E+02	2.71E-01	2.99E+00	2.47E+00
7.00E+02	2.61E-01	2.87E+00	2.36E+00
7.50E+02	2.42E-01	2.73E+00	2.24E+00
8.00E+02	2.16E-01	2.58E+00	2.11E+00
8.50E+02	1.90E-01	2.43E+00	1.98E+00
9.00E+02	1.67E-01	2.29E+00	1.86E+00
9.50E+02	1.48E-01	2.18E+00	1.75E+00
1.00E+03	1.33E-01	2.09E+00	1.67E+00
1.20E+03	9.58E-02	1.87E+00	1.46E+00
1.40E+03	7.39E-02	1.70E+00	1.33E+00
1.60E+03	6.66E-02	1.57E+00	1.22E+00
1.80E+03	6.74E-02	1.46E+00	1.14E+00
2.00E+03	6.89E-02	1.38E+00	1.08E+00
2.50E+03	6.05E-02	1.19E+00	9.29E-01
3.00E+03	4.54E-02	1.03E+00	8.02E-01
4.00E+03	2.65E-02	8.05E-01	6.22E-01
5.00E+03	1.75E-02	6.62E-01	5.08E-01
6.00E+03	1.25E-02	5.63E-01	4.30E-01
7.00E+03	9.30E-03	4.90E-01	3.73E-01
8.00E+03	7.21E-03	4.34E-01	3.29E-01
9.00E+03	5.74E-03	3.89E-01	2.95E-01
1.00E+04	4.68E-03	3.53E-01	2.67E-01
1.50E+04	2.12E-03	2.40E-01	1.81E-01
2.00E+04	1.20E-03	1.82E-01	1.37E-01
3.00E+04	5.38E-04	1.23E-01	9.20E-02
4.00E+04	3.04E-04	9.28E-02	6.92E-02
5.00E+04	1.95E-04	7.44E-02	5.56E-02

S XIII + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.00E+02	3.06E-06		9.00E-03
2.50E+02	4.78E-05		2.67E-02
3.00E+02	3.50E-04	3.17E-02	9.77E-02
3.20E+02	6.54E-04	4.32E-02	1.46E-01
3.40E+02	1.13E-03	7.15E-02	2.03E-01
3.50E+02	1.46E-03	8.95E-02	2.35E-01
3.60E+02	1.85E-03	1.10E-01	2.68E-01
3.80E+02	2.86E-03	1.58E-01	3.40E-01
4.00E+02	4.21E-03	2.16E-01	4.15E-01
4.20E+02	5.96E-03	2.83E-01	4.93E-01
4.40E+02	8.10E-03	3.56E-01	5.71E-01
4.60E+02	1.06E-02	4.35E-01	6.48E-01
4.80E+02	1.36E-02	5.16E-01	7.22E-01
5.00E+02	1.70E-02	6.01E-01	7.93E-01
5.20E+02	2.09E-02	6.85E-01	8.60E-01
5.40E+02	2.50E-02	7.68E-01	9.22E-01
5.60E+02	2.95E-02	8.49E-01	9.79E-01
5.80E+02	3.42E-02	9.26E-01	1.03E+00
6.00E+02	3.91E-02	9.98E-01	1.08E+00
6.50E+02	5.17E-02	1.16E+00	1.17E+00
7.00E+02	6.39E-02	1.28E+00	1.24E+00
7.50E+02	7.50E-02	1.37E+00	1.28E+00
8.00E+02	8.38E-02	1.43E+00	1.30E+00
8.50E+02	9.02E-02	1.46E+00	1.30E+00
9.00E+02	9.37E-02	1.47E+00	1.29E+00
9.50E+02	9.45E-02	1.46E+00	1.27E+00
1.00E+03	9.28E-02	1.44E+00	1.24E+00
1.50E+03	4.69E-02	1.09E+00	8.70E-01
2.00E+03	3.06E-02	9.48E-01	7.37E-01
2.50E+03	2.85E-02	8.41E-01	6.51E-01
3.00E+03	2.80E-02	7.52E-01	5.82E-01
4.00E+03	1.92E-02	5.98E-01	4.61E-01
5.00E+03	1.24E-02	4.89E-01	3.76E-01
6.00E+03	8.63E-03	4.14E-01	3.17E-01
7.00E+03	6.40E-03	3.59E-01	2.74E-01
8.00E+03	4.94E-03	3.18E-01	2.42E-01
9.00E+03	3.93E-03	2.85E-01	2.17E-01
1.00E+04	3.20E-03	2.58E-01	1.96E-01
1.50E+04	1.44E-03	1.76E-01	1.33E-01
2.00E+04	8.11E-04	1.34E-01	1.01E-01
2.50E+04	5.20E-04	1.08E-01	8.08E-02
3.00E+04	3.62E-04	9.04E-02	6.76E-02
4.00E+04	2.04E-04	6.82E-02	5.09E-02
5.00E+04	1.31E-04	5.48E-02	4.08E-02
6.00E+04	9.07E-05	4.58E-02	3.41E-02

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Ar XV + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
3.75E+02	1.67E-05	5.91E-03	9.29E-03
4.00E+02	3.52E-05	7.88E-03	1.47E-02
4.25E+02	7.03E-05	1.00E-02	2.33E-02
4.50E+02	1.29E-04	1.30E-02	3.62E-02
4.75E+02	2.23E-04	1.26E-02	5.28E-02
5.00E+02	3.65E-04	2.07E-02	7.33E-02
5.20E+02	5.23E-04	2.91E-02	9.23E-02
5.40E+02	7.30E-04	3.96E-02	1.13E-01
5.60E+02	9.98E-04	5.24E-02	1.36E-01
5.80E+02	1.33E-03	6.75E-02	1.60E-01
6.00E+02	1.73E-03	8.45E-02	1.86E-01
6.50E+02	3.05E-03	1.35E-01	2.53E-01
7.00E+02	4.93E-03	1.97E-01	3.21E-01
7.50E+02	7.31E-03	2.64E-01	3.87E-01
8.00E+02	1.01E-02	3.34E-01	4.48E-01
8.50E+02	1.34E-02	4.02E-01	5.03E-01
9.00E+02	1.68E-02	4.66E-01	5.50E-01
9.50E+02	2.02E-02	5.25E-01	5.89E-01
1.00E+03	2.36E-02	5.76E-01	6.21E-01
1.20E+03	3.31E-02	6.99E-01	6.81E-01
1.40E+03	3.40E-02	7.18E-01	6.64E-01
1.60E+03	2.90E-02	6.85E-01	6.09E-01
1.80E+03	2.37E-02	6.44E-01	5.51E-01
2.00E+03	2.01E-02	6.16E-01	5.09E-01
2.25E+03	1.72E-02	5.93E-01	4.75E-01
2.50E+03	1.51E-02	5.74E-01	4.52E-01
2.75E+03	1.39E-02	5.53E-01	4.32E-01
3.00E+03	1.33E-02	5.32E-01	4.14E-01
3.50E+03	1.31E-02	4.90E-01	3.79E-01
4.00E+03	1.23E-02	4.48E-01	3.46E-01
4.50E+03	1.08E-02	4.08E-01	3.15E-01
5.00E+03	8.99E-03	3.72E-01	2.86E-01
6.00E+03	6.20E-03	3.14E-01	2.41E-01
7.00E+03	4.49E-03	2.71E-01	2.08E-01
8.00E+03	3.41E-03	2.39E-01	1.83E-01
9.00E+03	2.69E-03	2.15E-01	1.64E-01
1.00E+04	2.18E-03	1.94E-01	1.48E-01
1.50E+04	9.65E-04	1.33E-01	1.00E-01
2.00E+04	5.40E-04	1.01E-01	7.59E-02
3.00E+04	2.39E-04	6.82E-02	5.11E-02
4.00E+04	1.34E-04	5.15E-02	3.85E-02
5.00E+04	8.56E-05	4.14E-02	3.09E-02
6.00E+04	5.94E-05	3.46E-02	2.58E-02
8.00E+04	3.34E-05	2.60E-02	1.94E-02
1.00E+05	2.13E-05	2.09E-02	1.55E-02

Ca XVII + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
6.00E+02	2.62E-05		9.32E-03
6.50E+02	6.16E-05		1.66E-02
7.00E+02	1.32E-04		2.79E-02
7.50E+02	2.55E-04	1.27E-02	4.38E-02
8.00E+02	4.49E-04	2.19E-02	6.33E-02
8.50E+02	7.38E-04	3.46E-02	8.58E-02
9.00E+02	1.14E-03	5.07E-02	1.11E-01
9.20E+02	1.33E-03	5.81E-02	1.21E-01
9.40E+02	1.55E-03	6.60E-02	1.32E-01
9.60E+02	1.78E-03	7.43E-02	1.43E-01
9.80E+02	2.04E-03	8.32E-02	1.53E-01
1.00E+03	2.31E-03	9.23E-02	1.64E-01
1.10E+03	3.97E-03	1.41E-01	2.17E-01
1.20E+03	6.00E-03	1.93E-01	2.64E-01
1.30E+03	8.20E-03	2.42E-01	3.04E-01
1.40E+03	1.03E-02	2.85E-01	3.35E-01
1.50E+03	1.21E-02	3.19E-01	3.57E-01
1.55E+03	1.28E-02	3.33E-01	3.65E-01
1.60E+03	1.34E-02	3.45E-01	3.71E-01
1.65E+03	1.39E-02	3.54E-01	3.75E-01
1.70E+03	1.42E-02	3.63E-01	3.77E-01
1.75E+03	1.44E-02	3.68E-01	3.78E-01
1.80E+03	1.44E-02	3.73E-01	3.78E-01
1.85E+03	1.44E-02	3.76E-01	3.77E-01
1.90E+03	1.42E-02	3.78E-01	3.74E-01
1.95E+03	1.40E-02	3.79E-01	3.71E-01
2.00E+03	1.37E-02	3.79E-01	3.67E-01
2.20E+03	1.21E-02	3.73E-01	3.48E-01
2.40E+03	1.07E-02	3.66E-01	3.28E-01
2.60E+03	9.64E-03	3.61E-01	3.12E-01
2.80E+03	8.86E-03	3.57E-01	3.00E-01
3.00E+03	8.25E-03	3.54E-01	2.91E-01
3.50E+03	7.21E-03	3.42E-01	2.72E-01
4.00E+03	6.71E-03	3.25E-01	2.55E-01
5.00E+03	5.87E-03	2.84E-01	2.21E-01
6.00E+03	4.50E-03	2.45E-01	1.89E-01
7.00E+03	3.28E-03	2.12E-01	1.63E-01
8.00E+03	2.45E-03	1.86E-01	1.44E-01
9.00E+03	1.90E-03	1.67E-01	1.28E-01
1.00E+04	1.52E-03	1.51E-01	1.16E-01
1.50E+04	6.52E-04	1.03E-01	7.83E-02
2.00E+04	3.60E-04	7.84E-02	5.93E-02
3.00E+04	1.57E-04	5.31E-02	3.99E-02
4.00E+04	8.74E-05	4.01E-02	3.01E-02
6.00E+04	3.85E-05	2.70E-02	2.02E-02

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Ti XIX + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
8.50E+02	1.63E-05		4.53E-03
9.00E+02	2.98E-05		6.83E-03
9.50E+02	5.26E-05		1.07E-02
1.00E+03	8.74E-05	3.75E-03	1.58E-02
1.10E+03	2.09E-04	9.24E-03	2.94E-02
1.20E+03	4.26E-04	1.84E-02	4.72E-02
1.30E+03	7.70E-04	3.16E-02	6.80E-02
1.40E+03	1.24E-03	4.80E-02	9.03E-02
1.50E+03	1.83E-03	6.69E-02	1.13E-01
1.60E+03	2.53E-03	8.70E-02	1.34E-01
1.70E+03	3.26E-03	1.07E-01	1.53E-01
1.80E+03	4.00E-03	1.26E-01	1.70E-01
1.90E+03	4.69E-03	1.44E-01	1.84E-01
2.00E+03	5.27E-03	1.59E-01	1.95E-01
2.10E+03	5.71E-03	1.71E-01	2.04E-01
2.20E+03	6.03E-03	1.82E-01	2.10E-01
2.30E+03	6.21E-03	1.90E-01	2.13E-01
2.40E+03	6.25E-03	1.96E-01	2.15E-01
2.50E+03	6.19E-03	2.01E-01	2.15E-01
2.60E+03	6.06E-03	2.05E-01	2.14E-01
2.70E+03	5.88E-03	2.07E-01	2.12E-01
2.80E+03	5.67E-03	2.09E-01	2.09E-01
2.90E+03	5.45E-03	2.10E-01	2.07E-01
3.00E+03	5.25E-03	2.11E-01	2.04E-01
3.50E+03	4.52E-03	2.15E-01	1.91E-01
4.00E+03	4.09E-03	2.16E-01	1.82E-01
4.50E+03	3.80E-03	2.13E-01	1.74E-01
5.00E+03	3.58E-03	2.06E-01	1.65E-01
5.50E+03	3.36E-03	1.97E-01	1.56E-01
6.00E+03	3.10E-03	1.86E-01	1.47E-01
6.50E+03	2.78E-03	1.75E-01	1.38E-01
7.00E+03	2.46E-03	1.65E-01	1.29E-01
7.50E+03	2.16E-03	1.55E-01	1.21E-01
8.00E+03	1.88E-03	1.46E-01	1.14E-01
8.50E+03	1.65E-03	1.38E-01	1.08E-01
9.00E+03	1.45E-03	1.31E-01	1.02E-01
9.50E+03	1.28E-03	1.24E-01	9.70E-02
1.00E+04	1.14E-03	1.19E-01	9.23E-02
1.20E+04	7.62E-04	1.00E-01	7.74E-02
1.40E+04	5.46E-04	8.66E-02	6.68E-02
1.60E+04	4.10E-04	7.65E-02	5.88E-02
1.80E+04	3.19E-04	6.85E-02	5.25E-02
2.00E+04	2.55E-04	6.21E-02	4.74E-02
2.50E+04	1.60E-04	5.02E-02	3.82E-02
3.00E+04	1.09E-04	4.22E-02	3.20E-02

Cr XXI + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.25E+03	2.22E-05		4.53E-03
1.40E+03	6.75E-05	2.64E-03	1.02E-02
1.50E+03	1.24E-04	5.01E-03	1.61E-02
1.60E+03	2.13E-04	8.63E-03	2.35E-02
1.70E+03	3.36E-04	1.34E-02	3.21E-02
1.80E+03	4.96E-04	1.94E-02	4.15E-02
1.90E+03	6.95E-04	2.64E-02	5.13E-02
2.00E+03	9.23E-04	3.41E-02	6.11E-02
2.10E+03	1.18E-03	4.24E-02	7.08E-02
2.20E+03	1.45E-03	5.08E-02	8.01E-02
2.30E+03	1.71E-03	5.91E-02	8.86E-02
2.40E+03	1.97E-03	6.72E-02	9.63E-02
2.50E+03	2.21E-03	7.47E-02	1.03E-01
2.60E+03	2.41E-03	8.17E-02	1.09E-01
2.70E+03	2.58E-03	8.80E-02	1.14E-01
2.80E+03	2.72E-03	9.36E-02	1.18E-01
2.90E+03	2.80E-03	9.85E-02	1.21E-01
3.00E+03	2.86E-03	1.03E-01	1.23E-01
3.50E+03	2.76E-03	1.17E-01	1.27E-01
4.00E+03	2.50E-03	1.26E-01	1.24E-01
4.50E+03	2.32E-03	1.32E-01	1.21E-01
5.00E+03	2.20E-03	1.35E-01	1.18E-01
5.50E+03	2.10E-03	1.34E-01	1.14E-01
6.00E+03	1.99E-03	1.32E-01	1.10E-01
6.50E+03	1.88E-03	1.28E-01	1.05E-01
7.00E+03	1.74E-03	1.23E-01	1.00E-01
7.50E+03	1.59E-03	1.18E-01	9.54E-02
8.00E+03	1.44E-03	1.13E-01	9.06E-02
8.50E+03	1.29E-03	1.07E-01	8.60E-02
9.00E+03	1.15E-03	1.02E-01	8.17E-02
9.50E+03	1.03E-03	9.76E-02	7.77E-02
1.00E+04	9.16E-04	9.32E-02	7.41E-02
1.20E+04	6.06E-04	7.89E-02	6.25E-02
1.40E+04	4.30E-04	6.86E-02	5.40E-02
1.60E+04	3.21E-04	6.08E-02	4.76E-02
1.80E+04	2.49E-04	5.46E-02	4.26E-02
2.00E+04	1.98E-04	4.96E-02	3.85E-02
3.00E+04	8.31E-05	3.40E-02	2.61E-02
4.00E+04	4.52E-05	2.59E-02	1.97E-02
5.00E+04	2.83E-05	2.09E-02	1.59E-02
6.00E+04	1.94E-05	1.75E-02	1.33E-02
7.00E+04	1.41E-05	1.51E-02	1.14E-02
8.00E+04	1.07E-05	1.32E-02	9.99E-03
9.00E+04	8.37E-06	1.18E-02	8.89E-03
1.00E+05	6.74E-06	1.06E-02	8.02E-03

TABLE V. Cross Sections for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Fe XXIII + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
1.60E+03	8.89E-06		
1.70E+03	1.62E-05		3.10E-03
1.80E+03	2.79E-05	9.46E-04	4.45E-03
1.90E+03	4.55E-05	1.68E-03	6.38E-03
2.00E+03	6.99E-05	2.68E-03	8.90E-03
2.10E+03	1.03E-04	4.05E-03	1.16E-02
2.20E+03	1.47E-04	5.84E-03	1.51E-02
2.30E+03	1.99E-04	7.95E-03	1.88E-02
2.40E+03	2.59E-04	1.04E-02	2.28E-02
2.50E+03	3.28E-04	1.31E-02	2.69E-02
2.55E+03	3.66E-04	1.45E-02	2.90E-02
2.60E+03	4.05E-04	1.61E-02	3.11E-02
2.65E+03	4.44E-04	1.76E-02	3.31E-02
2.70E+03	4.83E-04	1.92E-02	3.52E-02
2.75E+03	5.24E-04	2.08E-02	3.72E-02
2.80E+03	5.65E-04	2.24E-02	3.92E-02
2.85E+03	6.06E-04	2.40E-02	4.11E-02
2.90E+03	6.48E-04	2.57E-02	4.30E-02
2.95E+03	6.88E-04	2.73E-02	4.49E-02
3.00E+03	7.28E-04	2.90E-02	4.67E-02
3.25E+03	8.94E-04	3.67E-02	5.46E-02
3.50E+03	1.01E-03	4.37E-02	6.06E-02
3.75E+03	1.08E-03	4.98E-02	6.50E-02
4.00E+03	1.10E-03	5.50E-02	6.79E-02
4.50E+03	1.07E-03	6.36E-02	7.12E-02
5.00E+03	1.04E-03	7.02E-02	7.26E-02
5.50E+03	1.02E-03	7.49E-02	7.27E-02
6.00E+03	9.94E-04	7.75E-02	7.20E-02
6.50E+03	9.69E-04	7.85E-02	7.07E-02
7.00E+03	9.33E-04	7.81E-02	6.88E-02
7.50E+03	8.84E-04	7.68E-02	6.65E-02
8.00E+03	8.25E-04	7.48E-02	6.40E-02
9.00E+03	6.96E-04	7.00E-02	5.89E-02
1.00E+04	5.72E-04	6.47E-02	5.41E-02
1.20E+04	3.90E-04	5.60E-02	4.61E-02
1.40E+04	2.80E-04	4.93E-02	4.02E-02
1.60E+04	2.11E-04	4.41E-02	3.57E-02
1.80E+04	1.65E-04	4.00E-02	3.21E-02
2.00E+04	1.32E-04	3.65E-02	2.92E-02
3.00E+04	5.60E-05	2.55E-02	2.00E-02
4.00E+04	3.05E-05	1.96E-02	1.52E-02
5.00E+04	1.90E-05	1.59E-02	1.22E-02
6.00E+04	1.30E-05	1.33E-02	1.03E-02
8.00E+04	7.11E-06	1.01E-02	7.74E-03
1.00E+05	4.47E-06	8.16E-03	6.22E-03

Ni XXV + α			
E (eV)	Cross section (a_0^2)		
	0→1	0→2	1→2
2.10E+03	7.37E-06		1.20E-03
2.20E+03	1.15E-05		1.68E-03
2.30E+03	1.76E-05		2.33E-03
2.40E+03	2.60E-05		3.19E-03
2.50E+03	3.71E-05		4.27E-03
2.60E+03	5.12E-05		5.52E-03
2.70E+03	6.91E-05	2.45E-03	6.77E-03
2.80E+03	9.11E-05	3.31E-03	8.39E-03
2.90E+03	1.17E-04	4.30E-03	1.02E-02
3.00E+03	1.46E-04	5.42E-03	1.21E-02
3.20E+03	2.15E-04	8.06E-03	1.63E-02
3.40E+03	2.94E-04	1.11E-02	2.06E-02
3.60E+03	3.78E-04	1.44E-02	2.49E-02
3.80E+03	4.62E-04	1.79E-02	2.89E-02
4.00E+03	5.38E-04	2.13E-02	3.26E-02
4.20E+03	6.01E-04	2.46E-02	3.60E-02
4.40E+03	6.49E-04	2.77E-02	3.88E-02
4.50E+03	6.69E-04	2.92E-02	4.01E-02
4.60E+03	6.86E-04	3.06E-02	4.13E-02
4.80E+03	7.11E-04	3.34E-02	4.33E-02
5.00E+03	7.23E-04	3.59E-02	4.50E-02
5.50E+03	7.31E-04	4.16E-02	4.80E-02
6.00E+03	7.19E-04	4.60E-02	4.98E-02
6.50E+03	7.07E-04	4.95E-02	5.07E-02
7.00E+03	7.00E-04	5.22E-02	5.11E-02
7.50E+03	6.87E-04	5.37E-02	5.10E-02
8.00E+03	6.73E-04	5.46E-02	5.04E-02
8.50E+03	6.50E-04	5.47E-02	4.95E-02
9.00E+03	6.22E-04	5.42E-02	4.84E-02
9.50E+03	5.91E-04	5.35E-02	4.72E-02
1.00E+04	5.57E-04	5.24E-02	4.59E-02
1.20E+04	4.17E-04	4.73E-02	4.03E-02
1.40E+04	3.08E-04	4.22E-02	3.56E-02
1.60E+04	2.35E-04	3.82E-02	3.18E-02
1.80E+04	1.85E-04	3.48E-02	2.88E-02
2.00E+04	1.49E-04	3.20E-02	2.63E-02
2.50E+04	9.46E-05	2.67E-02	2.15E-02
3.00E+04	6.49E-05	2.28E-02	1.82E-02
4.00E+04	3.58E-05	1.77E-02	1.39E-02
5.00E+04	2.25E-05	1.44E-02	1.13E-02
6.00E+04	1.54E-05	1.22E-02	9.48E-03
7.00E+04	1.11E-05	1.05E-02	8.17E-03
8.00E+04	8.43E-06	9.29E-03	7.18E-03
9.00E+04	6.60E-06	8.32E-03	6.41E-03
1.00E+05	5.30E-06	7.52E-03	5.78E-03

TABLE VI. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

C III + p			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
5.00E+03	1.42E-13	5.83E-11	7.30E-11
7.50E+03	1.33E-12	2.53E-10	2.65E-10
1.00E+04	5.37E-12	5.81E-10	5.51E-10
2.00E+04	8.58E-11	2.46E-09	2.03E-09
3.00E+04	2.86E-10	4.25E-09	3.41E-09
5.00E+04	8.56E-10	6.67E-09	5.39E-09
7.00E+04	1.42E-09	8.09E-09	6.65E-09
8.00E+04	1.67E-09	8.60E-09	7.12E-09
1.00E+05	2.09E-09	9.36E-09	7.86E-09
1.50E+05	2.82E-09	1.05E-08	9.03E-09
2.00E+05	3.24E-09	1.12E-08	9.75E-09
3.00E+05	3.64E-09	1.21E-08	1.06E-08
5.00E+05	3.78E-09	1.30E-08	1.13E-08
7.50E+05	3.60E-09	1.35E-08	1.17E-08
1.00E+06	3.34E-09	1.37E-08	1.17E-08
2.50E+06	2.13E-09	1.30E-08	1.07E-08
5.00E+06	1.27E-09	1.14E-08	9.09E-09
7.50E+06	8.86E-10	1.02E-08	8.04E-09
1.00E+07	6.74E-10	9.29E-09	7.30E-09
3.00E+07	2.11E-10	6.10E-09	4.76E-09

N IV + p			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.00E+04	3.18E-14	1.54E-11	2.28E-11
2.00E+04	1.56E-12	2.19E-10	2.26E-10
4.00E+04	3.03E-11	1.15E-09	9.83E-10
6.00E+04	1.14E-10	2.17E-09	1.77E-09
7.00E+04	1.73E-10	2.62E-09	2.12E-09
8.00E+04	2.41E-10	3.02E-09	2.44E-09
9.00E+04	3.14E-10	3.38E-09	2.72E-09
1.00E+05	3.91E-10	3.70E-09	2.98E-09
1.50E+05	7.71E-10	4.82E-09	3.95E-09
2.00E+05	1.10E-09	5.50E-09	4.58E-09
3.00E+05	1.56E-09	6.29E-09	5.35E-09
5.00E+05	1.99E-09	7.05E-09	6.11E-09
7.50E+05	2.11E-09	7.49E-09	6.51E-09
1.00E+06	2.07E-09	7.71E-09	6.66E-09
1.50E+06	1.85E-09	7.84E-09	6.68E-09
2.00E+06	1.63E-09	7.79E-09	6.55E-09
3.00E+06	1.28E-09	7.52E-09	6.20E-09
5.00E+06	8.71E-10	6.88E-09	5.54E-09
7.00E+06	6.50E-10	6.35E-09	5.04E-09
1.00E+07	4.64E-10	5.72E-09	4.48E-09

O V + p			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
2.00E+04	2.57E-14	1.08E-11	1.62E-11
4.00E+04	1.22E-12	1.54E-10	1.60E-10
6.00E+04	7.47E-12	4.46E-10	4.08E-10
8.00E+04	2.24E-11	8.01E-10	6.89E-10
1.00E+05	4.72E-11	1.16E-09	9.67E-10
1.50E+05	1.45E-10	1.94E-09	1.57E-09
2.00E+05	2.71E-10	2.51E-09	2.03E-09
3.00E+05	5.28E-10	3.23E-09	2.66E-09
5.00E+05	9.03E-10	3.92E-09	3.32E-09
7.50E+05	1.13E-09	4.31E-09	3.70E-09
1.00E+06	1.20E-09	4.51E-09	3.89E-09
1.25E+06	1.20E-09	4.63E-09	3.98E-09
2.50E+06	9.72E-10	4.69E-09	3.94E-09
5.00E+06	6.13E-10	4.32E-09	3.52E-09
7.50E+06	4.32E-10	3.96E-09	3.17E-09
1.00E+07	3.29E-10	3.67E-09	2.90E-09
1.50E+07	2.17E-10	3.24E-09	2.53E-09
2.00E+07	1.59E-10	2.93E-09	2.27E-09
3.00E+07	1.00E-10	2.51E-09	1.93E-09
4.00E+07	7.16E-11	2.24E-09	1.71E-09

Ne VII + p			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
6.00E+04	2.05E-14	6.93E-12	1.06E-11
8.00E+04	1.10E-13	2.34E-11	2.98E-11
1.00E+05	3.51E-13	5.18E-11	5.87E-11
2.00E+05	6.68E-12	3.13E-10	2.81E-10
4.00E+05	5.07E-11	8.89E-10	7.25E-10
5.00E+05	8.10E-11	1.10E-09	8.91E-10
6.00E+05	1.12E-10	1.27E-09	1.02E-09
7.00E+05	1.40E-10	1.41E-09	1.13E-09
8.00E+05	1.66E-10	1.51E-09	1.22E-09
9.00E+05	1.89E-10	1.60E-09	1.29E-09
1.00E+06	2.09E-10	1.67E-09	1.35E-09
1.50E+06	2.69E-10	1.86E-09	1.51E-09
2.00E+06	2.89E-10	1.93E-09	1.57E-09
3.00E+06	2.81E-10	1.94E-09	1.58E-09
5.00E+06	2.29E-10	1.84E-09	1.49E-09
6.00E+06	2.05E-10	1.79E-09	1.44E-09
1.00E+07	1.38E-10	1.59E-09	1.26E-09
1.50E+07	9.48E-11	1.41E-09	1.11E-09
2.00E+07	7.05E-11	1.28E-09	9.97E-10
3.00E+07	4.51E-11	1.11E-09	8.53E-10

TABLE VI. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Mg IX + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	2.84E-15	1.11E-12	2.13E-12
2.00E+05	1.77E-13	2.51E-11	3.01E-11
3.00E+05	1.13E-12	8.63E-11	8.71E-11
4.00E+05	3.39E-12	1.69E-10	1.57E-10
5.00E+05	7.04E-12	2.59E-10	2.29E-10
6.00E+05	1.19E-11	3.48E-10	2.97E-10
7.00E+05	1.75E-11	4.31E-10	3.61E-10
8.00E+05	2.37E-11	5.06E-10	4.18E-10
9.00E+05	3.00E-11	5.73E-10	4.69E-10
1.00E+06	3.64E-11	6.33E-10	5.15E-10
1.50E+06	6.42E-11	8.44E-10	6.76E-10
2.00E+06	8.27E-11	9.57E-10	7.64E-10
3.00E+06	9.93E-11	1.05E-09	8.37E-10
5.00E+06	9.87E-11	1.06E-09	8.46E-10
7.50E+06	8.48E-11	1.01E-09	8.02E-10
1.00E+07	7.16E-11	9.54E-10	7.53E-10
1.25E+07	6.10E-11	9.02E-10	7.09E-10
1.50E+07	5.26E-11	8.57E-10	6.71E-10
2.00E+07	4.06E-11	7.83E-10	6.11E-10
3.00E+07	2.70E-11	6.80E-10	5.27E-10

Al X + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	1.99E-16	1.13E-13	2.97E-13
2.00E+05	2.69E-14	5.69E-12	8.29E-12
3.00E+05	2.32E-13	2.72E-11	3.15E-11
4.00E+05	8.36E-13	6.43E-11	6.62E-11
5.00E+05	1.98E-12	1.12E-10	1.07E-10
6.00E+05	3.70E-12	1.64E-10	1.50E-10
7.00E+05	5.92E-12	2.17E-10	1.92E-10
8.00E+05	8.56E-12	2.69E-10	2.32E-10
1.00E+06	1.46E-11	3.64E-10	3.06E-10
1.50E+06	3.04E-11	5.45E-10	4.43E-10
2.00E+06	4.32E-11	6.59E-10	5.29E-10
3.00E+06	5.81E-11	7.72E-10	6.14E-10
4.00E+06	6.36E-11	8.13E-10	6.45E-10
5.00E+06	6.44E-11	8.23E-10	6.53E-10
6.00E+06	6.29E-11	8.19E-10	6.49E-10
8.00E+06	5.76E-11	7.95E-10	6.28E-10
1.00E+07	5.17E-11	7.65E-10	6.03E-10
3.00E+07	2.13E-11	5.55E-10	4.31E-10
5.00E+07	1.23E-11	4.57E-10	3.52E-10
8.00E+07	7.15E-12	3.77E-10	2.89E-10

Si XI + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+05	3.85E-15	1.16E-12	2.06E-12
4.00E+05	1.98E-13	2.22E-11	2.60E-11
5.00E+05	5.36E-13	4.41E-11	4.69E-11
7.50E+05	2.42E-12	1.18E-10	1.10E-10
1.00E+06	5.65E-12	1.99E-10	1.75E-10
1.30E+06	1.05E-11	2.88E-10	2.43E-10
1.60E+06	1.56E-11	3.62E-10	3.00E-10
2.00E+06	2.20E-11	4.40E-10	3.59E-10
3.00E+06	3.33E-11	5.57E-10	4.46E-10
4.00E+06	3.91E-11	6.11E-10	4.86E-10
6.00E+06	4.19E-11	6.41E-10	5.07E-10
8.00E+06	4.01E-11	6.35E-10	5.01E-10
1.00E+07	3.72E-11	6.17E-10	4.86E-10
1.50E+07	2.97E-11	5.68E-10	4.45E-10
2.00E+07	2.41E-11	5.24E-10	4.09E-10
3.00E+07	1.69E-11	4.60E-10	3.57E-10
4.00E+07	1.27E-11	4.14E-10	3.20E-10
6.00E+07	8.17E-12	3.54E-10	2.72E-10
8.00E+07	5.87E-12	3.15E-10	2.42E-10
1.00E+08	4.50E-12	2.87E-10	2.20E-10

S XIII + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.50E+05	3.76E-16	1.29E-13	3.16E-13
5.00E+05	3.53E-14	5.27E-12	7.33E-12
7.50E+05	2.55E-13	2.27E-11	2.56E-11
1.00E+06	7.93E-13	5.01E-11	5.08E-11
1.25E+06	1.66E-12	8.27E-11	7.86E-11
1.50E+06	2.80E-12	1.16E-10	1.06E-10
1.75E+06	4.09E-12	1.49E-10	1.32E-10
2.00E+06	5.47E-12	1.80E-10	1.56E-10
2.50E+06	8.22E-12	2.33E-10	1.96E-10
3.00E+06	1.07E-11	2.75E-10	2.28E-10
4.00E+06	1.46E-11	3.34E-10	2.71E-10
5.00E+06	1.71E-11	3.69E-10	2.97E-10
7.50E+06	1.95E-11	4.05E-10	3.22E-10
1.00E+07	1.94E-11	4.09E-10	3.23E-10
1.50E+07	1.71E-11	3.92E-10	3.08E-10
2.00E+07	1.46E-11	3.69E-10	2.89E-10
3.00E+07	1.08E-11	3.29E-10	2.56E-10
5.00E+07	6.78E-12	2.76E-10	2.13E-10
7.50E+07	4.42E-12	2.36E-10	1.82E-10
1.00E+08	3.19E-12	2.09E-10	1.61E-10

TABLE VI. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Ar XV + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
7.00E+05	1.55E-14	2.40E-12	3.57E-12
8.00E+05	3.21E-14	4.26E-12	5.85E-12
1.00E+06	9.68E-14	9.91E-12	1.21E-11
1.50E+06	4.99E-13	3.32E-11	3.44E-11
2.00E+06	1.23E-12	6.30E-11	6.02E-11
2.50E+06	2.17E-12	9.34E-11	8.51E-11
3.00E+06	3.19E-12	1.21E-10	1.07E-10
5.00E+06	6.69E-12	2.01E-10	1.68E-10
7.00E+06	8.70E-12	2.42E-10	1.97E-10
9.00E+06	9.63E-12	2.61E-10	2.10E-10
1.00E+07	9.83E-12	2.66E-10	2.14E-10
3.00E+07	7.01E-12	2.41E-10	1.89E-10
5.00E+07	4.67E-12	2.06E-10	1.61E-10
7.00E+07	3.39E-12	1.83E-10	1.42E-10
1.00E+08	2.32E-12	1.59E-10	1.23E-10
1.25E+08	1.81E-12	1.45E-10	1.12E-10
1.50E+08	1.47E-12	1.34E-10	1.03E-10
1.75E+08	1.22E-12	1.26E-10	9.66E-11
2.00E+08	1.04E-12	1.19E-10	9.11E-11
2.50E+08	7.91E-13	1.08E-10	8.24E-11

Ca XVII + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	1.07E-14	1.60E-12	2.37E-12
2.00E+06	2.65E-13	1.94E-11	2.09E-11
2.50E+06	5.55E-13	3.37E-11	3.39E-11
3.00E+06	9.24E-13	4.90E-11	4.71E-11
4.00E+06	1.77E-12	7.88E-11	7.15E-11
5.00E+06	2.61E-12	1.04E-10	9.16E-11
6.00E+06	3.34E-12	1.25E-10	1.07E-10
7.00E+06	3.95E-12	1.41E-10	1.20E-10
8.00E+06	4.43E-12	1.54E-10	1.29E-10
1.00E+07	5.09E-12	1.72E-10	1.41E-10
1.50E+07	5.62E-12	1.89E-10	1.53E-10
2.00E+07	5.47E-12	1.91E-10	1.53E-10
2.50E+07	5.10E-12	1.88E-10	1.49E-10
3.00E+07	4.70E-12	1.83E-10	1.45E-10
4.00E+07	3.95E-12	1.71E-10	1.35E-10
6.00E+07	2.89E-12	1.52E-10	1.19E-10
8.00E+07	2.22E-12	1.37E-10	1.07E-10
1.00E+08	1.77E-12	1.26E-10	9.81E-11
2.00E+08	8.23E-13	9.52E-11	7.34E-11
3.00E+08	5.06E-13	7.98E-11	6.14E-11

Ti XIX + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	9.82E-16	2.02E-13	3.67E-13
2.00E+06	5.05E-14	5.05E-12	6.23E-12
3.00E+06	2.44E-13	1.74E-11	1.84E-11
4.00E+06	5.67E-13	3.32E-11	3.27E-11
5.00E+06	9.51E-13	4.94E-11	4.63E-11
6.00E+06	1.34E-12	6.42E-11	5.84E-11
7.00E+06	1.70E-12	7.71E-11	6.86E-11
8.00E+06	2.03E-12	8.82E-11	7.71E-11
1.00E+07	2.54E-12	1.05E-10	9.00E-11
1.50E+07	3.20E-12	1.28E-10	1.06E-10
2.00E+07	3.35E-12	1.37E-10	1.11E-10
2.50E+07	3.28E-12	1.39E-10	1.12E-10
3.00E+07	3.13E-12	1.38E-10	1.11E-10
5.00E+07	2.42E-12	1.26E-10	1.00E-10
7.50E+07	1.78E-12	1.13E-10	8.86E-11
1.00E+08	1.38E-12	1.02E-10	7.99E-11
1.50E+08	9.13E-13	8.77E-11	6.81E-11
2.00E+08	6.65E-13	7.82E-11	6.04E-11
3.00E+08	4.15E-13	6.62E-11	5.07E-11
4.00E+08	2.93E-13	5.88E-11	4.46E-11

Cr XXI + p			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	7.72E-17	1.79E-14	4.43E-14
2.00E+06	8.65E-15	1.10E-12	1.58E-12
3.00E+06	5.93E-14	5.39E-12	6.40E-12
5.00E+06	3.27E-13	2.14E-11	2.16E-11
6.00E+06	5.12E-13	3.05E-11	2.95E-11
7.00E+06	7.03E-13	3.94E-11	3.70E-11
8.00E+06	8.91E-13	4.76E-11	4.37E-11
1.00E+07	1.23E-12	6.16E-11	5.48E-11
1.50E+07	1.78E-12	8.43E-11	7.19E-11
2.00E+07	2.02E-12	9.56E-11	7.98E-11
3.00E+07	2.08E-12	1.03E-10	8.40E-11
5.00E+07	1.75E-12	9.98E-11	7.99E-11
6.00E+07	1.58E-12	9.64E-11	7.68E-11
8.00E+07	1.29E-12	8.97E-11	7.10E-11
1.00E+08	1.08E-12	8.38E-11	6.60E-11
1.50E+08	7.36E-13	7.27E-11	5.69E-11
2.00E+08	5.46E-13	6.51E-11	5.07E-11
3.00E+08	3.47E-13	5.51E-11	4.28E-11
4.00E+08	2.47E-13	4.87E-11	3.77E-11
5.00E+08	1.89E-13	4.41E-11	3.41E-11

TABLE VI. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Proton Impact

See page 183 for Explanation of Tables

Fe XXIII + p			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
2.00E+06	1.21E-15	1.97E-13	3.31E-13
4.00E+06	4.38E-14	4.16E-12	4.91E-12
5.00E+06	9.85E-14	8.16E-12	8.92E-12
6.00E+06	1.72E-13	1.29E-11	1.34E-11
7.00E+06	2.58E-13	1.81E-11	1.81E-11
8.00E+06	3.51E-13	2.32E-11	2.26E-11
1.00E+07	5.38E-13	3.30E-11	3.08E-11
1.50E+07	9.22E-13	5.19E-11	4.58E-11
2.00E+07	1.15E-12	6.34E-11	5.44E-11
2.50E+07	1.28E-12	7.02E-11	5.92E-11
3.00E+07	1.33E-12	7.41E-11	6.17E-11
4.00E+07	1.32E-12	7.71E-11	6.32E-11
5.00E+07	1.25E-12	7.71E-11	6.26E-11
6.00E+07	1.16E-12	7.58E-11	6.11E-11
8.00E+07	9.87E-13	7.21E-11	5.76E-11
1.00E+08	8.44E-13	6.82E-11	5.42E-11
1.50E+08	6.00E-13	6.02E-11	4.74E-11
2.00E+08	4.55E-13	5.43E-11	4.26E-11
3.00E+08	2.96E-13	4.63E-11	3.62E-11
4.00E+08	2.14E-13	4.11E-11	3.22E-11

Ni XXV + p			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
2.50E+06	8.36E-16	1.30E-13	2.11E-13
4.00E+06	1.19E-14	1.31E-12	1.66E-12
5.00E+06	3.15E-14	3.01E-12	3.51E-12
7.50E+06	1.24E-13	9.68E-12	1.00E-11
1.00E+07	2.53E-13	1.77E-11	1.72E-11
1.50E+07	5.06E-13	3.22E-11	2.93E-11
2.00E+07	6.92E-13	4.27E-11	3.75E-11
3.00E+07	8.76E-13	5.45E-11	4.62E-11
5.00E+07	9.02E-13	6.11E-11	5.02E-11
7.50E+07	7.84E-13	6.04E-11	4.87E-11
1.00E+08	6.64E-13	5.75E-11	4.60E-11
1.25E+08	5.66E-13	5.45E-11	4.33E-11
1.50E+08	4.89E-13	5.18E-11	4.09E-11
2.50E+08	3.03E-13	4.35E-11	3.41E-11
5.00E+08	1.42E-13	3.30E-11	2.54E-11
7.50E+08	8.76E-14	2.77E-11	2.07E-11
1.00E+09	6.14E-14	2.43E-11	1.77E-11
1.25E+09	4.64E-14	2.20E-11	1.55E-11
2.50E+09	1.90E-14	1.59E-11	9.58E-12
4.00E+09	1.02E-14	1.27E-11	6.59E-12

TABLE VII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

C III + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+03	5.58E-14	1.40E-11	2.27E-11
6.00E+03	7.43E-13	9.54E-11	1.21E-10
8.00E+03	3.61E-12	2.82E-10	3.10E-10
1.00E+04	1.08E-11	5.71E-10	5.73E-10
3.00E+04	4.73E-10	4.65E-09	3.85E-09
5.00E+04	1.23E-09	7.21E-09	5.98E-09
7.00E+04	1.89E-09	8.67E-09	7.30E-09
8.00E+04	2.17E-09	9.18E-09	7.78E-09
1.00E+05	2.62E-09	9.95E-09	8.53E-09
1.50E+05	3.37E-09	1.11E-08	9.69E-09
2.00E+05	3.79E-09	1.17E-08	1.04E-08
3.00E+05	4.21E-09	1.25E-08	1.11E-08
5.00E+05	4.41E-09	1.33E-08	1.19E-08
7.50E+05	4.33E-09	1.39E-08	1.23E-08
1.00E+06	4.14E-09	1.42E-08	1.24E-08
2.50E+06	3.03E-09	1.44E-08	1.21E-08
5.00E+06	2.01E-09	1.34E-08	1.08E-08
7.50E+06	1.49E-09	1.24E-08	9.76E-09
1.00E+07	1.17E-09	1.16E-08	8.94E-09
3.00E+07	4.11E-10	8.49E-09	5.81E-09

N IV + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+04	5.01E-14	1.00E-11	1.66E-11
2.00E+04	3.07E-12	2.00E-10	2.21E-10
4.00E+04	5.83E-11	1.22E-09	1.09E-09
6.00E+04	1.99E-10	2.35E-09	1.99E-09
7.00E+04	2.91E-10	2.85E-09	2.38E-09
8.00E+04	3.89E-10	3.28E-09	2.73E-09
9.00E+04	4.91E-10	3.66E-09	3.04E-09
1.00E+05	5.93E-10	4.00E-09	3.32E-09
1.50E+05	1.06E-09	5.18E-09	4.35E-09
2.00E+05	1.42E-09	5.88E-09	5.00E-09
3.00E+05	1.88E-09	6.68E-09	5.79E-09
5.00E+05	2.30E-09	7.48E-09	6.57E-09
7.50E+05	2.44E-09	8.00E-09	7.03E-09
1.00E+06	2.43E-09	8.30E-09	7.26E-09
1.50E+06	2.29E-09	8.59E-09	7.43E-09
2.00E+06	2.10E-09	8.68E-09	7.42E-09
3.00E+06	1.77E-09	8.61E-09	7.22E-09
5.00E+06	1.31E-09	8.17E-09	6.70E-09
7.00E+06	1.02E-09	7.70E-09	6.23E-09
1.00E+07	7.68E-10	7.10E-09	5.66E-09

O V + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+04	4.02E-14	6.84E-12	1.16E-11
4.00E+04	2.40E-12	1.39E-10	1.55E-10
6.00E+04	1.49E-11	4.49E-10	4.32E-10
8.00E+04	4.33E-11	8.41E-10	7.56E-10
1.00E+05	8.73E-11	1.24E-09	1.07E-09
1.50E+05	2.41E-10	2.09E-09	1.75E-09
2.00E+05	4.13E-10	2.71E-09	2.26E-09
3.00E+05	7.21E-10	3.49E-09	2.94E-09
5.00E+05	1.12E-09	4.25E-09	3.66E-09
7.50E+05	1.36E-09	4.71E-09	4.10E-09
1.00E+06	1.46E-09	4.97E-09	4.34E-09
1.25E+06	1.48E-09	5.13E-09	4.48E-09
2.50E+06	1.30E-09	5.38E-09	4.60E-09
5.00E+06	9.07E-10	5.18E-09	4.29E-09
7.50E+06	6.77E-10	4.86E-09	3.95E-09
1.00E+07	5.34E-10	4.58E-09	3.68E-09
1.50E+07	3.70E-10	4.12E-09	3.26E-09
2.00E+07	2.79E-10	3.77E-09	2.96E-09
3.00E+07	1.84E-10	3.29E-09	2.55E-09
4.00E+07	1.34E-10	2.96E-09	2.28E-09

Ne VII + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
8.00E+04	1.95E-13	1.77E-11	2.50E-11
1.00E+05	6.66E-13	4.35E-11	5.38E-11
2.00E+05	1.36E-11	3.20E-10	3.02E-10
4.00E+05	9.67E-11	9.58E-10	8.15E-10
5.00E+05	1.50E-10	1.19E-09	1.00E-09
6.00E+05	2.03E-10	1.37E-09	1.15E-09
7.00E+05	2.53E-10	1.51E-09	1.27E-09
8.00E+05	2.96E-10	1.63E-09	1.37E-09
9.00E+05	3.35E-10	1.72E-09	1.45E-09
1.00E+06	3.68E-10	1.79E-09	1.51E-09
1.50E+06	4.70E-10	2.01E-09	1.72E-09
2.00E+06	5.05E-10	2.11E-09	1.81E-09
3.00E+06	4.97E-10	2.18E-09	1.86E-09
5.00E+06	4.14E-10	2.15E-09	1.81E-09
6.00E+06	3.75E-10	2.12E-09	1.77E-09
8.00E+06	3.09E-10	2.04E-09	1.68E-09
1.00E+07	2.61E-10	1.96E-09	1.60E-09
1.50E+07	1.83E-10	1.78E-09	1.43E-09
2.00E+07	1.38E-10	1.64E-09	1.31E-09
3.00E+07	9.04E-11	1.44E-09	1.13E-09

TABLE VII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Mg IX + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	3.73E-15	5.55E-13	1.25E-12
2.00E+05	3.22E-13	1.97E-11	2.60E-11
3.00E+05	2.24E-12	7.91E-11	8.57E-11
4.00E+05	6.89E-12	1.67E-10	1.64E-10
5.00E+05	1.44E-11	2.66E-10	2.47E-10
6.00E+05	2.43E-11	3.65E-10	3.27E-10
7.00E+05	3.58E-11	4.58E-10	4.02E-10
8.00E+05	4.83E-11	5.42E-10	4.69E-10
9.00E+05	6.12E-11	6.19E-10	5.29E-10
1.00E+06	7.40E-11	6.86E-10	5.83E-10
1.25E+06	1.04E-10	8.24E-10	6.93E-10
1.50E+06	1.30E-10	9.26E-10	7.75E-10
2.00E+06	1.68E-10	1.06E-09	8.85E-10
3.00E+06	2.02E-10	1.18E-09	9.88E-10
5.00E+06	2.04E-10	1.23E-09	1.03E-09
7.50E+06	1.77E-10	1.21E-09	9.96E-10
1.00E+07	1.51E-10	1.16E-09	9.51E-10
1.50E+07	1.13E-10	1.07E-09	8.66E-10
2.00E+07	8.79E-11	9.97E-10	7.98E-10
3.00E+07	5.93E-11	8.84E-10	6.99E-10

Al X + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	2.18E-16	4.37E-14	1.34E-13
2.00E+05	4.30E-14	3.72E-12	6.06E-12
3.00E+05	4.28E-13	2.19E-11	2.76E-11
4.00E+05	1.64E-12	5.77E-11	6.37E-11
5.00E+05	4.00E-12	1.07E-10	1.09E-10
6.00E+05	7.57E-12	1.63E-10	1.57E-10
7.00E+05	1.22E-11	2.21E-10	2.06E-10
8.00E+05	1.77E-11	2.79E-10	2.53E-10
1.00E+06	3.04E-11	3.88E-10	3.40E-10
1.50E+06	6.37E-11	5.97E-10	5.05E-10
2.00E+06	9.09E-11	7.32E-10	6.12E-10
3.00E+06	1.23E-10	8.74E-10	7.26E-10
4.00E+06	1.36E-10	9.35E-10	7.74E-10
5.00E+06	1.38E-10	9.59E-10	7.92E-10
6.00E+06	1.36E-10	9.66E-10	7.95E-10
8.00E+06	1.26E-10	9.55E-10	7.83E-10
1.00E+07	1.14E-10	9.32E-10	7.60E-10
3.00E+07	4.83E-11	7.21E-10	5.71E-10
5.00E+07	2.84E-11	6.09E-10	4.78E-10
8.00E+07	1.66E-11	5.16E-10	4.02E-10

Si XI + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+05	7.45E-14	5.16E-12	7.90E-12
5.00E+05	1.03E-12	3.80E-11	4.37E-11
7.50E+05	4.93E-12	1.14E-10	1.13E-10
1.00E+06	1.18E-11	2.03E-10	1.88E-10
1.30E+06	2.22E-11	3.05E-10	2.70E-10
1.60E+06	3.33E-11	3.92E-10	3.39E-10
2.00E+06	4.71E-11	4.86E-10	4.12E-10
3.00E+06	7.23E-11	6.31E-10	5.25E-10
4.00E+06	8.55E-11	7.04E-10	5.82E-10
5.00E+06	9.13E-11	7.40E-10	6.10E-10
6.00E+06	9.28E-11	7.57E-10	6.22E-10
8.00E+06	8.96E-11	7.63E-10	6.24E-10
1.00E+07	8.35E-11	7.53E-10	6.13E-10
1.50E+07	6.76E-11	7.09E-10	5.73E-10
2.00E+07	5.52E-11	6.66E-10	5.34E-10
3.00E+07	3.91E-11	5.96E-10	4.73E-10
4.00E+07	2.96E-11	5.44E-10	4.28E-10
6.00E+07	1.92E-11	4.72E-10	3.68E-10
8.00E+07	1.39E-11	4.23E-10	3.28E-10
1.00E+08	1.07E-11	3.87E-10	2.99E-10

S XIII + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
5.00E+05	5.64E-14	3.47E-12	5.41E-12
7.50E+05	4.66E-13	1.83E-11	2.25E-11
1.00E+06	1.55E-12	4.49E-11	4.88E-11
1.25E+06	3.36E-12	7.87E-11	7.95E-11
1.50E+06	5.78E-12	1.16E-10	1.11E-10
1.75E+06	8.59E-12	1.52E-10	1.42E-10
2.00E+06	1.16E-11	1.88E-10	1.71E-10
2.50E+06	1.77E-11	2.51E-10	2.21E-10
3.00E+06	2.34E-11	3.03E-10	2.61E-10
4.00E+06	3.24E-11	3.78E-10	3.19E-10
5.00E+06	3.84E-11	4.26E-10	3.56E-10
7.50E+06	4.46E-11	4.82E-10	3.97E-10
1.00E+07	4.47E-11	4.97E-10	4.06E-10
1.50E+07	3.99E-11	4.88E-10	3.95E-10
2.00E+07	3.44E-11	4.67E-10	3.76E-10
3.00E+07	2.59E-11	4.25E-10	3.39E-10
5.00E+07	1.64E-11	3.64E-10	2.87E-10
7.50E+07	1.08E-11	3.15E-10	2.47E-10
1.00E+08	7.83E-12	2.82E-10	2.20E-10
2.00E+08	3.43E-12	2.12E-10	1.64E-10

TABLE VII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Ar XV + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
7.00E+05	3.18E-14	2.09E-12	3.44E-12
8.00E+05	7.03E-14	3.98E-12	6.01E-12
1.00E+06	2.30E-13	1.03E-11	1.37E-11
1.50E+06	1.33E-12	4.02E-11	4.47E-11
2.00E+06	3.45E-12	8.30E-11	8.42E-11
2.50E+06	6.28E-12	1.30E-10	1.25E-10
3.00E+06	9.42E-12	1.75E-10	1.62E-10
5.00E+06	2.07E-11	3.13E-10	2.72E-10
7.00E+06	2.75E-11	3.91E-10	3.30E-10
9.00E+06	3.09E-11	4.32E-10	3.60E-10
1.00E+07	3.18E-11	4.45E-10	3.69E-10
3.00E+07	2.37E-11	4.33E-10	3.48E-10
5.00E+07	1.60E-11	3.79E-10	3.01E-10
7.00E+07	1.17E-11	3.40E-10	2.68E-10
1.00E+08	8.09E-12	2.98E-10	2.34E-10
1.25E+08	6.33E-12	2.74E-10	2.14E-10
1.50E+08	5.14E-12	2.55E-10	1.98E-10
1.75E+08	4.29E-12	2.39E-10	1.86E-10
2.00E+08	3.66E-12	2.26E-10	1.75E-10
2.50E+08	2.80E-12	2.06E-10	1.59E-10

Ca XVII + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	1.50E-14	9.24E-13	1.52E-12
2.00E+06	4.79E-13	1.58E-11	1.84E-11
2.50E+06	1.05E-12	2.97E-11	3.19E-11
3.00E+06	1.82E-12	4.56E-11	4.65E-11
4.00E+06	3.64E-12	7.86E-11	7.52E-11
5.00E+06	5.51E-12	1.09E-10	1.00E-10
6.00E+06	7.21E-12	1.35E-10	1.21E-10
7.00E+06	8.64E-12	1.56E-10	1.37E-10
8.00E+06	9.82E-12	1.73E-10	1.51E-10
1.00E+07	1.15E-11	1.98E-10	1.69E-10
1.50E+07	1.30E-11	2.28E-10	1.90E-10
2.00E+07	1.29E-11	2.36E-10	1.94E-10
2.50E+07	1.21E-11	2.36E-10	1.93E-10
3.00E+07	1.13E-11	2.32E-10	1.88E-10
4.00E+07	9.59E-12	2.21E-10	1.78E-10
6.00E+07	7.10E-12	2.00E-10	1.59E-10
8.00E+07	5.50E-12	1.82E-10	1.45E-10
1.00E+08	4.42E-12	1.69E-10	1.33E-10
2.00E+08	2.08E-12	1.30E-10	1.01E-10
3.00E+08	1.29E-12	1.09E-10	8.49E-11

Ti XIX + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+06	1.69E-14	9.16E-13	1.46E-12
2.50E+06	2.16E-13	7.89E-12	9.67E-12
3.00E+06	4.35E-13	1.41E-11	1.61E-11
4.00E+06	1.08E-12	2.98E-11	3.11E-11
5.00E+06	1.88E-12	4.71E-11	4.66E-11
6.00E+06	2.73E-12	6.39E-11	6.11E-11
7.00E+06	3.55E-12	7.94E-11	7.40E-11
8.00E+06	4.29E-12	9.31E-11	8.52E-11
1.00E+07	5.51E-12	1.16E-10	1.03E-10
1.25E+07	6.56E-12	1.35E-10	1.18E-10
1.50E+07	7.20E-12	1.49E-10	1.28E-10
2.00E+07	7.72E-12	1.64E-10	1.38E-10
2.50E+07	7.68E-12	1.70E-10	1.41E-10
3.00E+07	7.40E-12	1.71E-10	1.41E-10
5.00E+07	5.87E-12	1.63E-10	1.32E-10
7.50E+07	4.39E-12	1.48E-10	1.19E-10
1.00E+08	3.42E-12	1.36E-10	1.08E-10
1.50E+08	2.30E-12	1.18E-10	9.32E-11
2.00E+08	1.69E-12	1.06E-10	8.31E-11
3.00E+08	1.06E-12	8.97E-11	7.01E-11

Cr XXI + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	6.41E-17	5.28E-15	1.56E-14
2.00E+06	1.15E-14	5.98E-13	9.63E-13
3.00E+06	9.31E-14	3.72E-12	4.81E-12
5.00E+06	5.94E-13	1.82E-11	1.96E-11
6.00E+06	9.64E-13	2.75E-11	2.83E-11
7.00E+06	1.36E-12	3.70E-11	3.68E-11
8.00E+06	1.77E-12	4.62E-11	4.48E-11
1.00E+07	2.52E-12	6.30E-11	5.89E-11
1.50E+07	3.84E-12	9.29E-11	8.26E-11
2.00E+07	4.50E-12	1.10E-10	9.52E-11
3.00E+07	4.78E-12	1.24E-10	1.05E-10
5.00E+07	4.17E-12	1.26E-10	1.04E-10
6.00E+07	3.79E-12	1.23E-10	1.01E-10
8.00E+07	3.14E-12	1.17E-10	9.44E-11
1.00E+08	2.64E-12	1.10E-10	8.86E-11
1.50E+08	1.84E-12	9.72E-11	7.74E-11
2.00E+08	1.37E-12	8.77E-11	6.94E-11
3.00E+08	8.83E-13	7.50E-11	5.89E-11
4.00E+08	6.33E-13	6.65E-11	5.20E-11
5.00E+08	4.85E-13	6.03E-11	4.71E-11

TABLE VII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Deuteron Impact

See page 183 for Explanation of Tables

Fe XXIII + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+06	1.34E-15	8.32E-14	1.61E-13
4.00E+06	6.62E-14	2.78E-12	3.57E-12
5.00E+06	1.60E-13	6.04E-12	7.14E-12
6.00E+06	2.94E-13	1.03E-11	1.15E-11
7.00E+06	4.59E-13	1.52E-11	1.62E-11
8.00E+06	6.43E-13	2.05E-11	2.11E-11
1.00E+07	1.03E-12	3.10E-11	3.06E-11
1.50E+07	1.88E-12	5.36E-11	4.96E-11
2.00E+07	2.45E-12	6.91E-11	6.19E-11
2.50E+07	2.78E-12	7.93E-11	6.95E-11
3.00E+07	2.94E-12	8.58E-11	7.41E-11
4.00E+07	3.00E-12	9.24E-11	7.83E-11
5.00E+07	2.88E-12	9.45E-11	7.91E-11
6.00E+07	2.71E-12	9.44E-11	7.84E-11
8.00E+07	2.35E-12	9.18E-11	7.53E-11
1.00E+08	2.04E-12	8.82E-11	7.17E-11
1.50E+08	1.48E-12	7.94E-11	6.38E-11
2.00E+08	1.13E-12	7.25E-11	5.78E-11
3.00E+08	7.46E-13	6.26E-11	4.95E-11
4.00E+08	5.42E-13	5.60E-11	4.40E-11

Ni XXV + d			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+06	1.56E-14	7.32E-13	1.03E-12
5.00E+06	4.53E-14	1.91E-12	2.43E-12
7.50E+06	2.03E-13	7.41E-12	8.22E-12
1.00E+07	4.45E-13	1.50E-11	1.55E-11
1.50E+07	9.66E-13	3.08E-11	2.95E-11
2.00E+07	1.39E-12	4.37E-11	4.02E-11
3.00E+07	1.85E-12	6.01E-11	5.30E-11
5.00E+07	2.01E-12	7.25E-11	6.15E-11
7.50E+07	1.81E-12	7.46E-11	6.19E-11
1.00E+08	1.56E-12	7.28E-11	5.97E-11
1.25E+08	1.35E-12	7.01E-11	5.70E-11
1.50E+08	1.18E-12	6.73E-11	5.44E-11
2.50E+08	7.47E-13	5.79E-11	4.61E-11
5.00E+08	3.58E-13	4.47E-11	3.54E-11
7.50E+08	2.24E-13	3.75E-11	3.00E-11
1.00E+09	1.58E-13	3.28E-11	2.67E-11
1.25E+09	1.20E-13	2.93E-11	2.44E-11
2.50E+09	5.02E-14	2.03E-11	1.86E-11
4.00E+09	2.74E-14	1.55E-11	1.54E-11
5.00E+09	2.05E-14	1.36E-11	1.41E-11

TABLE VIII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

C III + t			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
4.00E+03	6.72E-14	1.02E-11	1.81E-11
6.00E+03	9.86E-13	8.12E-11	1.08E-10
8.00E+03	4.97E-12	2.58E-10	2.93E-10
1.00E+04	1.50E-11	5.42E-10	5.61E-10
3.00E+04	5.94E-10	4.73E-09	3.99E-09
5.00E+04	1.45E-09	7.36E-09	6.21E-09
7.00E+04	2.16E-09	8.86E-09	7.56E-09
8.00E+04	2.45E-09	9.38E-09	8.06E-09
1.00E+05	2.92E-09	1.02E-08	8.82E-09
2.00E+05	4.07E-09	1.20E-08	1.07E-08
3.00E+05	4.47E-09	1.27E-08	1.14E-08
5.00E+05	4.69E-09	1.35E-08	1.21E-08
7.50E+05	4.66E-09	1.40E-08	1.25E-08
1.00E+06	4.53E-09	1.43E-08	1.27E-08
2.50E+06	3.55E-09	1.48E-08	1.26E-08
5.00E+06	2.49E-09	1.41E-08	1.16E-08
7.50E+06	1.90E-09	1.33E-08	1.07E-08
1.00E+07	1.53E-09	1.26E-08	9.94E-09
2.00E+07	8.32E-10	1.05E-08	7.94E-09
3.00E+07	5.58E-10	9.25E-09	6.79E-09

N IV + t			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.00E+04	6.06E-14	7.37E-12	1.32E-11
2.00E+04	4.23E-12	1.81E-10	2.08E-10
4.00E+04	7.91E-11	1.21E-09	1.10E-09
6.00E+04	2.57E-10	2.37E-09	2.05E-09
7.00E+04	3.68E-10	2.87E-09	2.46E-09
8.00E+04	4.84E-10	3.32E-09	2.83E-09
9.00E+04	6.02E-10	3.71E-09	3.15E-09
1.00E+05	7.17E-10	4.06E-09	3.44E-09
1.50E+05	1.23E-09	5.27E-09	4.51E-09
2.00E+05	1.61E-09	5.99E-09	5.18E-09
3.00E+05	2.10E-09	6.80E-09	5.98E-09
5.00E+05	2.53E-09	7.59E-09	6.75E-09
7.50E+05	2.68E-09	8.09E-09	7.20E-09
1.00E+06	2.69E-09	8.41E-09	7.45E-09
1.50E+06	2.57E-09	8.76E-09	7.67E-09
2.00E+06	2.41E-09	8.92E-09	7.73E-09
3.00E+06	2.09E-09	9.00E-09	7.65E-09
5.00E+06	1.62E-09	8.82E-09	7.25E-09
7.00E+06	1.31E-09	8.57E-09	6.84E-09
1.00E+07	1.01E-09	8.22E-09	6.32E-09

O V + t			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
2.00E+04	4.84E-14	5.03E-12	9.23E-12
4.00E+04	3.30E-12	1.25E-10	1.45E-10
6.00E+04	2.06E-11	4.29E-10	4.27E-10
8.00E+04	5.86E-11	8.24E-10	7.63E-10
1.00E+05	1.15E-10	1.23E-09	1.10E-09
1.50E+05	3.01E-10	2.10E-09	1.81E-09
2.00E+05	4.99E-10	2.74E-09	2.34E-09
3.00E+05	8.34E-10	3.55E-09	3.05E-09
5.00E+05	1.24E-09	4.36E-09	3.80E-09
7.50E+05	1.48E-09	4.85E-09	4.26E-09
1.00E+06	1.58E-09	5.13E-09	4.51E-09
1.25E+06	1.61E-09	5.32E-09	4.67E-09
2.50E+06	1.47E-09	5.67E-09	4.90E-09
5.00E+06	1.09E-09	5.60E-09	4.69E-09
7.50E+06	8.43E-10	5.34E-09	4.39E-09
1.00E+07	6.82E-10	5.08E-09	4.12E-09
1.50E+07	4.87E-10	4.63E-09	3.70E-09
2.00E+07	3.76E-10	4.28E-09	3.39E-09
3.00E+07	2.53E-10	3.77E-09	2.94E-09
4.00E+07	1.88E-10	3.42E-09	2.64E-09

Ne VII + t			
T (K)	Rate coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
8.00E+04	2.53E-13	1.42E-11	2.10E-11
1.00E+05	8.99E-13	3.72E-11	4.80E-11
2.00E+05	1.89E-11	3.07E-10	3.00E-10
4.00E+05	1.27E-10	9.56E-10	8.37E-10
5.00E+05	1.94E-10	1.19E-09	1.04E-09
6.00E+05	2.59E-10	1.38E-09	1.19E-09
7.00E+05	3.17E-10	1.53E-09	1.32E-09
8.00E+05	3.69E-10	1.65E-09	1.43E-09
9.00E+05	4.15E-10	1.74E-09	1.51E-09
1.00E+06	4.54E-10	1.82E-09	1.58E-09
1.25E+06	5.27E-10	1.97E-09	1.72E-09
1.50E+06	5.75E-10	2.07E-09	1.81E-09
2.00E+06	6.19E-10	2.19E-09	1.93E-09
3.00E+06	6.16E-10	2.30E-09	2.01E-09
5.00E+06	5.24E-10	2.33E-09	2.00E-09
6.00E+06	4.78E-10	2.31E-09	1.96E-09
1.00E+07	3.42E-10	2.18E-09	1.81E-09
1.50E+07	2.45E-10	2.01E-09	1.64E-09
2.00E+07	1.88E-10	1.88E-09	1.51E-09
3.00E+07	1.26E-10	1.67E-09	1.32E-09

TABLE VIII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Mg IX + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	4.07E-15	3.76E-13	8.55E-13
2.00E+05	4.24E-13	1.63E-11	2.24E-11
3.00E+05	3.09E-12	7.11E-11	8.01E-11
4.00E+05	9.62E-12	1.56E-10	1.59E-10
5.00E+05	2.01E-11	2.55E-10	2.45E-10
6.00E+05	3.39E-11	3.54E-10	3.28E-10
7.00E+05	4.98E-11	4.48E-10	4.06E-10
8.00E+05	6.69E-11	5.34E-10	4.77E-10
9.00E+05	8.45E-11	6.12E-10	5.41E-10
1.00E+06	1.02E-10	6.81E-10	5.98E-10
1.50E+06	1.78E-10	9.30E-10	8.06E-10
2.00E+06	2.30E-10	1.07E-09	9.29E-10
3.00E+06	2.78E-10	1.22E-09	1.05E-09
5.00E+06	2.83E-10	1.30E-09	1.12E-09
7.50E+06	2.49E-10	1.30E-09	1.10E-09
1.00E+07	2.15E-10	1.27E-09	1.07E-09
1.25E+07	1.85E-10	1.23E-09	1.03E-09
1.50E+07	1.62E-10	1.20E-09	9.86E-10
2.00E+07	1.28E-10	1.13E-09	9.16E-10
3.00E+07	8.72E-11	1.01E-09	8.11E-10

Al X + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	2.06E-16	2.07E-14	7.81E-14
2.00E+05	5.22E-14	2.67E-12	4.73E-12
3.00E+05	5.66E-13	1.80E-11	2.41E-11
4.00E+05	2.25E-12	5.07E-11	5.87E-11
5.00E+05	5.57E-12	9.72E-11	1.03E-10
6.00E+05	1.06E-11	1.52E-10	1.53E-10
7.00E+05	1.72E-11	2.10E-10	2.03E-10
8.00E+05	2.50E-11	2.68E-10	2.52E-10
1.00E+06	4.29E-11	3.78E-10	3.44E-10
1.50E+06	8.98E-11	5.94E-10	5.20E-10
2.00E+06	1.29E-10	7.37E-10	6.37E-10
3.00E+06	1.75E-10	8.95E-10	7.69E-10
4.00E+06	1.94E-10	9.69E-10	8.30E-10
5.00E+06	1.99E-10	1.01E-09	8.58E-10
6.00E+06	1.96E-10	1.02E-09	8.69E-10
8.00E+06	1.83E-10	1.03E-09	8.66E-10
1.00E+07	1.66E-10	1.01E-09	8.50E-10
3.00E+07	7.29E-11	8.23E-10	6.62E-10
5.00E+07	4.34E-11	7.05E-10	5.57E-10
8.00E+07	2.57E-11	5.98E-10	4.65E-10

Si XI + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+05	9.19E-14	3.85E-12	6.29E-12
5.00E+05	1.39E-12	3.26E-11	3.94E-11
7.50E+05	6.90E-12	1.05E-10	1.09E-10
1.00E+06	1.67E-11	1.93E-10	1.86E-10
1.30E+06	3.16E-11	2.96E-10	2.72E-10
1.60E+06	4.76E-11	3.87E-10	3.46E-10
2.00E+06	6.77E-11	4.84E-10	4.25E-10
3.00E+06	1.05E-10	6.43E-10	5.54E-10
4.00E+06	1.25E-10	7.27E-10	6.22E-10
5.00E+06	1.34E-10	7.73E-10	6.58E-10
6.00E+06	1.37E-10	7.98E-10	6.77E-10
8.00E+06	1.33E-10	8.16E-10	6.88E-10
1.00E+07	1.25E-10	8.15E-10	6.83E-10
1.50E+07	1.02E-10	7.84E-10	6.48E-10
2.00E+07	8.40E-11	7.46E-10	6.11E-10
3.00E+07	6.00E-11	6.78E-10	5.48E-10
4.00E+07	4.57E-11	6.25E-10	5.00E-10
6.00E+07	3.01E-11	5.48E-10	4.33E-10
8.00E+07	2.19E-11	4.95E-10	3.88E-10
1.00E+08	1.69E-11	4.55E-10	3.55E-10

S XIII + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
5.00E+05	6.83E-14	2.57E-12	4.19E-12
7.50E+05	6.13E-13	1.51E-11	1.94E-11
1.00E+06	2.12E-12	3.94E-11	4.46E-11
1.25E+06	4.70E-12	7.17E-11	7.52E-11
1.50E+06	8.18E-12	1.08E-10	1.08E-10
1.75E+06	1.23E-11	1.45E-10	1.40E-10
2.00E+06	1.67E-11	1.81E-10	1.70E-10
3.00E+06	3.44E-11	3.02E-10	2.69E-10
4.00E+06	4.81E-11	3.85E-10	3.35E-10
5.00E+06	5.75E-11	4.40E-10	3.78E-10
7.50E+06	6.77E-11	5.10E-10	4.32E-10
1.00E+07	6.85E-11	5.34E-10	4.48E-10
1.50E+07	6.19E-11	5.36E-10	4.45E-10
2.00E+07	5.38E-11	5.20E-10	4.28E-10
3.00E+07	4.08E-11	4.81E-10	3.92E-10
5.00E+07	2.61E-11	4.19E-10	3.36E-10
7.50E+07	1.73E-11	3.67E-10	2.91E-10
1.00E+08	1.26E-11	3.31E-10	2.60E-10
1.50E+08	7.91E-12	2.83E-10	2.21E-10
2.00E+08	5.60E-12	2.52E-10	1.95E-10

TABLE VIII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_J$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Ar XV + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
7.00E+05	2.62E-14	9.74E-13	1.76E-12
8.00E+05	6.02E-14	1.98E-12	3.24E-12
1.00E+06	2.08E-13	5.60E-12	7.93E-12
1.50E+06	1.28E-12	2.45E-11	2.86E-11
2.00E+06	3.45E-12	5.36E-11	5.65E-11
2.50E+06	6.41E-12	8.66E-11	8.63E-11
3.00E+06	9.75E-12	1.20E-10	1.15E-10
5.00E+06	2.21E-11	2.26E-10	2.02E-10
7.00E+06	3.00E-11	2.90E-10	2.52E-10
9.00E+06	3.40E-11	3.26E-10	2.79E-10
1.00E+07	3.51E-11	3.38E-10	2.88E-10
2.50E+07	3.01E-11	3.59E-10	2.96E-10
5.00E+07	1.86E-11	3.12E-10	2.52E-10
7.00E+07	1.37E-11	2.82E-10	2.26E-10
1.00E+08	9.52E-12	2.50E-10	1.98E-10
1.25E+08	7.47E-12	2.31E-10	1.82E-10
1.50E+08	6.09E-12	2.15E-10	1.69E-10
1.75E+08	5.10E-12	2.03E-10	1.59E-10
2.00E+08	4.36E-12	1.92E-10	1.50E-10
2.50E+08	3.34E-12	1.75E-10	1.37E-10

Ca XVII + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	1.67E-14	5.87E-13	1.08E-12
2.00E+06	6.25E-13	1.30E-11	1.58E-11
2.50E+06	1.42E-12	2.56E-11	2.87E-11
3.00E+06	2.51E-12	4.08E-11	4.33E-11
4.00E+06	5.19E-12	7.37E-11	7.29E-11
5.00E+06	8.01E-12	1.05E-10	9.99E-11
6.00E+06	1.06E-11	1.33E-10	1.23E-10
7.00E+06	1.29E-11	1.56E-10	1.42E-10
8.00E+06	1.47E-11	1.76E-10	1.57E-10
1.00E+07	1.75E-11	2.05E-10	1.80E-10
1.50E+07	2.02E-11	2.44E-10	2.08E-10
2.00E+07	2.02E-11	2.57E-10	2.17E-10
2.50E+07	1.92E-11	2.60E-10	2.17E-10
3.00E+07	1.80E-11	2.58E-10	2.14E-10
4.00E+07	1.54E-11	2.50E-10	2.05E-10
6.00E+07	1.15E-11	2.29E-10	1.86E-10
8.00E+07	9.00E-12	2.11E-10	1.70E-10
1.00E+08	7.28E-12	1.97E-10	1.58E-10
2.00E+08	3.47E-12	1.53E-10	1.21E-10
3.00E+08	2.16E-12	1.30E-10	1.02E-10

Ti XIX + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	1.06E-15	4.29E-14	1.07E-13
2.00E+06	9.52E-14	2.48E-12	3.58E-12
3.00E+06	5.64E-13	1.15E-11	1.38E-11
4.00E+06	1.46E-12	2.59E-11	2.83E-11
5.00E+06	2.62E-12	4.28E-11	4.40E-11
6.00E+06	3.87E-12	5.98E-11	5.92E-11
7.00E+06	5.11E-12	7.60E-11	7.32E-11
8.00E+06	6.25E-12	9.07E-11	8.56E-11
1.00E+07	8.17E-12	1.16E-10	1.06E-10
1.50E+07	1.10E-11	1.55E-10	1.37E-10
2.00E+07	1.20E-11	1.75E-10	1.51E-10
2.50E+07	1.20E-11	1.84E-10	1.57E-10
3.00E+07	1.17E-11	1.88E-10	1.59E-10
5.00E+07	9.46E-12	1.84E-10	1.52E-10
7.50E+07	7.17E-12	1.70E-10	1.39E-10
1.00E+08	5.63E-12	1.57E-10	1.27E-10
1.50E+08	3.81E-12	1.38E-10	1.10E-10
2.00E+08	2.81E-12	1.25E-10	9.87E-11
3.00E+08	1.78E-12	1.06E-10	8.34E-11
4.00E+08	1.27E-12	9.45E-11	7.35E-11

Cr XXI + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+06	1.21E-14	3.77E-13	6.52E-13
3.00E+06	1.10E-13	2.73E-12	3.73E-12
5.00E+06	7.77E-13	1.53E-11	1.72E-11
6.00E+06	1.30E-12	2.41E-11	2.58E-11
7.00E+06	1.87E-12	3.34E-11	3.44E-11
8.00E+06	2.47E-12	4.27E-11	4.29E-11
1.00E+07	3.60E-12	6.02E-11	5.81E-11
1.50E+07	5.69E-12	9.36E-11	8.56E-11
2.00E+07	6.81E-12	1.14E-10	1.01E-10
3.00E+07	7.41E-12	1.33E-10	1.15E-10
4.00E+07	7.14E-12	1.39E-10	1.18E-10
5.00E+07	6.63E-12	1.40E-10	1.18E-10
6.00E+07	6.08E-12	1.38E-10	1.15E-10
8.00E+07	5.10E-12	1.33E-10	1.09E-10
1.00E+08	4.32E-12	1.27E-10	1.03E-10
1.50E+08	3.03E-12	1.13E-10	9.13E-11
2.00E+08	2.29E-12	1.03E-10	8.24E-11
3.00E+08	1.48E-12	8.87E-11	7.04E-11
4.00E+08	1.07E-12	7.92E-11	6.26E-11
5.00E+08	8.21E-13	7.22E-11	5.71E-11

TABLE VIII. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by Triton Impact

See page 183 for Explanation of Tables

Fe XXIII + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+06	1.23E-15	4.46E-14	9.18E-14
4.00E+06	7.68E-14	2.00E-12	2.70E-12
5.00E+06	1.95E-13	4.66E-12	5.75E-12
6.00E+06	3.71E-13	8.35E-12	9.69E-12
7.00E+06	5.94E-13	1.28E-11	1.42E-11
8.00E+06	8.49E-13	1.77E-11	1.90E-11
1.00E+07	1.40E-12	2.80E-11	2.86E-11
1.50E+07	2.69E-12	5.16E-11	4.92E-11
2.00E+07	3.60E-12	6.92E-11	6.36E-11
2.50E+07	4.15E-12	8.14E-11	7.31E-11
3.00E+07	4.46E-12	8.97E-11	7.94E-11
4.00E+07	4.63E-12	9.90E-11	8.58E-11
5.00E+07	4.51E-12	1.03E-10	8.80E-11
6.00E+07	4.29E-12	1.04E-10	8.82E-11
8.00E+07	3.77E-12	1.03E-10	8.60E-11
1.00E+08	3.29E-12	1.00E-10	8.27E-11
1.50E+08	2.42E-12	9.16E-11	7.47E-11
2.00E+08	1.87E-12	8.44E-11	6.81E-11
3.00E+08	1.25E-12	7.37E-11	5.88E-11
4.00E+08	9.11E-13	6.62E-11	5.25E-11

Ni XXV + t			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.50E+06	7.62E-16	2.63E-14	5.32E-14
4.00E+06	1.65E-14	4.70E-13	6.98E-13
5.00E+06	5.08E-14	1.34E-12	1.79E-12
7.50E+06	2.49E-13	5.84E-12	6.75E-12
1.00E+07	5.71E-13	1.27E-11	1.36E-11
1.50E+07	1.31E-12	2.82E-11	2.79E-11
2.00E+07	1.95E-12	4.18E-11	3.96E-11
3.00E+07	2.71E-12	6.07E-11	5.49E-11
5.00E+07	3.06E-12	7.71E-11	6.69E-11
7.50E+07	2.83E-12	8.19E-11	6.93E-11
1.00E+08	2.48E-12	8.13E-11	6.79E-11
1.25E+08	2.16E-12	7.92E-11	6.55E-11
1.50E+08	1.90E-12	7.67E-11	6.29E-11
2.50E+08	1.23E-12	6.73E-11	5.43E-11
5.00E+08	6.00E-13	5.33E-11	4.25E-11
7.50E+08	3.77E-13	4.60E-11	3.67E-11
1.00E+09	2.67E-13	4.14E-11	3.33E-11
1.25E+09	2.03E-13	3.82E-11	3.11E-11
2.50E+09	8.42E-14	2.99E-11	2.54E-11
4.00E+09	4.54E-14	2.52E-11	2.21E-11

TABLE IX. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

C III + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
7.00E+03	2.77E-13	2.82E-11	4.76E-11
1.00E+04	2.83E-12	1.71E-10	2.28E-10
3.00E+04	3.74E-10	4.63E-09	4.16E-09
5.00E+04	1.36E-09	9.56E-09	8.18E-09
7.00E+04	2.45E-09	1.30E-08	1.11E-08
8.00E+04	2.96E-09	1.43E-08	1.22E-08
1.00E+05	3.86E-09	1.63E-08	1.40E-08
1.50E+05	5.48E-09	1.93E-08	1.68E-08
2.00E+05	6.48E-09	2.10E-08	1.85E-08
3.00E+05	7.53E-09	2.29E-08	2.03E-08
5.00E+05	8.18E-09	2.47E-08	2.20E-08
7.50E+05	8.24E-09	2.56E-08	2.28E-08
1.00E+06	8.07E-09	2.61E-08	2.31E-08
2.50E+06	6.54E-09	2.61E-08	2.24E-08
5.00E+06	4.90E-09	2.45E-08	2.06E-08
7.50E+06	3.96E-09	2.31E-08	1.91E-08
1.00E+07	3.34E-09	2.19E-08	1.79E-08
2.00E+07	2.08E-09	1.85E-08	1.49E-08
4.00E+07	1.18E-09	1.50E-08	1.19E-08
6.00E+07	8.09E-10	1.30E-08	1.03E-08

N IV + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+04	5.96E-13	4.06E-11	6.41E-11
4.00E+04	2.68E-11	6.83E-10	7.36E-10
6.00E+04	1.34E-10	1.97E-09	1.87E-09
7.00E+04	2.21E-10	2.68E-09	2.48E-09
8.00E+04	3.28E-10	3.40E-09	3.07E-09
9.00E+04	4.48E-10	4.08E-09	3.63E-09
1.00E+05	5.80E-10	4.73E-09	4.16E-09
1.50E+05	1.29E-09	7.33E-09	6.32E-09
2.00E+05	1.94E-09	9.08E-09	7.82E-09
3.00E+05	2.92E-09	1.12E-08	9.71E-09
4.00E+05	3.54E-09	1.24E-08	1.08E-08
6.00E+05	4.20E-09	1.37E-08	1.21E-08
8.00E+05	4.48E-09	1.44E-08	1.27E-08
1.00E+06	4.58E-09	1.49E-08	1.31E-08
1.50E+06	4.51E-09	1.54E-08	1.35E-08
2.00E+06	4.28E-09	1.55E-08	1.35E-08
3.00E+06	3.80E-09	1.54E-08	1.33E-08
5.00E+06	3.05E-09	1.49E-08	1.25E-08
7.00E+06	2.55E-09	1.43E-08	1.19E-08
1.00E+07	2.06E-09	1.36E-08	1.10E-08

O V + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
5.00E+04	1.78E-12	7.94E-11	1.10E-10
7.50E+04	1.45E-11	3.73E-10	4.19E-10
1.00E+05	4.88E-11	8.55E-10	8.66E-10
1.50E+05	1.89E-10	2.03E-09	1.87E-09
2.00E+05	3.97E-10	3.14E-09	2.79E-09
3.00E+05	8.68E-10	4.85E-09	4.21E-09
4.00E+05	1.30E-09	5.98E-09	5.18E-09
5.00E+05	1.65E-09	6.75E-09	5.87E-09
7.50E+05	2.22E-09	7.89E-09	6.92E-09
1.00E+06	2.50E-09	8.49E-09	7.48E-09
1.25E+06	2.62E-09	8.85E-09	7.80E-09
2.50E+06	2.51E-09	9.42E-09	8.20E-09
5.00E+06	1.95E-09	9.25E-09	7.85E-09
7.50E+06	1.58E-09	8.88E-09	7.40E-09
1.00E+07	1.32E-09	8.53E-09	7.02E-09
1.50E+07	1.00E-09	7.93E-09	6.42E-09
2.00E+07	8.08E-10	7.45E-09	5.96E-09
3.00E+07	5.80E-10	6.74E-09	5.30E-09
4.00E+07	4.50E-10	6.21E-09	4.84E-09
5.00E+07	3.67E-10	5.80E-09	4.48E-09

Ne VII + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	9.08E-14	5.80E-12	1.11E-11
2.00E+05	4.68E-12	1.34E-10	1.63E-10
4.00E+05	6.05E-11	8.22E-10	7.91E-10
5.00E+05	1.08E-10	1.20E-09	1.11E-09
6.00E+05	1.60E-10	1.55E-09	1.39E-09
7.00E+05	2.12E-10	1.85E-09	1.63E-09
8.00E+05	2.62E-10	2.11E-09	1.84E-09
9.00E+05	3.06E-10	2.34E-09	2.02E-09
1.00E+06	3.46E-10	2.53E-09	2.17E-09
1.50E+06	4.74E-10	3.14E-09	2.66E-09
2.00E+06	5.26E-10	3.43E-09	2.88E-09
3.00E+06	5.39E-10	3.65E-09	3.03E-09
4.00E+06	5.16E-10	3.69E-09	3.05E-09
5.00E+06	4.87E-10	3.67E-09	3.02E-09
6.00E+06	4.58E-10	3.63E-09	2.97E-09
8.00E+06	4.06E-10	3.53E-09	2.87E-09
1.00E+07	3.64E-10	3.43E-09	2.77E-09
1.50E+07	2.89E-10	3.20E-09	2.56E-09
2.00E+07	2.38E-10	3.01E-09	2.39E-09
3.00E+07	1.76E-10	2.70E-09	2.14E-09

TABLE IX. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Mg IX + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	7.21E-17	7.40E-15	3.82E-14
2.00E+05	3.38E-14	1.91E-12	4.18E-12
3.00E+05	4.46E-13	1.71E-11	2.69E-11
4.00E+05	1.96E-12	5.67E-11	7.49E-11
5.00E+05	5.17E-12	1.21E-10	1.44E-10
6.00E+05	1.02E-11	2.04E-10	2.26E-10
7.00E+05	1.70E-11	2.99E-10	3.14E-10
8.00E+05	2.51E-11	4.01E-10	4.05E-10
9.00E+05	3.42E-11	5.03E-10	4.94E-10
1.00E+06	4.38E-11	6.04E-10	5.80E-10
1.25E+06	6.81E-11	8.39E-10	7.73E-10
1.50E+06	9.05E-11	1.04E-09	9.34E-10
2.00E+06	1.26E-10	1.34E-09	1.17E-09
3.00E+06	1.63E-10	1.69E-09	1.43E-09
5.00E+06	1.78E-10	1.93E-09	1.59E-09
7.50E+06	1.69E-10	1.99E-09	1.62E-09
1.00E+07	1.57E-10	1.98E-09	1.59E-09
1.25E+07	1.45E-10	1.94E-09	1.55E-09
2.00E+07	1.15E-10	1.81E-09	1.44E-09
3.00E+07	8.95E-11	1.66E-09	1.30E-09

Al X + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+05	1.41E-18	1.34E-16	1.30E-15
2.00E+05	2.21E-15	1.46E-13	4.62E-13
3.00E+05	4.88E-14	2.36E-12	4.88E-12
4.00E+05	2.93E-13	1.10E-11	1.81E-11
5.00E+05	9.56E-13	2.94E-11	4.18E-11
6.00E+05	2.22E-12	5.84E-11	7.54E-11
7.00E+05	4.18E-12	9.68E-11	1.16E-10
8.00E+05	6.84E-12	1.43E-10	1.63E-10
1.00E+06	1.39E-11	2.49E-10	2.63E-10
1.50E+06	3.64E-11	5.30E-10	5.07E-10
2.00E+06	5.79E-11	7.68E-10	7.02E-10
3.00E+06	8.68E-11	1.09E-09	9.49E-10
4.00E+06	1.01E-10	1.27E-09	1.08E-09
5.00E+06	1.07E-10	1.38E-09	1.15E-09
6.00E+06	1.10E-10	1.44E-09	1.19E-09
8.00E+06	1.09E-10	1.50E-09	1.23E-09
1.00E+07	1.05E-10	1.52E-09	1.23E-09
3.00E+07	6.58E-11	1.34E-09	1.05E-09
5.00E+07	4.59E-11	1.18E-09	9.14E-10
8.00E+07	3.10E-11	1.02E-09	7.78E-10

Si XI + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+05	4.52E-15	2.60E-13	7.30E-13
5.00E+05	1.55E-13	5.99E-12	1.06E-11
7.50E+05	1.26E-12	3.51E-11	4.81E-11
1.00E+06	3.98E-12	9.09E-11	1.09E-10
1.30E+06	9.21E-12	1.80E-10	1.96E-10
1.60E+06	1.57E-11	2.78E-10	2.86E-10
2.00E+06	2.47E-11	4.06E-10	3.97E-10
3.00E+06	4.36E-11	6.63E-10	6.06E-10
4.00E+06	5.53E-11	8.34E-10	7.35E-10
5.00E+06	6.19E-11	9.46E-10	8.15E-10
6.00E+06	6.56E-11	1.02E-09	8.66E-10
8.00E+06	6.81E-11	1.11E-09	9.20E-10
1.00E+07	6.77E-11	1.15E-09	9.42E-10
1.50E+07	6.28E-11	1.17E-09	9.41E-10
2.00E+07	5.69E-11	1.15E-09	9.15E-10
3.00E+07	4.68E-11	1.08E-09	8.54E-10
4.00E+07	3.93E-11	1.02E-09	7.97E-10
6.00E+07	2.92E-11	9.16E-10	7.09E-10
8.00E+07	2.31E-11	8.37E-10	6.44E-10
1.00E+08	1.89E-11	7.75E-10	5.95E-10

S XIII + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
7.50E+05	5.21E-14	2.30E-12	4.18E-12
1.00E+06	2.64E-13	9.03E-12	1.41E-11
1.25E+06	7.50E-13	2.20E-11	3.07E-11
1.50E+06	1.55E-12	4.09E-11	5.28E-11
1.75E+06	2.65E-12	6.47E-11	7.87E-11
2.00E+06	3.98E-12	9.18E-11	1.07E-10
2.50E+06	7.03E-12	1.51E-10	1.64E-10
3.00E+06	1.02E-11	2.11E-10	2.19E-10
4.00E+06	1.59E-11	3.20E-10	3.12E-10
5.00E+06	2.03E-11	4.08E-10	3.83E-10
7.50E+06	2.66E-11	5.55E-10	4.92E-10
1.00E+07	2.91E-11	6.37E-10	5.46E-10
1.50E+07	2.98E-11	7.09E-10	5.88E-10
2.00E+07	2.85E-11	7.30E-10	5.94E-10
3.00E+07	2.50E-11	7.22E-10	5.76E-10
5.00E+07	1.90E-11	6.66E-10	5.22E-10
7.50E+07	1.43E-11	6.01E-10	4.66E-10
1.00E+08	1.13E-11	5.51E-10	4.24E-10
2.00E+08	5.92E-12	4.28E-10	3.26E-10
3.00E+08	3.88E-12	3.63E-10	2.75E-10

TABLE IX. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P^o_J \rightarrow 1s^2 2s2p\ ^3P^o_{J'}$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Ar XV + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
6.00E+05	2.06E-16	1.65E-14	4.25E-14
7.00E+05	8.11E-16	5.35E-14	1.31E-13
8.00E+05	2.40E-15	1.37E-13	3.16E-13
1.00E+06	1.22E-14	5.62E-13	1.16E-12
1.50E+06	1.33E-13	4.63E-12	7.70E-12
2.00E+06	4.89E-13	1.49E-11	2.15E-11
2.50E+06	1.10E-12	3.10E-11	4.09E-11
3.00E+06	1.91E-12	5.15E-11	6.35E-11
4.00E+06	3.79E-12	9.82E-11	1.11E-10
5.00E+06	5.64E-12	1.45E-10	1.55E-10
7.00E+06	8.61E-12	2.27E-10	2.25E-10
8.00E+06	9.71E-12	2.61E-10	2.52E-10
1.00E+07	1.13E-11	3.15E-10	2.93E-10
1.50E+07	1.31E-11	3.98E-10	3.49E-10
2.50E+07	1.33E-11	4.57E-10	3.81E-10
5.00E+07	1.05E-11	4.55E-10	3.63E-10
1.00E+08	6.62E-12	3.93E-10	3.06E-10
1.50E+08	4.70E-12	3.46E-10	2.67E-10
2.00E+08	3.59E-12	3.13E-10	2.39E-10
2.50E+08	2.88E-12	2.87E-10	2.19E-10

Ca XVII + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	4.14E-16	1.97E-14	6.92E-14
2.00E+06	5.09E-14	1.81E-12	3.43E-12
2.50E+06	1.51E-13	5.02E-12	8.32E-12
3.00E+06	3.21E-13	1.02E-11	1.54E-11
4.00E+06	8.37E-13	2.56E-11	3.42E-11
5.00E+06	1.49E-12	4.52E-11	5.58E-11
6.00E+06	2.18E-12	6.64E-11	7.76E-11
7.00E+06	2.84E-12	8.78E-11	9.82E-11
8.00E+06	3.44E-12	1.08E-10	1.17E-10
1.00E+07	4.45E-12	1.45E-10	1.49E-10
1.50E+07	5.98E-12	2.14E-10	2.02E-10
2.00E+07	6.64E-12	2.56E-10	2.31E-10
2.50E+07	6.85E-12	2.82E-10	2.47E-10
3.00E+07	6.83E-12	2.97E-10	2.55E-10
4.00E+07	6.48E-12	3.11E-10	2.60E-10
6.00E+07	5.53E-12	3.11E-10	2.52E-10
8.00E+07	4.69E-12	3.01E-10	2.40E-10
1.00E+08	4.03E-12	2.88E-10	2.27E-10
2.00E+08	2.25E-12	2.36E-10	1.82E-10
3.00E+08	1.51E-12	2.04E-10	1.56E-10

Ti XIX + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.50E+06	1.65E-14	6.02E-13	1.27E-12
3.00E+06	4.36E-14	1.54E-12	2.89E-12
4.00E+06	1.54E-13	5.29E-12	8.50E-12
5.00E+06	3.36E-13	1.15E-11	1.67E-11
6.00E+06	5.68E-13	1.95E-11	2.65E-11
7.00E+06	8.24E-13	2.88E-11	3.70E-11
8.00E+06	1.09E-12	3.88E-11	4.76E-11
1.00E+07	1.59E-12	5.91E-11	6.78E-11
1.25E+07	2.13E-12	8.32E-11	8.99E-11
1.50E+07	2.55E-12	1.05E-10	1.08E-10
2.00E+07	3.12E-12	1.39E-10	1.35E-10
2.50E+07	3.42E-12	1.63E-10	1.52E-10
3.00E+07	3.56E-12	1.80E-10	1.63E-10
5.00E+07	3.43E-12	2.09E-10	1.78E-10
7.50E+07	2.93E-12	2.13E-10	1.76E-10
1.00E+08	2.48E-12	2.08E-10	1.68E-10
1.50E+08	1.85E-12	1.92E-10	1.53E-10
2.00E+08	1.45E-12	1.78E-10	1.40E-10
3.00E+08	9.84E-13	1.56E-10	1.21E-10
4.00E+08	7.32E-13	1.41E-10	1.08E-10

Cr XXI + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+06	4.90E-15	1.86E-13	4.32E-13
4.00E+06	2.44E-14	9.06E-13	1.74E-12
5.00E+06	6.67E-14	2.47E-12	4.22E-12
6.00E+06	1.32E-13	4.96E-12	7.77E-12
7.00E+06	2.17E-13	8.28E-12	1.22E-11
8.00E+06	3.15E-13	1.23E-11	1.71E-11
1.00E+07	5.30E-13	2.16E-11	2.78E-11
1.50E+07	1.04E-12	4.72E-11	5.35E-11
2.00E+07	1.42E-12	7.03E-11	7.40E-11
3.00E+07	1.83E-12	1.04E-10	1.00E-10
4.00E+07	1.97E-12	1.24E-10	1.14E-10
5.00E+07	1.97E-12	1.35E-10	1.21E-10
6.00E+07	1.92E-12	1.42E-10	1.25E-10
8.00E+07	1.75E-12	1.48E-10	1.26E-10
1.00E+08	1.57E-12	1.48E-10	1.24E-10
1.50E+08	1.21E-12	1.42E-10	1.16E-10
2.00E+08	9.68E-13	1.34E-10	1.08E-10
3.00E+08	6.73E-13	1.20E-10	9.52E-11
4.00E+08	5.07E-13	1.09E-10	8.58E-11
5.00E+08	4.02E-13	9.97E-11	7.88E-11

TABLE IX. Rate Coefficients for Excitation of the $1s^2 2s2p\ ^3P_J^o \rightarrow 1s^2 2s2p\ ^3P_{J'}^o$ Transitions in Be-like Ions by α Impact

See page 183 for Explanation of Tables

Fe XXIII + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+06	3.84E-16	1.59E-14	4.82E-14
5.00E+06	9.62E-15	4.01E-13	8.30E-13
6.00E+06	2.26E-14	9.67E-13	1.80E-12
7.00E+06	4.21E-14	1.85E-12	3.19E-12
8.00E+06	6.76E-14	3.07E-12	4.96E-12
1.00E+07	1.32E-13	6.37E-12	9.34E-12
1.50E+07	3.23E-13	1.77E-11	2.24E-11
2.00E+07	4.99E-13	3.03E-11	3.49E-11
2.50E+07	6.36E-13	4.18E-11	4.55E-11
3.00E+07	7.36E-13	5.18E-11	5.40E-11
4.00E+07	8.52E-13	6.70E-11	6.61E-11
5.00E+07	8.97E-13	7.73E-11	7.35E-11
6.00E+07	9.03E-13	8.42E-11	7.81E-11
8.00E+07	8.63E-13	9.19E-11	8.24E-11
1.00E+08	7.99E-13	9.52E-11	8.34E-11
1.25E+08	7.19E-13	9.62E-11	8.27E-11
1.50E+08	6.46E-13	9.57E-11	8.11E-11
2.00E+08	5.29E-13	9.27E-11	7.71E-11
3.00E+08	3.79E-13	8.54E-11	6.95E-11
4.00E+08	2.90E-13	7.90E-11	6.35E-11

Ni XXV + α			
T (K)	Rate coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
5.00E+06	1.79E-15	6.65E-14	1.59E-13
7.50E+06	1.52E-14	6.18E-13	1.13E-12
1.00E+07	4.66E-14	2.06E-12	3.28E-12
1.50E+07	1.47E-13	7.46E-12	1.01E-11
2.00E+07	2.61E-13	1.47E-11	1.80E-11
2.50E+07	3.64E-13	2.24E-11	2.57E-11
3.00E+07	4.50E-13	2.97E-11	3.25E-11
5.00E+07	6.36E-13	5.14E-11	5.09E-11
7.50E+07	6.79E-13	6.56E-11	6.13E-11
1.00E+08	6.53E-13	7.23E-11	6.53E-11
1.25E+08	6.07E-13	7.53E-11	6.66E-11
1.50E+08	5.59E-13	7.65E-11	6.66E-11
2.50E+08	4.07E-13	7.46E-11	6.25E-11
5.00E+08	2.26E-13	6.42E-11	5.20E-11
7.50E+08	1.51E-13	5.65E-11	4.50E-11
1.00E+09	1.11E-13	5.09E-11	4.02E-11
1.25E+09	8.68E-14	4.66E-11	3.66E-11
2.50E+09	3.87E-14	3.46E-11	2.68E-11
4.00E+09	2.18E-14	2.79E-11	2.14E-11
5.00E+09	1.65E-14	2.50E-11	1.92E-11