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

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We have calculated cross sections for excitation of the fine-structure transitions in carbon-like ions by proton, deuteron, triton, and α-particle impact via a close-coupled impact-parameter method. This technique includes the effects of dipole coupling to the nearby triplet $2s2p^3$ configuration by means of a polarization potential. We consider the ions N II, O III, Ne V, Mg VII, Si IX, S XI, Ar XIII, Ca XV, Ti XVII, Cr XIX, Fe XXI, and Ni XXIII. Excitation rate coefficients have also been calculated for a range of temperatures.

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CONTENTS

INTRODUCTION

Many laboratory and astrophysical diagnostic emission lines arise from fine-structure transitions within the ground states of carbon-like ions. These features may then be modeled to provide information on plasma parameters such as electron density and temperature distribution [1–6]. Clearly, the reliability of the modeling is critically dependent on the accuracy of the adopted atomic data. In most cases, line ratios for collisionally induced transitions are dominated by electron impact. However, Seaton [7] demonstrated that heavier particle collisions could be equally important for fine-structure transitions, where the energy of the impacting particle exceeds the excitation energy.

The importance of including polarization in the ion–ion interaction was demonstrated by Heil et al. [8, 9], and we have shown previously [10–13] that including the effects of higher-lying states (via a polarization technique) in the calculation of fine-structure excitation can lead to significant reduction in the cross sections and rate coefficients. We have now extended this work to C-like ions, and in this paper we present proton, deuteron, triton, and α-particle excitation cross sections and rate coefficients for transitions among the fine-structure levels for 12 ions in the carbon-like isoelectronic sequence: N II, O III, Ne V, Mg VII, Si IX, S XI, Ar XIII, Ca XV, Ti XVII, Cr XIX, Fe XXI, and Ni XXIII.

Calculation

Method

We are concerned with the $J = 0 \rightarrow 1$, $J = 0 \rightarrow 2$, and $J = 1 \rightarrow 2$ transitions among the fine-structure levels $1s^2 2s^2 2p^2\ ^3P_J$ of carbon-like ions, induced by collisions with positive ions. We calculated the cross sections using the symmetrized close-coupling semi-classical method that we have used previously for similar excitations in fluorine-like [11], boron-like [12], and beryllium-like [13] ions. This method is similar to that described by Alder and Winther [14] for Coulomb excitation of nuclei, except that first, we modify the interaction matrix elements to give them the correct short-range forms, and second, we include the effects of dipole coupling to nearby terms by means of a polarization potential using the technique described in Section II.6 of [14].

Atomic Data

Within this formulation, our calculation is determined by specifying the charges and masses of the colliding ions (which are known), the $E2$ line strengths for the transitions within the ground term, the set of excited terms to be included in the calculation via the polarization potential, the $E1$ line-strengths for the transitions between the levels of these excited terms and the levels of the ground term, and the excitation energies of all the levels included in the calculation. We have taken our energy-level data and line-strength data from Wiese et al. [15], Cheng et al. [16], and from the CHIANTI database [17], as shown in Table I.

The $E2$ line-strengths for the $J = 0 \rightarrow 2$ and $J = 1 \rightarrow 2$ transitions in the ^3P ground term are used to determine the corresponding collisional matrix elements. The LS-coupling expressions for these line strengths are $\frac{2}{5}\langle 2p|r^2|2p\rangle^2$ and $\frac{9}{10}\langle 2p|r^2|2p\rangle^2$, respectively, and the effective $\langle 2p|r^2|2p\rangle$ values deduced from these expressions are shown in Table I. For the lighter ions (N II–Mg VII), the closeness of the $0 \rightarrow 2$ and $1 \rightarrow 2$ values shows that LS-coupling is a good approximation. For the diagonal matrix elements, we used the LS-coupling expression with a mean value for $\langle 2p|r^2|2p\rangle$.

The $E1$ line strengths are used to determine the collisional matrix elements between the ground term and the excited terms. We simplified the present calculation by using the multiplet strength for each excited term, deducing the required level-to-level line strengths on the basis of LS-coupling.

The Set of Excited Terms

For most of the ions, only the three excited terms $2s2p^3\ ^3D^o$, $^3P^o$, and $^3S^o$ were included in the calculation via the polarization potential. The terms $2s^2 2p3s\ ^3P^o$, and $2s^2 2p3d\ ^3D^o$, $^3P^o$ were also included for O III, Ne V, Mg VII, and Fe XXI to test the convergence of the results [18]. These tests showed that, for this wide spread of ions, and for protons or α-particles as perturbers, the inclusion of the further excited terms had a negligible effect on the cross sections. For the lighter ions the polarization potential had not converged, since the next terms above $2s2p^3$ have excitation energies only about twice the excitation energies of the $2s2p^3$ terms. However, inclusion of the polarization had little effect on the cross sections for the lighter ions, except at very high impact energies. Hence, for the lighter ions, the lack of convergence of the polarization is unimportant. For the heavier ions, the situation is reversed, and the polarization affects the cross sections significantly at all impact energies. However, for the heavier ions the polarization potential is dominated by the $2s2p^3$ terms, because the excitation energies of the $2s^2 2p3l$, $2s2p^2 3l$, and higher terms are much larger than the excitation energies of $2s2p^3$. Therefore, we conclude that in the context of calculating fine-structure excitation cross sections, the representation of polarization by the $2s2p^3$ terms is adequate for all the ions. All data in the following tables refer to that case.

For large values of the ion-perturber separation R, the effect of polarization is to multiply each $2s^2 2p^2\ ^3P_{JM}$–$2s^2 2p^2\ ^3P_{J'M'}$ matrix element by a factor $(1 + C_{JJ'} Z_p/R)$, where Z_p is the charge of the perturbing ion. This simple factorization is not valid for small R, because the quadrupole matrix elements and the dipole matrix elements have distinct short-range forms. Nevertheless, the coefficients $C_{JJ'}$ are useful indicators of the polarization potential, and we show their values in Table I. As discussed in [13], the effect of polarization at impact energies near the cross section maxima increases strongly along the isoelectronic sequence, despite the decrease in the magnitude of $C_{JJ'}$ along the sequence. For the present cases, as noted above, the effect of polarization goes from being minimal for the lighter ions to very significant for the heavier ions.

Rate Coefficients

We derived the excitation rate coefficients from the calculated cross sections by Maxwellian averaging. In the low energy tail of the cross sections, where close-coupling calculations are difficult, first-order cross sections, modified to allow for polarization [19], were used.

Accuracy

The accuracy of our calculated cross sections depends both on the impact energy and on the ion. For impact energies in the neighborhood of the cross section maxima, the error in the cross sections for the lighter ions is largely due to the uncertainties in the $E2$ line strengths, and we estimate this error to be about 10%. For the heavier ions, again near the cross section maxima, our estimated error rises to about 20% because polarization has such a signifi-

cant effect. For all the ions, the error in the cross sections increases with impact energy, due to the increase in the roles of polarization and of the short-range forms of the matrix elements, both of which are treated approximately. At the highest impact energies for which we give results, our estimated error has risen to about 20% for the lighter ions and to about 30% for the heavier ions. Our calculated cross sections are shown in Tables II–V.

Similar error estimates apply to our calculated rate coefficients, which are shown in Tables VI–IX. For temperatures where the rates are increasing, the error is about 10% for the lighter ions, rising to about 20% for the heavier ions. For temperatures where the rate coefficients are maximum, the error increases to about 20% for the lighter ions and to about 30% for the heavier ions.

Comparison with Previous Work

Faucher et al. [20, 21] have considered proton-impact excitation of C-like ions using a quantal formulation. Details of the comparison between their results and the present semi-classical results have been given elsewhere [18]. For the lighter ions O III, Ne V, and Mg VII, where polarization has little effect on our results, the differences between our calculations and those of Faucher et al. [21] are not great, and arise from differences in the adopted values of $\langle 2p|r^2|2p\rangle$ and from our use of short-range corrections to the matrix elements. For the heavier ions Ca XV and Fe XXI, the differences between our results and those of Faucher [20] are more pronounced, especially for the $0 \rightarrow 1$ transition, due to the significant effect of polarization in our calculation. Finally, by recalculating Fe XXI with the polarization omitted and with the same atomic data as Faucher [19], we confirmed the result of Faucher and Landman [22] that the use of the semi-classical collision formulation per se does not introduce significant errors.

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EXPLANATION OF TABLES

TABLE I. Sources of Atomic Data and Derived Polarization Terms

Ion	Ion, in spectroscopic notation
$E2$ line strengths	Source of $E2$ data
WFD	Wiese et al. [15]
CKD	Cheng et al. [16]
$E1$ line strengths	Source of $E1$ data
WFD	Wiese et al. [15]
CKD	Cheng et al. [16]
CHI	CHIANTI database [17]
Energy levels	Source of energy level data
WFD	Wiese et al. [15]
CKD	Cheng et al. [16]
CHI	CHIANTI database [17]
Effective $\langle 2p\|r^2\|2p\rangle$	Effective $\langle 2p\|r^2\|2p\rangle$ calculated from the $E2$ line strengths for the $J \rightarrow J'$ transitions in the $2s^2 2p^2\ ^3P$ term; see text for details
Polarization $C_{JJ'}$	Polarization coefficients $C_{JJ'}$ in the factor $(1 + C_{JJ'} Z_p/R)$ in the $J \rightarrow J'$ coupling within the $2s^2 2p^2\ ^3P$ term; see text for details

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

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

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

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

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

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

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

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

Tables II–IX contain data for the 12 C-like ions N II, O III, Ne V, Mg VII, Si IX, S XI, Ar XIII, Ca XV, Ti XVII, Cr XIX, Fe XXI, and Ni XXIII. 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 $0 \rightarrow 1$, $0 \rightarrow 2$, $1 \rightarrow 2$:

$0 \rightarrow 1$ $1s^2 2s^2 2p^2\ ^3P_0 \rightarrow 1s^2 2s^2 2p^2\ ^3P_1$ transition
$0 \rightarrow 2$ $1s^2 2s^2 2p^2\ ^3P_0 \rightarrow 1s^2 2s^2 2p^2\ ^3P_2$ transition
$1 \rightarrow 2$ $1s^2 2s^2 2p^2\ ^3P_1 \rightarrow 1s^2 2s^2 2p^2\ ^3P_2$ 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. Sources of Atomic Data and Derived Polarization Terms

See page 5 for Explanation of Tables

Ion	*E2* line strengths	*E1* line strengths	Energy levels	Effective $\langle 2p \mid r^2 \mid 2p \rangle$		Polarization $C_{JJ'}$	
				0→2	1→2	0→2	1→2
N II	WFD	WFD	WFD	1.681	1.856	-0.275	-0.249
O III	WFD	WFD	WFD	1.147	1.164	-0.229	-0.229
Ne V	CKD	CHI	CHI	0.581	0.580	-0.154	-0.154
Mg VII	CKD	CHI	CHI	0.351	0.350	-0.131	-0.131
Si IX	CKD	CHI	CHI	0.236	0.234	-0.112	-0.112
S XI	CKD	CHI	CHI	0.170	0.167	-0.0990	-0.0994
Ar XIII	CKD	CHI	CHI	0.130	0.125	-0.0862	-0.0869
Ca XV	CKD	CKD	CKD	0.1030	0.0960	-0.0681	-0.0741
Ti XVII	CKD	CKD	CKD	0.0847	0.0751	-0.0602	-0.0694
Cr XIX	CKD	CKD	CKD	0.0717	0.0594	-0.0520	-0.0649
Fe XXI	CKD	CHI	CHI	0.0618	0.0473	-0.0447	-0.0610
Ni XXIII	CKD	CKD	CKD	0.0539	0.0381	-0.0348	-0.0522

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

See page 5 for Explanation of Tables

N II + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+00	1.25E-03	5.01E-01	3.91E+00
1.25E+00	1.26E-02	2.88E+00	1.33E+01
1.50E+00	5.98E-02	9.24E+00	2.69E+01
1.75E+00	1.86E-01	1.94E+01	4.19E+01
2.00E+00	4.41E-01	3.17E+01	5.65E+01
2.25E+00	8.78E-01	4.47E+01	6.94E+01
2.50E+00	1.55E+00	5.72E+01	8.04E+01
2.75E+00	2.47E+00	6.83E+01	8.93E+01
3.00E+00	3.68E+00	7.76E+01	9.60E+01
3.25E+00	5.18E+00	8.50E+01	1.01E+02
3.50E+00	6.93E+00	9.05E+01	1.04E+02
3.75E+00	8.91E+00	9.41E+01	1.05E+02
4.00E+00	1.10E+01	9.61E+01	1.05E+02
4.25E+00	1.33E+01	9.68E+01	1.04E+02
4.50E+00	1.55E+01	9.66E+01	1.03E+02
5.00E+00	1.96E+01	9.45E+01	9.95E+01
6.00E+00	2.50E+01	9.04E+01	9.58E+01
7.00E+00	2.68E+01	8.91E+01	9.36E+01
8.00E+00	2.76E+01	8.63E+01	8.96E+01
9.00E+00	2.82E+01	8.27E+01	8.67E+01
1.00E+01	2.81E+01	8.05E+01	8.42E+01
1.50E+01	2.61E+01	6.98E+01	7.29E+01
2.00E+01	2.37E+01	6.24E+01	6.53E+01
2.50E+01	2.17E+01	5.71E+01	5.94E+01
3.00E+01	1.97E+01	5.35E+01	5.52E+01
3.50E+01	1.90E+01	4.97E+01	5.15E+01
4.00E+01	1.78E+01	4.69E+01	4.86E+01
5.00E+01	1.50E+01	4.32E+01	4.37E+01
6.00E+01	1.45E+01	3.91E+01	3.99E+01
7.00E+01	1.40E+01	3.59E+01	3.71E+01
8.00E+01	1.32E+01	3.36E+01	3.48E+01
9.00E+01	1.22E+01	3.19E+01	3.28E+01
1.00E+02	1.14E+01	3.05E+01	3.12E+01
1.25E+02	9.80E+00	2.80E+01	2.80E+01
1.50E+02	8.78E+00	2.62E+01	2.58E+01
2.00E+02	7.27E+00	2.35E+01	2.28E+01
2.50E+02	6.04E+00	2.14E+01	2.07E+01
3.00E+02	5.03E+00	1.97E+01	1.88E+01
4.00E+02	3.56E+00	1.69E+01	1.60E+01
5.00E+02	2.62E+00	1.48E+01	1.38E+01
6.00E+02	2.00E+00	1.31E+01	1.21E+01
7.00E+02	1.57E+00	1.18E+01	1.08E+01
8.00E+02	1.26E+00	1.07E+01	9.75E+00
1.00E+03	8.63E-01	8.96E+00	8.12E+00
1.20E+03	6.27E-01	7.72E+00	6.96E+00

O III + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.00E+00	2.90E-06		1.40E-01
3.00E+00	4.88E-04	2.63E-01	1.62E+00
4.00E+00	7.33E-03	2.40E+00	6.21E+00
5.00E+00	3.89E-02	7.28E+00	1.22E+01
6.00E+00	1.23E-01	1.37E+01	1.80E+01
7.00E+00	2.91E-01	2.04E+01	2.31E+01
8.00E+00	5.69E-01	2.64E+01	2.73E+01
9.00E+00	9.79E-01	3.14E+01	3.06E+01
1.00E+01	1.53E+00	3.52E+01	3.29E+01
1.10E+01	2.22E+00	3.78E+01	3.44E+01
1.20E+01	3.04E+00	3.93E+01	3.52E+01
1.30E+01	3.95E+00	3.99E+01	3.53E+01
1.40E+01	4.92E+00	3.98E+01	3.50E+01
1.50E+01	5.88E+00	3.93E+01	3.44E+01
1.60E+01	6.80E+00	3.85E+01	3.37E+01
1.70E+01	7.63E+00	3.76E+01	3.29E+01
1.80E+01	8.34E+00	3.68E+01	3.23E+01
1.90E+01	8.90E+00	3.62E+01	3.18E+01
2.00E+01	9.32E+00	3.58E+01	3.14E+01
2.50E+01	1.00E+01	3.45E+01	3.03E+01
3.00E+01	1.03E+01	3.23E+01	2.84E+01
4.00E+01	9.97E+00	2.95E+01	2.61E+01
5.00E+01	9.36E+00	2.73E+01	2.41E+01
6.00E+01	8.76E+00	2.55E+01	2.25E+01
7.00E+01	8.34E+00	2.39E+01	2.11E+01
8.00E+01	8.07E+00	2.23E+01	1.99E+01
9.00E+01	7.73E+00	2.12E+01	1.89E+01
1.00E+02	7.24E+00	2.04E+01	1.81E+01
1.10E+02	6.72E+00	1.97E+01	1.74E+01
1.20E+02	6.25E+00	1.92E+01	1.69E+01
1.30E+02	5.87E+00	1.87E+01	1.63E+01
1.40E+02	5.58E+00	1.82E+01	1.59E+01
1.50E+02	5.34E+00	1.77E+01	1.54E+01
1.60E+02	5.15E+00	1.73E+01	1.50E+01
1.80E+02	4.82E+00	1.66E+01	1.43E+01
2.00E+02	4.54E+00	1.59E+01	1.37E+01
3.00E+02	3.30E+00	1.34E+01	1.14E+01
4.00E+02	2.38E+00	1.16E+01	9.66E+00
5.00E+02	1.77E+00	1.02E+01	8.35E+00
6.00E+02	1.35E+00	9.06E+00	7.33E+00
8.00E+02	8.56E-01	7.39E+00	5.88E+00
1.00E+03	5.86E-01	6.23E+00	4.91E+00
1.25E+03	3.95E-01	5.21E+00	4.06E+00
1.50E+03	2.84E-01	4.47E+00	3.46E+00
1.75E+03	2.14E-01	3.91E+00	3.02E+00

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

See page 5 for Explanation of Tables

Ne V + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+01	2.57E-05	3.49E-02	1.79E-01
1.20E+01	1.91E-04	1.35E-01	5.52E-01
1.40E+01	8.10E-04	3.66E-01	1.13E+00
1.60E+01	2.45E-03	8.21E-01	1.84E+00
1.80E+01	5.85E-03	1.46E+00	2.61E+00
2.00E+01	1.19E-02	2.23E+00	3.38E+00
2.20E+01	2.14E-02	3.07E+00	4.13E+00
2.40E+01	3.56E-02	3.95E+00	4.83E+00
2.60E+01	5.52E-02	4.81E+00	5.47E+00
2.80E+01	8.11E-02	5.63E+00	6.06E+00
3.00E+01	1.14E-01	6.40E+00	6.58E+00
3.20E+01	1.55E-01	7.10E+00	7.05E+00
3.40E+01	2.04E-01	7.74E+00	7.46E+00
3.60E+01	2.62E-01	8.29E+00	7.81E+00
3.80E+01	3.29E-01	8.77E+00	8.11E+00
4.00E+01	4.04E-01	9.17E+00	8.35E+00
4.50E+01	6.29E-01	9.86E+00	8.75E+00
5.00E+01	8.98E-01	1.02E+01	8.88E+00
5.50E+01	1.19E+00	1.02E+01	8.81E+00
6.00E+01	1.49E+00	9.96E+00	8.63E+00
6.50E+01	1.78E+00	9.68E+00	8.39E+00
7.00E+01	2.02E+00	9.39E+00	8.17E+00
7.50E+01	2.22E+00	9.14E+00	7.98E+00
8.00E+01	2.36E+00	8.95E+00	7.83E+00
8.50E+01	2.47E+00	8.81E+00	7.73E+00
9.00E+01	2.53E+00	8.70E+00	7.64E+00
9.50E+01	2.57E+00	8.61E+00	7.57E+00
1.00E+02	2.59E+00	8.52E+00	7.49E+00
1.40E+02	2.52E+00	7.80E+00	6.86E+00
1.80E+02	2.36E+00	7.18E+00	6.31E+00
2.20E+02	2.25E+00	6.66E+00	5.87E+00
2.60E+02	2.10E+00	6.26E+00	5.51E+00
3.00E+02	1.91E+00	5.96E+00	5.20E+00
4.00E+02	1.37E+00	5.35E+00	4.53E+00
5.00E+02	9.78E-01	4.80E+00	3.96E+00
7.50E+02	4.87E-01	3.72E+00	2.96E+00
1.00E+03	2.89E-01	3.00E+00	2.36E+00
1.25E+03	1.92E-01	2.51E+00	1.95E+00
1.50E+03	1.37E-01	2.16E+00	1.67E+00
1.75E+03	1.02E-01	1.89E+00	1.46E+00
2.00E+03	7.92E-02	1.69E+00	1.29E+00
2.50E+03	5.16E-02	1.38E+00	1.06E+00
3.00E+03	3.62E-02	1.17E+00	8.92E-01
3.50E+03	2.68E-02	1.02E+00	7.73E-01
4.00E+03	2.06E-02	8.99E-01	6.81E-01

Mg VII + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.00E+01	6.31E-07		2.24E-02
3.00E+01	8.50E-05	4.38E-02	2.27E-01
4.00E+01	1.09E-03	3.24E-01	7.50E-01
5.00E+01	5.28E-03	8.80E-01	1.37E+00
6.00E+01	1.57E-02	1.56E+00	1.93E+00
7.00E+01	3.55E-02	2.22E+00	2.41E+00
8.00E+01	6.73E-02	2.78E+00	2.79E+00
9.00E+01	1.13E-01	3.23E+00	3.07E+00
1.00E+02	1.72E-01	3.56E+00	3.26E+00
1.10E+02	2.44E-01	3.76E+00	3.37E+00
1.20E+02	3.27E-01	3.87E+00	3.41E+00
1.30E+02	4.16E-01	3.89E+00	3.41E+00
1.40E+02	5.08E-01	3.86E+00	3.36E+00
1.50E+02	5.97E-01	3.80E+00	3.30E+00
1.60E+02	6.80E-01	3.72E+00	3.23E+00
1.70E+02	7.54E-01	3.64E+00	3.16E+00
1.80E+02	8.18E-01	3.56E+00	3.10E+00
1.90E+02	8.72E-01	3.48E+00	3.04E+00
2.00E+02	9.17E-01	3.42E+00	2.99E+00
2.25E+02	9.94E-01	3.28E+00	2.89E+00
2.50E+02	1.04E+00	3.17E+00	2.80E+00
2.75E+02	1.06E+00	3.07E+00	2.73E+00
3.00E+02	1.06E+00	2.98E+00	2.66E+00
3.50E+02	1.03E+00	2.84E+00	2.53E+00
4.00E+02	9.69E-01	2.73E+00	2.41E+00
4.50E+02	8.79E-01	2.64E+00	2.31E+00
5.00E+02	7.78E-01	2.55E+00	2.20E+00
5.50E+02	6.80E-01	2.46E+00	2.09E+00
6.00E+02	5.90E-01	2.37E+00	1.99E+00
7.00E+02	4.45E-01	2.20E+00	1.80E+00
8.00E+02	3.41E-01	2.03E+00	1.63E+00
9.00E+02	2.67E-01	1.88E+00	1.49E+00
1.00E+03	2.13E-01	1.74E+00	1.37E+00
1.25E+03	1.33E-01	1.47E+00	1.14E+00
1.50E+03	9.05E-02	1.26E+00	9.73E-01
1.75E+03	6.58E-02	1.11E+00	8.50E-01
2.00E+03	5.02E-02	9.89E-01	7.55E-01
2.50E+03	3.21E-02	8.13E-01	6.18E-01
3.00E+03	2.24E-02	6.90E-01	5.24E-01
3.50E+03	1.65E-02	6.00E-01	4.54E-01
4.00E+03	1.26E-02	5.31E-01	4.02E-01
5.00E+03	8.11E-03	4.32E-01	3.26E-01
6.00E+03	5.63E-03	3.64E-01	2.74E-01
7.00E+03	4.13E-03	3.14E-01	2.37E-01
8.00E+03	3.16E-03	2.77E-01	2.08E-01

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

See page 5 for Explanation of Tables

Si IX + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
5.50E+01	1.65E-05	1.10E-02	6.84E-02
6.00E+01	4.21E-05	1.80E-02	1.12E-01
6.50E+01	9.39E-05	3.57E-02	1.67E-01
7.00E+01	1.86E-04	6.21E-02	2.30E-01
7.50E+01	3.37E-04	9.83E-02	3.00E-01
8.00E+01	5.75E-04	1.45E-01	3.74E-01
8.50E+01	9.16E-04	2.00E-01	4.50E-01
9.00E+01	1.38E-03	2.62E-01	5.28E-01
9.50E+01	2.01E-03	3.33E-01	6.06E-01
1.00E+02	2.83E-03	4.08E-01	6.82E-01
1.10E+02	5.13E-03	5.68E-01	8.28E-01
1.20E+02	8.49E-03	7.35E-01	9.63E-01
1.30E+02	1.31E-02	8.99E-01	1.09E+00
1.40E+02	1.92E-02	1.06E+00	1.20E+00
1.50E+02	2.69E-02	1.20E+00	1.29E+00
1.60E+02	3.62E-02	1.33E+00	1.38E+00
1.70E+02	4.74E-02	1.45E+00	1.45E+00
1.80E+02	6.02E-02	1.54E+00	1.50E+00
1.90E+02	7.48E-02	1.63E+00	1.55E+00
2.00E+02	9.10E-02	1.70E+00	1.59E+00
2.20E+02	1.27E-01	1.79E+00	1.63E+00
2.40E+02	1.68E-01	1.83E+00	1.64E+00
2.60E+02	2.10E-01	1.85E+00	1.63E+00
2.80E+02	2.51E-01	1.83E+00	1.61E+00
3.00E+02	2.89E-01	1.81E+00	1.58E+00
3.50E+02	3.67E-01	1.73E+00	1.50E+00
4.00E+02	4.16E-01	1.65E+00	1.44E+00
4.50E+02	4.40E-01	1.59E+00	1.38E+00
5.00E+02	4.45E-01	1.53E+00	1.33E+00
5.50E+02	4.36E-01	1.49E+00	1.29E+00
6.00E+02	4.15E-01	1.45E+00	1.24E+00
6.50E+02	3.88E-01	1.41E+00	1.19E+00
7.00E+02	3.57E-01	1.37E+00	1.15E+00
7.50E+02	3.25E-01	1.33E+00	1.11E+00
8.00E+02	2.94E-01	1.29E+00	1.06E+00
9.00E+02	2.39E-01	1.21E+00	9.80E-01
1.00E+03	1.94E-01	1.13E+00	9.05E-01
1.50E+03	7.75E-02	8.38E-01	6.45E-01
2.00E+03	3.97E-02	6.56E-01	4.98E-01
3.00E+03	1.62E-02	4.57E-01	3.45E-01
4.00E+03	8.91E-03	3.52E-01	2.65E-01
5.00E+03	5.66E-03	2.86E-01	2.15E-01
6.00E+03	3.91E-03	2.42E-01	1.82E-01
7.00E+03	2.87E-03	2.09E-01	1.57E-01
8.00E+03	2.19E-03	1.84E-01	1.39E-01

S XI + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
8.50E+01	1.80E-06		1.62E-02
9.00E+01	3.78E-06		2.45E-02
9.50E+01	7.39E-06	4.93E-03	3.51E-02
1.00E+02	1.33E-05	6.96E-03	4.79E-02
1.10E+02	3.61E-05	1.37E-02	7.96E-02
1.20E+02	8.37E-05	2.46E-02	1.18E-01
1.30E+02	1.73E-04	4.38E-02	1.62E-01
1.40E+02	3.24E-04	6.99E-02	2.10E-01
1.50E+02	5.52E-04	1.02E-01	2.59E-01
1.60E+02	8.85E-04	1.41E-01	3.09E-01
1.70E+02	1.35E-03	1.84E-01	3.58E-01
1.80E+02	1.96E-03	2.31E-01	4.06E-01
1.90E+02	2.76E-03	2.81E-01	4.53E-01
2.00E+02	3.76E-03	3.32E-01	4.97E-01
2.10E+02	4.98E-03	3.84E-01	5.39E-01
2.20E+02	6.44E-03	4.35E-01	5.79E-01
2.30E+02	8.17E-03	4.86E-01	6.16E-01
2.40E+02	1.02E-02	5.35E-01	6.50E-01
2.50E+02	1.25E-02	5.83E-01	6.82E-01
2.60E+02	1.51E-02	6.28E-01	7.11E-01
2.70E+02	1.80E-02	6.70E-01	7.38E-01
2.80E+02	2.12E-02	7.10E-01	7.62E-01
2.90E+02	2.48E-02	7.46E-01	7.84E-01
3.00E+02	2.87E-02	7.80E-01	8.03E-01
3.20E+02	3.72E-02	8.39E-01	8.34E-01
3.40E+02	4.69E-02	8.86E-01	8.57E-01
3.60E+02	5.74E-02	9.22E-01	8.73E-01
3.80E+02	6.85E-02	9.49E-01	8.82E-01
4.00E+02	8.01E-02	9.68E-01	8.86E-01
5.00E+02	1.35E-01	9.84E-01	8.63E-01
6.00E+02	1.71E-01	9.49E-01	8.16E-01
7.00E+02	1.86E-01	9.07E-01	7.69E-01
8.00E+02	1.83E-01	8.65E-01	7.24E-01
9.00E+02	1.70E-01	8.23E-01	6.79E-01
1.00E+03	1.51E-01	7.82E-01	6.36E-01
1.50E+03	7.17E-02	5.97E-01	4.62E-01
2.00E+03	3.62E-02	4.69E-01	3.55E-01
3.00E+03	1.34E-02	3.25E-01	2.43E-01
4.00E+03	6.91E-03	2.49E-01	1.86E-01
5.00E+03	4.25E-03	2.02E-01	1.51E-01
6.00E+03	2.89E-03	1.71E-01	1.27E-01
7.00E+03	2.10E-03	1.48E-01	1.10E-01
8.00E+03	1.60E-03	1.30E-01	9.74E-02
9.00E+03	1.26E-03	1.17E-01	8.72E-02
1.00E+04	1.02E-03	1.05E-01	7.89E-02

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

See page 5 for Explanation of Tables

Ar XIII + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.40E+02	1.43E-06		1.33E-02
1.60E+02	7.12E-06		3.01E-02
1.80E+02	2.57E-05	6.90E-03	5.57E-02
2.00E+02	7.35E-05	1.67E-02	8.77E-02
2.20E+02	1.69E-04	3.23E-02	1.24E-01
2.40E+02	3.43E-04	5.43E-02	1.62E-01
2.60E+02	6.20E-04	8.20E-02	2.01E-01
2.80E+02	1.04E-03	1.14E-01	2.39E-01
3.00E+02	1.63E-03	1.50E-01	2.75E-01
3.20E+02	2.41E-03	1.88E-01	3.09E-01
3.40E+02	3.43E-03	2.26E-01	3.41E-01
3.60E+02	4.70E-03	2.65E-01	3.71E-01
3.80E+02	6.24E-03	3.02E-01	3.97E-01
4.00E+02	8.08E-03	3.38E-01	4.21E-01
4.50E+02	1.39E-02	4.17E-01	4.68E-01
5.00E+02	2.15E-02	4.79E-01	5.00E-01
5.50E+02	3.03E-02	5.23E-01	5.18E-01
6.00E+02	3.98E-02	5.52E-01	5.27E-01
6.50E+02	4.93E-02	5.70E-01	5.27E-01
7.00E+02	5.81E-02	5.79E-01	5.23E-01
7.50E+02	6.59E-02	5.81E-01	5.16E-01
8.00E+02	7.24E-02	5.80E-01	5.07E-01
8.50E+02	7.74E-02	5.76E-01	4.98E-01
9.00E+02	8.10E-02	5.70E-01	4.87E-01
9.50E+02	8.32E-02	5.62E-01	4.76E-01
1.00E+03	8.41E-02	5.54E-01	4.64E-01
1.33E+03	7.10E-02	4.86E-01	3.88E-01
1.67E+03	4.98E-02	4.18E-01	3.24E-01
2.00E+03	3.40E-02	3.61E-01	2.74E-01
2.33E+03	2.36E-02	3.15E-01	2.36E-01
2.67E+03	1.70E-02	2.78E-01	2.07E-01
3.00E+03	1.26E-02	2.49E-01	1.85E-01
4.00E+03	6.13E-03	1.89E-01	1.40E-01
5.00E+03	3.59E-03	1.53E-01	1.13E-01
6.00E+03	2.37E-03	1.29E-01	9.53E-02
7.00E+03	1.69E-03	1.11E-01	8.25E-02
8.00E+03	1.27E-03	9.80E-02	7.28E-02
9.00E+03	9.94E-04	8.77E-02	6.52E-02
1.00E+04	7.99E-04	7.94E-02	5.90E-02
1.10E+04	6.57E-04	7.25E-02	5.40E-02
1.20E+04	5.49E-04	6.68E-02	4.97E-02
1.30E+04	4.66E-04	6.19E-02	4.61E-02
1.40E+04	4.01E-04	5.77E-02	4.29E-02
1.50E+04	3.48E-04	5.40E-02	4.02E-02
1.60E+04	3.05E-04	5.07E-02	3.78E-02

Ca XV + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.00E+02	3.88E-07		6.40E-03
2.20E+02	1.45E-06		1.20E-02
2.40E+02	4.30E-06		2.03E-02
2.60E+02	1.08E-05		3.08E-02
2.80E+02	2.35E-05	5.36E-03	4.34E-02
3.00E+02	4.69E-05	9.63E-03	5.74E-02
3.20E+02	8.47E-05	1.56E-02	7.25E-02
3.40E+02	1.43E-04	2.35E-02	8.83E-02
3.60E+02	2.27E-04	3.33E-02	1.04E-01
3.80E+02	3.45E-04	4.49E-02	1.20E-01
4.00E+02	5.03E-04	5.82E-02	1.36E-01
4.20E+02	7.06E-04	7.28E-02	1.52E-01
4.40E+02	9.61E-04	8.85E-02	1.67E-01
4.60E+02	1.28E-03	1.05E-01	1.81E-01
4.80E+02	1.66E-03	1.22E-01	1.95E-01
5.00E+02	2.12E-03	1.40E-01	2.08E-01
5.42E+02	3.31E-03	1.76E-01	2.33E-01
5.83E+02	4.85E-03	2.12E-01	2.54E-01
6.25E+02	6.76E-03	2.44E-01	2.71E-01
6.67E+02	9.01E-03	2.73E-01	2.86E-01
7.08E+02	1.16E-02	2.98E-01	2.97E-01
7.50E+02	1.43E-02	3.19E-01	3.05E-01
7.92E+02	1.73E-02	3.37E-01	3.11E-01
8.33E+02	2.03E-02	3.51E-01	3.15E-01
8.75E+02	2.33E-02	3.62E-01	3.17E-01
9.17E+02	2.62E-02	3.71E-01	3.17E-01
9.58E+02	2.90E-02	3.77E-01	3.16E-01
1.00E+03	3.15E-02	3.81E-01	3.15E-01
1.25E+03	4.10E-02	3.82E-01	2.93E-01
1.50E+03	4.10E-02	3.62E-01	2.65E-01
1.75E+03	3.60E-02	3.34E-01	2.37E-01
2.00E+03	2.97E-02	3.05E-01	2.12E-01
2.50E+03	1.91E-02	2.54E-01	1.71E-01
3.00E+03	1.25E-02	2.14E-01	1.43E-01
4.00E+03	6.03E-03	1.62E-01	1.07E-01
5.00E+03	3.42E-03	1.30E-01	8.56E-02
6.00E+03	2.18E-03	1.09E-01	7.17E-02
7.00E+03	1.52E-03	9.37E-02	6.19E-02
8.00E+03	1.12E-03	8.24E-02	5.45E-02
1.00E+04	6.91E-04	6.66E-02	4.42E-02
1.20E+04	4.71E-04	5.60E-02	3.72E-02
1.40E+04	3.42E-04	4.84E-02	3.22E-02
1.60E+04	2.60E-04	4.26E-02	2.84E-02
1.80E+04	2.04E-04	3.81E-02	2.54E-02
2.00E+04	1.64E-04	3.44E-02	2.29E-02

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

See page 5 for Explanation of Tables

Ti XVII + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+02	4.44E-07		7.09E-03
3.50E+02	3.34E-06	1.66E-03	1.70E-02
4.00E+02	1.54E-05	3.11E-03	3.16E-02
4.50E+02	4.86E-05	8.38E-03	4.88E-02
5.00E+02	1.23E-04	1.75E-02	6.73E-02
5.50E+02	2.63E-04	3.07E-02	8.59E-02
6.00E+02	4.92E-04	4.74E-02	1.04E-01
6.50E+02	8.37E-04	6.66E-02	1.20E-01
7.00E+02	1.32E-03	8.73E-02	1.35E-01
7.50E+02	1.95E-03	1.09E-01	1.49E-01
8.00E+02	2.75E-03	1.29E-01	1.61E-01
8.50E+02	3.71E-03	1.49E-01	1.71E-01
9.00E+02	4.82E-03	1.68E-01	1.79E-01
9.50E+02	6.06E-03	1.84E-01	1.85E-01
1.00E+03	7.40E-03	1.99E-01	1.91E-01
1.10E+03	1.02E-02	2.22E-01	1.97E-01
1.20E+03	1.31E-02	2.39E-01	2.00E-01
1.30E+03	1.57E-02	2.49E-01	1.99E-01
1.40E+03	1.78E-02	2.55E-01	1.96E-01
1.50E+03	1.94E-02	2.58E-01	1.92E-01
1.60E+03	2.05E-02	2.58E-01	1.87E-01
1.70E+03	2.11E-02	2.56E-01	1.82E-01
1.80E+03	2.12E-02	2.53E-01	1.76E-01
1.90E+03	2.10E-02	2.49E-01	1.70E-01
2.00E+03	2.04E-02	2.43E-01	1.64E-01
2.25E+03	1.83E-02	2.28E-01	1.49E-01
2.50E+03	1.58E-02	2.12E-01	1.36E-01
2.75E+03	1.34E-02	1.97E-01	1.24E-01
3.00E+03	1.13E-02	1.83E-01	1.14E-01
4.00E+03	5.77E-03	1.39E-01	8.46E-02
5.00E+03	3.26E-03	1.11E-01	6.71E-02
6.00E+03	2.04E-03	9.25E-02	5.58E-02
7.00E+03	1.39E-03	7.93E-02	4.79E-02
8.00E+03	1.00E-03	6.95E-02	4.20E-02
1.04E+04	5.47E-04	5.38E-02	3.27E-02
1.28E+04	3.48E-04	4.41E-02	2.68E-02
1.52E+04	2.42E-04	3.74E-02	2.28E-02
1.76E+04	1.78E-04	3.25E-02	1.99E-02
2.00E+04	1.37E-04	2.87E-02	1.76E-02
2.25E+04	1.07E-04	2.57E-02	1.57E-02
2.50E+04	8.64E-05	2.32E-02	1.42E-02
2.75E+04	7.11E-05	2.12E-02	1.30E-02
3.00E+04	5.95E-05	1.94E-02	1.20E-02
3.25E+04	5.05E-05	1.80E-02	1.11E-02
3.50E+04	4.34E-05	1.67E-02	1.03E-02

Cr XIX + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
4.00E+02	1.55E-07	8.38E-04	4.82E-03
4.50E+02	9.24E-07	9.19E-04	9.74E-03
5.00E+02	3.47E-06	1.36E-03	1.64E-02
5.50E+02	1.03E-05	1.94E-03	2.43E-02
6.00E+02	2.51E-05	4.26E-03	3.30E-02
6.50E+02	5.30E-05	7.95E-03	4.21E-02
7.00E+02	1.01E-04	1.32E-02	5.13E-02
7.50E+02	1.76E-04	2.00E-02	6.03E-02
8.00E+02	2.84E-04	2.82E-02	6.88E-02
8.50E+02	4.33E-04	3.76E-02	7.70E-02
9.00E+02	6.28E-04	4.79E-02	8.46E-02
9.50E+02	8.76E-04	5.87E-02	9.15E-02
1.00E+03	1.18E-03	6.98E-02	9.79E-02
1.20E+03	2.93E-03	1.12E-01	1.17E-01
1.40E+03	5.26E-03	1.44E-01	1.26E-01
1.60E+03	7.63E-03	1.64E-01	1.28E-01
1.80E+03	9.52E-03	1.75E-01	1.26E-01
2.00E+03	1.07E-02	1.79E-01	1.21E-01
2.20E+03	1.12E-02	1.79E-01	1.16E-01
2.40E+03	1.10E-02	1.75E-01	1.09E-01
2.60E+03	1.05E-02	1.69E-01	1.03E-01
2.80E+03	9.82E-03	1.63E-01	9.66E-02
3.00E+03	8.99E-03	1.56E-01	9.07E-02
3.50E+03	6.93E-03	1.38E-01	7.80E-02
4.00E+03	5.25E-03	1.22E-01	6.79E-02
4.50E+03	3.99E-03	1.09E-01	6.00E-02
5.00E+03	3.08E-03	9.83E-02	5.36E-02
5.50E+03	2.42E-03	8.92E-02	4.84E-02
6.00E+03	1.94E-03	8.16E-02	4.42E-02
6.50E+03	1.57E-03	7.52E-02	4.06E-02
7.00E+03	1.30E-03	6.97E-02	3.76E-02
7.50E+03	1.09E-03	6.50E-02	3.51E-02
8.00E+03	9.25E-04	6.09E-02	3.29E-02
9.00E+03	6.90E-04	5.41E-02	2.92E-02
1.00E+04	5.34E-04	4.87E-02	2.63E-02
1.40E+04	2.47E-04	3.50E-02	1.90E-02
1.80E+04	1.44E-04	2.75E-02	1.50E-02
2.20E+04	9.48E-05	2.26E-02	1.24E-02
2.60E+04	6.71E-05	1.93E-02	1.06E-02
3.00E+04	5.00E-05	1.68E-02	9.25E-03
3.40E+04	3.86E-05	1.49E-02	8.20E-03
3.80E+04	3.08E-05	1.33E-02	7.37E-03
4.20E+04	2.51E-05	1.21E-02	6.70E-03
4.60E+04	2.08E-05	1.11E-02	6.13E-03
5.00E+04	1.75E-05	1.02E-02	5.66E-03

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

See page 5 for Explanation of Tables

Fe XXI + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
4.00E+02	3.42E-10		9.47E-04
5.00E+02	3.49E-08		3.17E-03
6.00E+02	5.94E-07		8.85E-03
7.00E+02	4.20E-06	1.29E-03	1.69E-02
8.00E+02	1.82E-05	3.02E-03	2.61E-02
8.50E+02	3.24E-05	4.94E-03	3.09E-02
9.00E+02	5.37E-05	7.48E-03	3.56E-02
9.50E+02	8.59E-05	1.08E-02	4.02E-02
1.00E+03	1.28E-04	1.46E-02	4.46E-02
1.05E+03	1.85E-04	1.91E-02	4.89E-02
1.10E+03	2.60E-04	2.42E-02	5.29E-02
1.15E+03	3.51E-04	2.97E-02	5.66E-02
1.20E+03	4.62E-04	3.55E-02	6.02E-02
1.25E+03	5.91E-04	4.15E-02	6.34E-02
1.30E+03	7.42E-04	4.76E-02	6.64E-02
1.35E+03	9.14E-04	5.38E-02	6.92E-02
1.40E+03	1.11E-03	5.99E-02	7.17E-02
1.45E+03	1.32E-03	6.59E-02	7.39E-02
1.50E+03	1.54E-03	7.17E-02	7.59E-02
1.75E+03	2.85E-03	9.67E-02	8.22E-02
2.00E+03	4.19E-03	1.14E-01	8.39E-02
2.25E+03	5.25E-03	1.23E-01	8.25E-02
2.50E+03	5.90E-03	1.28E-01	7.94E-02
2.75E+03	6.13E-03	1.28E-01	7.53E-02
3.00E+03	6.04E-03	1.26E-01	7.09E-02
3.50E+03	5.31E-03	1.17E-01	6.22E-02
4.00E+03	4.35E-03	1.07E-01	5.47E-02
5.00E+03	2.76E-03	8.80E-02	4.32E-02
6.00E+03	1.78E-03	7.35E-02	3.54E-02
7.00E+03	1.20E-03	6.27E-02	3.00E-02
8.00E+03	8.52E-04	5.47E-02	2.60E-02
9.00E+03	6.31E-04	4.84E-02	2.30E-02
1.00E+04	4.84E-04	4.35E-02	2.07E-02
1.25E+04	2.82E-04	3.48E-02	1.65E-02
1.50E+04	1.86E-04	2.90E-02	1.39E-02
1.75E+04	1.32E-04	2.50E-02	1.20E-02
2.00E+04	9.90E-05	2.19E-02	1.05E-02
2.50E+04	6.19E-05	1.77E-02	8.53E-03
3.00E+04	4.24E-05	1.48E-02	7.18E-03
3.50E+04	3.09E-05	1.28E-02	6.20E-03
4.00E+04	2.35E-05	1.12E-02	5.45E-03
4.50E+04	1.84E-05	1.00E-02	4.87E-03
5.00E+04	1.48E-05	9.02E-03	4.40E-03
5.50E+04	1.22E-05	8.22E-03	4.02E-03
6.00E+04	1.02E-05	7.55E-03	3.69E-03

Ni XXIII + p			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
5.00E+02	1.82E-10		7.08E-04
6.00E+02	4.00E-09		1.92E-03
7.00E+02	6.07E-08		4.66E-03
8.00E+02	5.30E-07		8.65E-03
9.00E+02	2.51E-06		1.34E-02
1.00E+03	8.35E-06	1.46E-03	1.85E-02
1.10E+03	2.20E-05	3.35E-03	2.37E-02
1.20E+03	4.85E-05	6.39E-03	2.86E-02
1.30E+03	9.39E-05	1.06E-02	3.33E-02
1.40E+03	1.64E-04	1.60E-02	3.76E-02
1.50E+03	2.64E-04	2.22E-02	4.14E-02
1.60E+03	3.94E-04	2.90E-02	4.48E-02
1.70E+03	5.57E-04	3.61E-02	4.77E-02
1.80E+03	7.51E-04	4.32E-02	5.02E-02
1.90E+03	9.71E-04	5.00E-02	5.22E-02
2.00E+03	1.21E-03	5.66E-02	5.38E-02
2.25E+03	1.86E-03	7.05E-02	5.60E-02
2.50E+03	2.46E-03	8.07E-02	5.64E-02
2.75E+03	2.94E-03	8.75E-02	5.55E-02
3.00E+03	3.26E-03	9.13E-02	5.37E-02
3.50E+03	3.43E-03	9.28E-02	4.90E-02
4.00E+03	3.18E-03	8.94E-02	4.40E-02
5.00E+03	2.32E-03	7.78E-02	3.54E-02
6.00E+03	1.60E-03	6.65E-02	2.91E-02
7.00E+03	1.11E-03	5.73E-02	2.46E-02
8.00E+03	7.97E-04	5.00E-02	2.12E-02
9.00E+03	5.91E-04	4.43E-02	1.87E-02
1.00E+04	4.52E-04	3.98E-02	1.67E-02
1.20E+04	2.85E-04	3.30E-02	1.38E-02
1.40E+04	1.96E-04	2.82E-02	1.18E-02
1.60E+04	1.43E-04	2.47E-02	1.04E-02
1.80E+04	1.09E-04	2.20E-02	9.24E-03
2.00E+04	8.64E-05	1.98E-02	8.35E-03
2.25E+04	6.69E-05	1.76E-02	7.46E-03
2.50E+04	5.34E-05	1.59E-02	6.75E-03
2.75E+04	4.37E-05	1.45E-02	6.17E-03
3.00E+04	3.64E-05	1.33E-02	5.68E-03
3.25E+04	3.08E-05	1.23E-02	5.26E-03
3.50E+04	2.65E-05	1.15E-02	4.91E-03
3.75E+04	2.29E-05	1.07E-02	4.60E-03
4.00E+04	2.01E-05	1.01E-02	4.32E-03
4.50E+04	1.58E-05	8.99E-03	3.86E-03
5.00E+04	1.27E-05	8.12E-03	3.49E-03
5.50E+04	1.04E-05	7.40E-03	3.19E-03
6.00E+04	8.73E-06	6.80E-03	2.93E-03

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

See page 5 for Explanation of Tables

N II + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+00	7.47E-04	3.88E-01	1.83E+00
1.25E+00	1.15E-02	1.17E+00	9.78E+00
1.50E+00	7.44E-02	4.78E+00	2.62E+01
1.75E+00	2.82E-01	1.34E+01	4.85E+01
2.00E+00	7.74E-01	2.66E+01	7.25E+01
2.25E+00	1.69E+00	4.25E+01	9.49E+01
2.50E+00	3.16E+00	5.92E+01	1.14E+02
2.75E+00	5.22E+00	7.47E+01	1.28E+02
3.00E+00	7.90E+00	8.80E+01	1.38E+02
3.25E+00	1.11E+01	9.84E+01	1.44E+02
3.50E+00	1.46E+01	1.06E+02	1.47E+02
3.75E+00	1.83E+01	1.11E+02	1.47E+02
4.00E+00	2.19E+01	1.15E+02	1.47E+02
4.25E+00	2.52E+01	1.17E+02	1.46E+02
4.50E+00	2.81E+01	1.19E+02	1.46E+02
5.00E+00	3.23E+01	1.22E+02	1.45E+02
6.00E+00	3.65E+01	1.26E+02	1.42E+02
7.00E+00	3.90E+01	1.24E+02	1.35E+02
8.00E+00	3.98E+01	1.22E+02	1.31E+02
9.00E+00	3.99E+01	1.18E+02	1.26E+02
1.00E+01	3.95E+01	1.15E+02	1.22E+02
1.50E+01	3.58E+01	1.00E+02	1.04E+02
2.00E+01	3.22E+01	8.96E+01	9.25E+01
2.50E+01	2.94E+01	8.17E+01	8.41E+01
3.00E+01	2.71E+01	7.56E+01	7.74E+01
3.50E+01	2.52E+01	7.08E+01	7.24E+01
4.00E+01	2.41E+01	6.62E+01	6.79E+01
5.00E+01	2.08E+01	6.08E+01	6.14E+01
6.00E+01	1.96E+01	5.54E+01	5.63E+01
7.00E+01	1.76E+01	5.15E+01	5.21E+01
8.00E+01	1.62E+01	4.84E+01	4.84E+01
9.00E+01	1.55E+01	4.56E+01	4.56E+01
1.00E+02	1.53E+01	4.31E+01	4.33E+01
1.25E+02	1.44E+01	3.81E+01	3.90E+01
1.50E+02	1.31E+01	3.47E+01	3.56E+01
2.00E+02	1.09E+01	3.03E+01	3.06E+01
2.50E+02	9.51E+00	2.76E+01	2.74E+01
3.00E+02	8.49E+00	2.58E+01	2.53E+01
4.00E+02	6.88E+00	2.31E+01	2.23E+01
5.00E+02	5.60E+00	2.10E+01	2.01E+01
6.00E+02	4.60E+00	1.93E+01	1.83E+01
7.00E+02	3.82E+00	1.78E+01	1.67E+01
8.00E+02	3.20E+00	1.64E+01	1.54E+01
1.00E+03	2.34E+00	1.43E+01	1.33E+01
1.20E+03	1.77E+00	1.26E+01	1.16E+01

O III + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+00	3.34E-04	1.79E-01	8.74E-01
4.00E+00	8.51E-03	1.12E+00	5.68E+00
5.00E+00	6.23E-02	5.34E+00	1.46E+01
6.00E+00	2.38E-01	1.30E+01	2.48E+01
7.00E+00	6.26E-01	2.23E+01	3.42E+01
8.00E+00	1.31E+00	3.14E+01	4.16E+01
9.00E+00	2.31E+00	3.90E+01	4.69E+01
1.00E+01	3.62E+00	4.47E+01	5.01E+01
1.10E+01	5.18E+00	4.83E+01	5.14E+01
1.20E+01	6.86E+00	5.02E+01	5.16E+01
1.30E+01	8.52E+00	5.11E+01	5.10E+01
1.40E+01	1.00E+01	5.14E+01	5.01E+01
1.50E+01	1.13E+01	5.15E+01	4.93E+01
1.60E+01	1.23E+01	5.16E+01	4.88E+01
1.70E+01	1.30E+01	5.19E+01	4.85E+01
1.80E+01	1.34E+01	5.21E+01	4.82E+01
1.90E+01	1.38E+01	5.21E+01	4.78E+01
2.00E+01	1.40E+01	5.19E+01	4.73E+01
2.50E+01	1.48E+01	4.93E+01	4.41E+01
3.00E+01	1.48E+01	4.71E+01	4.17E+01
4.00E+01	1.40E+01	4.29E+01	3.77E+01
5.00E+01	1.31E+01	3.95E+01	3.46E+01
6.00E+01	1.22E+01	3.67E+01	3.21E+01
7.00E+01	1.16E+01	3.43E+01	3.00E+01
8.00E+01	1.10E+01	3.23E+01	2.84E+01
9.00E+01	1.01E+01	3.10E+01	2.71E+01
1.00E+02	9.40E+00	2.98E+01	2.59E+01
1.10E+02	9.06E+00	2.84E+01	2.47E+01
1.20E+02	8.94E+00	2.70E+01	2.37E+01
1.30E+02	8.84E+00	2.58E+01	2.27E+01
1.40E+02	8.68E+00	2.48E+01	2.19E+01
1.50E+02	8.45E+00	2.39E+01	2.12E+01
1.60E+02	8.16E+00	2.32E+01	2.06E+01
1.80E+02	7.55E+00	2.20E+01	1.95E+01
2.00E+02	7.00E+00	2.11E+01	1.85E+01
2.67E+02	5.78E+00	1.87E+01	1.63E+01
3.33E+02	5.05E+00	1.72E+01	1.49E+01
4.00E+02	4.46E+00	1.60E+01	1.38E+01
5.00E+02	3.70E+00	1.45E+01	1.24E+01
6.00E+02	3.07E+00	1.33E+01	1.12E+01
8.00E+02	2.16E+00	1.14E+01	9.45E+00
1.00E+03	1.59E+00	9.98E+00	8.12E+00
1.25E+03	1.13E+00	8.59E+00	6.89E+00
1.50E+03	8.41E-01	7.53E+00	5.98E+00
1.75E+03	6.50E-01	6.69E+00	5.28E+00

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

See page 5 for Explanation of Tables

Ne V + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+01	1.39E-05		9.00E-02
1.20E+01	1.43E-04	5.45E-02	3.44E-01
1.40E+01	8.22E-04	1.63E-01	9.21E-01
1.60E+01	3.16E-03	4.40E-01	1.84E+00
1.80E+01	8.91E-03	9.90E-01	3.01E+00
2.00E+01	2.05E-02	1.80E+00	4.31E+00
2.20E+01	4.13E-02	2.84E+00	5.64E+00
2.40E+01	7.37E-02	4.02E+00	6.95E+00
2.60E+01	1.21E-01	5.27E+00	8.16E+00
2.80E+01	1.85E-01	6.54E+00	9.26E+00
3.00E+01	2.69E-01	7.75E+00	1.02E+01
3.20E+01	3.73E-01	8.87E+00	1.10E+01
3.40E+01	4.99E-01	9.87E+00	1.17E+01
3.60E+01	6.45E-01	1.07E+01	1.23E+01
3.80E+01	8.10E-01	1.15E+01	1.27E+01
4.00E+01	9.93E-01	1.21E+01	1.29E+01
4.50E+01	1.51E+00	1.30E+01	1.32E+01
5.00E+01	2.05E+00	1.33E+01	1.31E+01
5.50E+01	2.54E+00	1.33E+01	1.28E+01
6.00E+01	2.95E+00	1.33E+01	1.25E+01
6.50E+01	3.24E+00	1.33E+01	1.23E+01
7.00E+01	3.43E+00	1.33E+01	1.22E+01
7.50E+01	3.54E+00	1.33E+01	1.21E+01
8.00E+01	3.60E+00	1.32E+01	1.19E+01
9.00E+01	3.69E+00	1.29E+01	1.15E+01
1.00E+02	3.75E+00	1.25E+01	1.11E+01
1.40E+02	3.69E+00	1.12E+01	9.88E+00
1.80E+02	3.42E+00	1.03E+01	9.00E+00
2.20E+02	3.05E+00	9.64E+00	8.38E+00
2.60E+02	2.73E+00	9.16E+00	7.90E+00
3.00E+02	2.52E+00	8.70E+00	7.48E+00
4.00E+02	2.18E+00	7.79E+00	6.67E+00
5.00E+02	1.85E+00	7.13E+00	6.04E+00
7.50E+02	1.18E+00	5.87E+00	4.84E+00
1.00E+03	7.86E-01	4.95E+00	4.00E+00
1.25E+03	5.56E-01	4.25E+00	3.39E+00
1.50E+03	4.12E-01	3.72E+00	2.94E+00
1.75E+03	3.17E-01	3.31E+00	2.60E+00
2.00E+03	2.51E-01	2.98E+00	2.32E+00
2.50E+03	1.68E-01	2.48E+00	1.92E+00
3.00E+03	1.20E-01	2.12E+00	1.63E+00
3.50E+03	9.01E-02	1.85E+00	1.42E+00
4.00E+03	6.99E-02	1.65E+00	1.26E+00
4.50E+03	5.59E-02	1.48E+00	1.13E+00
5.00E+03	4.56E-02	1.35E+00	1.03E+00

Mg VII + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+01	6.36E-05	2.45E-02	1.42E-01
4.00E+01	1.39E-03	1.69E-01	7.50E-01
5.00E+01	9.13E-03	7.00E-01	1.74E+00
6.00E+01	3.24E-02	1.56E+00	2.79E+00
7.00E+01	8.11E-02	2.54E+00	3.69E+00
8.00E+01	1.62E-01	3.43E+00	4.36E+00
9.00E+01	2.76E-01	4.13E+00	4.80E+00
1.00E+02	4.20E-01	4.62E+00	5.03E+00
1.10E+02	5.83E-01	4.90E+00	5.10E+00
1.20E+02	7.51E-01	5.04E+00	5.06E+00
1.30E+02	9.12E-01	5.09E+00	4.98E+00
1.40E+02	1.05E+00	5.09E+00	4.89E+00
1.50E+02	1.17E+00	5.08E+00	4.81E+00
1.60E+02	1.26E+00	5.07E+00	4.74E+00
1.70E+02	1.32E+00	5.06E+00	4.69E+00
1.80E+02	1.37E+00	5.06E+00	4.64E+00
1.90E+02	1.40E+00	5.04E+00	4.60E+00
2.00E+02	1.42E+00	5.02E+00	4.55E+00
2.25E+02	1.44E+00	4.94E+00	4.42E+00
2.50E+02	1.43E+00	4.84E+00	4.29E+00
2.75E+02	1.42E+00	4.72E+00	4.17E+00
3.00E+02	1.40E+00	4.61E+00	4.05E+00
3.50E+02	1.35E+00	4.39E+00	3.84E+00
4.00E+02	1.32E+00	4.19E+00	3.65E+00
4.50E+02	1.27E+00	4.01E+00	3.49E+00
5.00E+02	1.22E+00	3.86E+00	3.35E+00
5.50E+02	1.15E+00	3.73E+00	3.22E+00
6.00E+02	1.07E+00	3.62E+00	3.10E+00
7.00E+02	9.08E-01	3.41E+00	2.88E+00
8.00E+02	7.62E-01	3.22E+00	2.67E+00
9.00E+02	6.40E-01	3.04E+00	2.49E+00
1.00E+03	5.41E-01	2.87E+00	2.33E+00
1.25E+03	3.70E-01	2.50E+00	1.99E+00
1.50E+03	2.68E-01	2.20E+00	1.73E+00
1.75E+03	2.03E-01	1.96E+00	1.53E+00
2.00E+03	1.59E-01	1.77E+00	1.37E+00
2.50E+03	1.05E-01	1.47E+00	1.13E+00
3.00E+03	7.49E-02	1.26E+00	9.68E-01
3.50E+03	5.60E-02	1.11E+00	8.45E-01
4.00E+03	4.34E-02	9.83E-01	7.49E-01
5.00E+03	2.83E-02	8.05E-01	6.11E-01
6.00E+03	1.98E-02	6.81E-01	5.17E-01
7.00E+03	1.47E-02	5.91E-01	4.47E-01
8.00E+03	1.13E-02	5.22E-01	3.94E-01
1.00E+04	7.25E-03	4.23E-01	3.19E-01

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

See page 5 for Explanation of Tables

Si IX + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
5.50E+01	9.79E-06		3.57E-02
6.00E+01	2.95E-05		7.09E-02
6.50E+01	7.77E-05		1.19E-01
7.00E+01	1.78E-04	2.10E-02	1.85E-01
7.50E+01	3.69E-04	4.02E-02	2.70E-01
8.00E+01	6.95E-04	6.95E-02	3.70E-01
8.50E+01	1.22E-03	1.10E-01	4.82E-01
9.00E+01	2.02E-03	1.64E-01	6.03E-01
9.50E+01	3.17E-03	2.29E-01	7.31E-01
1.00E+02	4.74E-03	3.06E-01	8.62E-01
1.10E+02	9.53E-03	4.91E-01	1.13E+00
1.20E+02	1.71E-02	7.04E-01	1.38E+00
1.30E+02	2.80E-02	9.33E-01	1.61E+00
1.40E+02	4.28E-02	1.16E+00	1.82E+00
1.50E+02	6.19E-02	1.38E+00	1.99E+00
1.60E+02	8.53E-02	1.59E+00	2.13E+00
1.70E+02	1.13E-01	1.76E+00	2.25E+00
1.80E+02	1.44E-01	1.92E+00	2.33E+00
1.90E+02	1.79E-01	2.04E+00	2.39E+00
2.00E+02	2.17E-01	2.14E+00	2.43E+00
2.20E+02	2.97E-01	2.28E+00	2.45E+00
2.40E+02	3.78E-01	2.35E+00	2.43E+00
2.60E+02	4.52E-01	2.39E+00	2.39E+00
2.80E+02	5.17E-01	2.40E+00	2.35E+00
3.00E+02	5.70E-01	2.40E+00	2.31E+00
3.50E+02	6.59E-01	2.38E+00	2.22E+00
4.00E+02	7.04E-01	2.35E+00	2.15E+00
4.50E+02	7.25E-01	2.30E+00	2.08E+00
5.00E+02	7.32E-01	2.24E+00	2.01E+00
5.50E+02	7.29E-01	2.18E+00	1.95E+00
6.00E+02	7.18E-01	2.13E+00	1.89E+00
6.50E+02	6.98E-01	2.08E+00	1.83E+00
7.00E+02	6.70E-01	2.04E+00	1.78E+00
8.00E+02	6.01E-01	1.96E+00	1.68E+00
9.00E+02	5.25E-01	1.89E+00	1.59E+00
1.00E+03	4.52E-01	1.81E+00	1.50E+00
1.50E+03	2.19E-01	1.45E+00	1.14E+00
2.00E+03	1.22E-01	1.18E+00	9.07E-01
3.00E+03	5.41E-02	8.44E-01	6.42E-01
4.00E+03	3.07E-02	6.57E-01	4.98E-01
5.00E+03	1.98E-02	5.38E-01	4.07E-01
6.00E+03	1.39E-02	4.56E-01	3.44E-01
7.00E+03	1.02E-02	3.96E-01	2.99E-01
8.00E+03	7.87E-03	3.50E-01	2.64E-01
1.00E+04	5.05E-03	2.84E-01	2.14E-01

S XI + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+02	7.53E-06		2.55E-02
1.10E+02	2.58E-05		5.12E-02
1.20E+02	7.23E-05		9.05E-02
1.30E+02	1.74E-04	1.57E-02	1.42E-01
1.40E+02	3.69E-04	3.05E-02	2.06E-01
1.50E+02	7.10E-04	5.28E-02	2.78E-01
1.60E+02	1.26E-03	8.36E-02	3.56E-01
1.70E+02	2.10E-03	1.23E-01	4.39E-01
1.80E+02	3.29E-03	1.70E-01	5.23E-01
1.90E+02	4.89E-03	2.24E-01	6.07E-01
2.00E+02	7.01E-03	2.84E-01	6.89E-01
2.10E+02	9.71E-03	3.49E-01	7.68E-01
2.20E+02	1.30E-02	4.16E-01	8.43E-01
2.30E+02	1.71E-02	4.86E-01	9.13E-01
2.40E+02	2.19E-02	5.55E-01	9.77E-01
2.50E+02	2.74E-02	6.24E-01	1.04E+00
2.60E+02	3.38E-02	6.90E-01	1.09E+00
2.70E+02	4.09E-02	7.54E-01	1.13E+00
2.80E+02	4.88E-02	8.14E-01	1.18E+00
2.90E+02	5.75E-02	8.70E-01	1.21E+00
3.00E+02	6.68E-02	9.23E-01	1.24E+00
3.20E+02	8.74E-02	1.01E+00	1.29E+00
3.40E+02	1.10E-01	1.09E+00	1.31E+00
3.60E+02	1.34E-01	1.14E+00	1.33E+00
3.80E+02	1.58E-01	1.19E+00	1.33E+00
4.00E+02	1.82E-01	1.22E+00	1.33E+00
5.00E+02	2.85E-01	1.29E+00	1.27E+00
6.00E+02	3.45E-01	1.29E+00	1.21E+00
7.00E+02	3.72E-01	1.26E+00	1.16E+00
8.00E+02	3.76E-01	1.24E+00	1.11E+00
9.00E+02	3.63E-01	1.21E+00	1.06E+00
1.00E+03	3.38E-01	1.18E+00	1.01E+00
1.50E+03	1.93E-01	1.00E+00	7.99E-01
2.00E+03	1.08E-01	8.31E-01	6.41E-01
3.00E+03	4.41E-02	6.02E-01	4.53E-01
4.00E+03	2.37E-02	4.68E-01	3.51E-01
5.00E+03	1.49E-02	3.83E-01	2.87E-01
6.00E+03	1.03E-02	3.24E-01	2.43E-01
7.00E+03	7.56E-03	2.82E-01	2.11E-01
8.00E+03	5.79E-03	2.49E-01	1.86E-01
9.00E+03	4.58E-03	2.23E-01	1.67E-01
100E+04	3.71E-03	2.02E-01	1.51E-01
1.10E+04	3.06E-03	1.85E-01	1.38E-01
1.20E+04	2.57E-03	1.70E-01	1.27E-01
1.40E+04	1.89E-03	1.47E-01	1.10E-01

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

See page 5 for Explanation of Tables

Ar XIII + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.40E+02	5.36E-07		5.99E-03
1.60E+02	3.71E-06		1.53E-02
1.80E+02	1.77E-05		3.73E-02
2.00E+02	6.23E-05		7.18E-02
2.20E+02	1.76E-04	1.20E-02	1.18E-01
2.40E+02	4.16E-04	2.53E-02	1.74E-01
2.60E+02	8.63E-04	4.59E-02	2.35E-01
2.80E+02	1.59E-03	7.38E-02	3.00E-01
3.00E+02	2.72E-03	1.09E-01	3.65E-01
3.20E+02	4.33E-03	1.50E-01	4.28E-01
3.40E+02	6.51E-03	1.96E-01	4.88E-01
3.60E+02	9.38E-03	2.44E-01	5.43E-01
3.80E+02	1.29E-02	2.94E-01	5.92E-01
4.00E+02	1.72E-02	3.43E-01	6.36E-01
4.50E+02	3.13E-02	4.59E-01	7.20E-01
5.00E+02	4.93E-02	5.54E-01	7.71E-01
5.50E+02	6.99E-02	6.26E-01	7.96E-01
6.00E+02	9.15E-02	6.78E-01	8.03E-01
6.50E+02	1.12E-01	7.14E-01	8.01E-01
7.00E+02	1.31E-01	7.38E-01	7.93E-01
7.50E+02	1.48E-01	7.54E-01	7.83E-01
8.00E+02	1.62E-01	7.64E-01	7.71E-01
8.50E+02	1.73E-01	7.70E-01	7.58E-01
9.00E+02	1.81E-01	7.74E-01	7.46E-01
9.50E+02	1.87E-01	7.74E-01	7.33E-01
1.00E+03	1.91E-01	7.74E-01	7.21E-01
1.33E+03	1.76E-01	7.41E-01	6.37E-01
1.67E+03	1.35E-01	6.84E-01	5.56E-01
2.00E+03	9.79E-02	6.20E-01	4.86E-01
2.33E+03	7.15E-02	5.59E-01	4.28E-01
2.67E+03	5.33E-02	5.05E-01	3.82E-01
3.00E+03	4.07E-02	4.59E-01	3.44E-01
4.00E+03	2.09E-02	3.58E-01	2.65E-01
5.00E+03	1.26E-02	2.92E-01	2.16E-01
6.00E+03	8.47E-03	2.47E-01	1.83E-01
7.00E+03	6.11E-03	2.14E-01	1.58E-01
8.00E+03	4.63E-03	1.89E-01	1.40E-01
9.00E+03	3.64E-03	1.69E-01	1.26E-01
1.00E+04	2.94E-03	1.53E-01	1.14E-01
1.10E+04	2.42E-03	1.40E-01	1.04E-01
1.20E+04	2.03E-03	1.29E-01	9.60E-02
1.40E+04	1.49E-03	1.12E-01	8.31E-02
1.60E+04	1.14E-03	9.83E-02	7.32E-02
1.80E+04	8.96E-04	8.79E-02	6.54E-02
2.00E+04	7.24E-04	7.94E-02	5.92E-02

Ca XV + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.00E+02	1.13E-07		2.98E-03
2.25E+02	7.16E-07		6.44E-03
2.50E+02	3.56E-06		1.48E-02
2.75E+02	1.26E-05		2.94E-02
3.00E+02	3.64E-05	4.28E-03	4.83E-02
3.25E+02	9.22E-05	7.17E-03	7.30E-02
3.50E+02	1.98E-04	1.12E-02	1.02E-01
3.75E+02	3.84E-04	1.97E-02	1.33E-01
4.00E+02	6.87E-04	3.16E-02	1.66E-01
4.25E+02	1.14E-03	4.70E-02	2.00E-01
4.50E+02	1.79E-03	6.55E-02	2.34E-01
4.75E+02	2.66E-03	8.70E-02	2.66E-01
5.00E+02	3.80E-03	1.11E-01	2.97E-01
5.25E+02	5.24E-03	1.36E-01	3.26E-01
5.50E+02	7.00E-03	1.63E-01	3.53E-01
5.75E+02	9.10E-03	1.90E-01	3.77E-01
6.00E+02	1.15E-02	2.17E-01	3.98E-01
6.50E+02	1.73E-02	2.69E-01	4.33E-01
7.00E+02	2.43E-02	3.16E-01	4.58E-01
7.50E+02	3.21E-02	3.58E-01	4.76E-01
8.00E+02	4.05E-02	3.92E-01	4.86E-01
8.50E+02	4.90E-02	4.21E-01	4.91E-01
9.00E+02	5.73E-02	4.45E-01	4.93E-01
9.50E+02	6.52E-02	4.65E-01	4.92E-01
1.00E+03	7.25E-02	4.80E-01	4.90E-01
1.25E+03	9.68E-02	5.21E-01	4.65E-01
1.50E+03	1.02E-01	5.27E-01	4.32E-01
1.75E+03	9.41E-02	5.15E-01	3.98E-01
2.00E+03	8.15E-02	4.93E-01	3.65E-01
2.50E+03	5.66E-02	4.38E-01	3.07E-01
3.00E+03	3.88E-02	3.86E-01	2.62E-01
4.00E+03	2.00E-02	3.03E-01	2.01E-01
5.00E+03	1.18E-02	2.48E-01	1.63E-01
6.00E+03	7.72E-03	2.09E-01	1.37E-01
7.00E+03	5.45E-03	1.81E-01	1.19E-01
8.00E+03	4.07E-03	1.59E-01	1.05E-01
9.00E+03	3.16E-03	1.43E-01	9.41E-02
1.00E+04	2.54E-03	1.29E-01	8.53E-02
1.20E+04	1.74E-03	1.09E-01	7.19E-02
1.40E+04	1.27E-03	9.38E-02	6.23E-02
1.60E+04	9.67E-04	8.27E-02	5.49E-02
1.80E+04	7.61E-04	7.39E-02	4.91E-02
2.00E+04	6.15E-04	6.68E-02	4.45E-02
2.25E+04	4.84E-04	5.97E-02	3.97E-02
2.50E+04	3.91E-04	5.39E-02	3.59E-02

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

See page 5 for Explanation of Tables

Ti XVII + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+02	1.13E-07		3.15E-03
3.50E+02	1.36E-06		1.01E-02
4.00E+02	9.30E-06		2.47E-02
4.50E+02	3.96E-05	2.19E-03	4.64E-02
5.00E+02	1.25E-04	6.30E-03	7.36E-02
5.50E+02	3.19E-04	1.41E-02	1.04E-01
6.00E+02	6.87E-04	2.62E-02	1.36E-01
6.50E+02	1.30E-03	4.28E-02	1.67E-01
7.00E+02	2.24E-03	6.31E-02	1.95E-01
7.50E+02	3.57E-03	8.63E-02	2.22E-01
8.00E+02	5.29E-03	1.11E-01	2.44E-01
8.50E+02	7.43E-03	1.36E-01	2.64E-01
9.00E+02	9.98E-03	1.61E-01	2.79E-01
9.50E+02	1.28E-02	1.85E-01	2.92E-01
1.00E+03	1.60E-02	2.07E-01	3.02E-01
1.10E+03	2.29E-02	2.46E-01	3.14E-01
1.20E+03	2.98E-02	2.78E-01	3.19E-01
1.30E+03	3.63E-02	3.02E-01	3.19E-01
1.40E+03	4.20E-02	3.21E-01	3.17E-01
1.50E+03	4.65E-02	3.36E-01	3.12E-01
1.60E+03	5.00E-02	3.46E-01	3.07E-01
1.70E+03	5.22E-02	3.53E-01	3.00E-01
1.80E+03	5.35E-02	3.58E-01	2.93E-01
1.90E+03	5.38E-02	3.60E-01	2.86E-01
2.00E+03	5.34E-02	3.61E-01	2.78E-01
2.25E+03	4.99E-02	3.56E-01	2.59E-01
2.50E+03	4.48E-02	3.45E-01	2.40E-01
2.75E+03	3.91E-02	3.31E-01	2.23E-01
3.00E+03	3.38E-02	3.15E-01	2.07E-01
4.00E+03	1.87E-02	2.56E-01	1.59E-01
5.00E+03	1.11E-02	2.10E-01	1.28E-01
6.00E+03	7.14E-03	1.78E-01	1.07E-01
7.00E+03	4.94E-03	1.53E-01	9.24E-02
8.00E+03	3.62E-03	1.35E-01	8.13E-02
1.04E+04	2.02E-03	1.05E-01	6.34E-02
1.28E+04	1.29E-03	8.60E-02	5.21E-02
1.52E+04	9.04E-04	7.30E-02	4.44E-02
1.76E+04	6.69E-04	6.34E-02	3.87E-02
2.00E+04	5.15E-04	5.61E-02	3.43E-02
2.25E+04	4.05E-04	5.01E-02	3.07E-02
2.50E+04	3.27E-04	4.53E-02	2.77E-02
2.75E+04	2.69E-04	4.13E-02	2.53E-02
3.00E+04	2.25E-04	3.80E-02	2.33E-02
3.25E+04	1.92E-04	3.52E-02	2.16E-02
3.50E+04	1.65E-04	3.27E-02	2.01E-02

Cr XIX + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
4.00E+02	2.76E-08		2.29E-03
5.00E+02	1.40E-06		1.19E-02
6.00E+02	1.74E-05		3.21E-02
7.00E+02	9.95E-05	4.58E-03	6.04E-02
8.00E+02	3.63E-04	1.37E-02	9.15E-02
8.50E+02	6.05E-04	2.07E-02	1.07E-01
9.00E+02	9.52E-04	2.93E-02	1.22E-01
9.50E+02	1.42E-03	3.94E-02	1.35E-01
1.00E+03	2.02E-03	5.05E-02	1.48E-01
1.05E+03	2.76E-03	6.25E-02	1.59E-01
1.10E+03	3.63E-03	7.51E-02	1.69E-01
1.15E+03	4.66E-03	8.79E-02	1.78E-01
1.20E+03	5.80E-03	1.01E-01	1.86E-01
1.25E+03	7.06E-03	1.13E-01	1.92E-01
1.30E+03	8.42E-03	1.26E-01	1.97E-01
1.35E+03	9.85E-03	1.37E-01	2.01E-01
1.40E+03	1.13E-02	1.49E-01	2.04E-01
1.45E+03	1.28E-02	1.59E-01	2.07E-01
1.50E+03	1.43E-02	1.69E-01	2.09E-01
1.55E+03	1.58E-02	1.78E-01	2.10E-01
1.60E+03	1.73E-02	1.87E-01	2.11E-01
1.70E+03	2.00E-02	2.02E-01	2.11E-01
1.80E+03	2.25E-02	2.15E-01	2.09E-01
1.90E+03	2.45E-02	2.25E-01	2.07E-01
2.00E+03	2.61E-02	2.34E-01	2.04E-01
2.20E+03	2.82E-02	2.45E-01	1.97E-01
2.40E+03	2.89E-02	2.52E-01	1.89E-01
2.60E+03	2.84E-02	2.54E-01	1.80E-01
2.80E+03	2.72E-02	2.52E-01	1.71E-01
3.00E+03	2.55E-02	2.49E-01	1.62E-01
4.00E+03	1.63E-02	2.16E-01	1.26E-01
5.00E+03	1.01E-02	1.82E-01	1.02E-01
6.00E+03	6.61E-03	1.55E-01	8.47E-02
7.00E+03	4.55E-03	1.34E-01	7.26E-02
8.00E+03	3.30E-03	1.18E-01	6.36E-02
9.00E+03	2.49E-03	1.05E-01	5.67E-02
1.00E+04	1.95E-03	9.50E-02	5.12E-02
1.50E+04	7.96E-04	6.41E-02	3.48E-02
2.00E+04	4.36E-04	4.86E-02	2.65E-02
2.50E+04	2.76E-04	3.92E-02	2.15E-02
3.00E+04	1.90E-04	3.29E-02	1.81E-02
3.50E+04	1.39E-04	2.83E-02	1.56E-02
4.00E+04	1.06E-04	2.49E-02	1.37E-02
4.50E+04	8.30E-05	2.22E-02	1.22E-02
5.00E+04	6.70E-05	2.00E-02	1.11E-02

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

See page 5 for Explanation of Tables

Fe XXI + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
5.00E+02	4.55E-09		1.61E-03
5.50E+02	2.83E-08		3.04E-03
6.00E+02	1.42E-07		5.82E-03
7.00E+02	1.76E-06		1.49E-02
8.00E+02	1.17E-05		2.80E-02
8.50E+02	2.47E-05	1.21E-03	3.56E-02
9.00E+02	4.71E-05	2.21E-03	4.36E-02
9.50E+02	8.35E-05	3.69E-03	5.18E-02
1.00E+03	1.40E-04	5.78E-03	6.00E-02
1.05E+03	2.23E-04	8.52E-03	6.81E-02
1.10E+03	3.35E-04	1.19E-02	7.60E-02
1.15E+03	4.84E-04	1.60E-02	8.35E-02
1.20E+03	6.76E-04	2.07E-02	9.07E-02
1.25E+03	9.15E-04	2.60E-02	9.74E-02
1.30E+03	1.20E-03	3.18E-02	1.04E-01
1.35E+03	1.54E-03	3.81E-02	1.09E-01
1.40E+03	1.93E-03	4.47E-02	1.14E-01
1.45E+03	2.38E-03	5.14E-02	1.19E-01
1.50E+03	2.87E-03	5.84E-02	1.23E-01
1.75E+03	5.87E-03	9.27E-02	1.37E-01
2.00E+03	9.23E-03	1.23E-01	1.42E-01
2.25E+03	1.22E-02	1.46E-01	1.41E-01
2.50E+03	1.43E-02	1.62E-01	1.37E-01
2.75E+03	1.55E-02	1.73E-01	1.32E-01
3.00E+03	1.59E-02	1.79E-01	1.26E-01
3.50E+03	1.48E-02	1.82E-01	1.13E-01
4.00E+03	1.28E-02	1.76E-01	1.01E-01
5.00E+03	8.68E-03	1.56E-01	8.15E-02
6.00E+03	5.86E-03	1.36E-01	6.77E-02
7.00E+03	4.09E-03	1.19E-01	5.78E-02
8.00E+03	2.97E-03	1.05E-01	5.04E-02
9.00E+03	2.24E-03	9.36E-02	4.47E-02
1.00E+04	1.74E-03	8.45E-02	4.02E-02
1.25E+04	1.04E-03	6.80E-02	3.23E-02
1.50E+04	6.90E-04	5.69E-02	2.71E-02
1.75E+04	4.94E-04	4.90E-02	2.34E-02
2.00E+04	3.73E-04	4.30E-02	2.06E-02
2.50E+04	2.34E-04	3.47E-02	1.67E-02
3.00E+04	1.61E-04	2.91E-02	1.40E-02
3.50E+04	1.18E-04	2.50E-02	1.21E-02
4.00E+04	8.95E-05	2.20E-02	1.07E-02
4.50E+04	7.04E-05	1.96E-02	9.54E-03
5.00E+04	5.68E-05	1.77E-02	8.62E-03
5.50E+04	4.67E-05	1.61E-02	7.87E-03
6.00E+04	3.91E-05	1.48E-02	7.23E-03

Ni XXIII + d			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
7.00E+02	7.40E-09		2.77E-03
8.00E+02	1.11E-07		6.83E-03
9.00E+02	9.16E-07		1.29E-02
1.00E+03	4.47E-06		2.06E-02
1.10E+03	1.53E-05	7.39E-04	2.92E-02
1.20E+03	4.18E-05	1.87E-03	3.83E-02
1.30E+03	9.64E-05	3.90E-03	4.73E-02
1.40E+03	1.94E-04	7.03E-03	5.59E-02
1.50E+03	3.48E-04	1.13E-02	6.38E-02
1.60E+03	5.72E-04	1.67E-02	7.09E-02
1.70E+03	8.72E-04	2.31E-02	7.71E-02
1.80E+03	1.25E-03	3.01E-02	8.24E-02
1.90E+03	1.70E-03	3.76E-02	8.67E-02
2.00E+03	2.22E-03	4.55E-02	9.02E-02
2.25E+03	3.70E-03	6.50E-02	9.56E-02
2.50E+03	5.25E-03	8.28E-02	9.74E-02
2.75E+03	6.63E-03	9.78E-02	9.68E-02
3.00E+03	7.68E-03	1.10E-01	9.47E-02
3.50E+03	8.70E-03	1.25E-01	8.81E-02
4.00E+03	8.57E-03	1.31E-01	8.04E-02
5.00E+03	6.84E-03	1.28E-01	6.64E-02
6.00E+03	4.99E-03	1.16E-01	5.54E-02
7.00E+03	3.62E-03	1.04E-01	4.73E-02
8.00E+03	2.68E-03	9.34E-02	4.11E-02
9.00E+03	2.03E-03	8.41E-02	3.63E-02
1.00E+04	1.58E-03	7.62E-02	3.26E-02
1.20E+04	1.02E-03	6.40E-02	2.70E-02
1.40E+04	7.15E-04	5.51E-02	2.31E-02
1.60E+04	5.28E-04	4.83E-02	2.03E-02
1.80E+04	4.07E-04	4.30E-02	1.81E-02
2.00E+04	3.23E-04	3.88E-02	1.64E-02
2.25E+04	2.51E-04	3.46E-02	1.46E-02
2.50E+04	2.02E-04	3.12E-02	1.32E-02
2.75E+04	1.65E-04	2.85E-02	1.21E-02
3.00E+04	1.38E-04	2.62E-02	1.11E-02
3.25E+04	1.17E-04	2.42E-02	1.03E-02
3.50E+04	1.01E-04	2.25E-02	9.61E-03
3.75E+04	8.73E-05	2.11E-02	9.00E-03
4.00E+04	7.66E-05	1.98E-02	8.47E-03
4.50E+04	6.02E-05	1.77E-02	7.57E-03
5.00E+04	4.85E-05	1.59E-02	6.85E-03
5.50E+04	4.00E-05	1.45E-02	6.25E-03
6.00E+04	3.35E-05	1.33E-02	5.75E-03
6.50E+04	2.84E-05	1.23E-02	5.32E-03
7.00E+04	2.44E-05	1.15E-02	4.95E-03

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

See page 5 for Explanation of Tables

N II + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+00	4.87E-04	5.40E-01	1.12E+00
1.25E+00	9.18E-03	8.71E-01	6.92E+00
1.50E+00	7.12E-02	2.80E+00	2.24E+01
1.75E+00	3.09E-01	8.80E+00	4.69E+01
2.00E+00	9.24E-01	2.00E+01	7.54E+01
2.25E+00	2.15E+00	3.51E+01	1.03E+02
2.50E+00	4.16E+00	5.19E+01	1.27E+02
2.75E+00	7.05E+00	6.84E+01	1.45E+02
3.00E+00	1.07E+01	8.29E+01	1.58E+02
3.25E+00	1.50E+01	9.49E+01	1.65E+02
3.50E+00	1.95E+01	1.04E+02	1.69E+02
3.75E+00	2.40E+01	1.12E+02	1.72E+02
4.00E+00	2.80E+01	1.18E+02	1.74E+02
4.25E+00	3.15E+01	1.24E+02	1.75E+02
4.50E+00	3.44E+01	1.29E+02	1.76E+02
5.00E+00	3.85E+01	1.37E+02	1.77E+02
6.00E+00	4.39E+01	1.44E+02	1.71E+02
7.00E+00	4.65E+01	1.45E+02	1.66E+02
8.00E+00	4.74E+01	1.44E+02	1.59E+02
9.00E+00	4.73E+01	1.41E+02	1.54E+02
1.00E+01	4.68E+01	1.38E+02	1.48E+02
1.50E+01	4.21E+01	1.22E+02	1.27E+02
2.00E+01	3.78E+01	1.09E+02	1.12E+02
2.50E+01	3.45E+01	9.92E+01	1.01E+02
3.00E+01	3.17E+01	9.18E+01	9.34E+01
3.50E+01	3.00E+01	8.53E+01	8.70E+01
4.00E+01	2.76E+01	8.09E+01	8.19E+01
5.00E+01	2.56E+01	7.21E+01	7.34E+01
6.00E+01	2.25E+01	6.70E+01	6.75E+01
7.00E+01	2.09E+01	6.26E+01	6.27E+01
8.00E+01	1.98E+01	5.84E+01	5.89E+01
9.00E+01	1.84E+01	5.49E+01	5.53E+01
1.00E+02	1.72E+01	5.21E+01	5.21E+01
1.25E+02	1.58E+01	4.64E+01	4.62E+01
1.50E+02	1.52E+01	4.21E+01	4.25E+01
2.00E+02	1.35E+01	3.61E+01	3.69E+01
2.50E+02	1.17E+01	3.22E+01	3.27E+01
3.00E+02	1.05E+01	2.96E+01	2.97E+01
4.00E+02	8.77E+00	2.64E+01	2.59E+01
5.00E+02	7.52E+00	2.43E+01	2.35E+01
6.00E+02	6.48E+00	2.26E+01	2.17E+01
7.00E+02	5.60E+00	2.11E+01	2.02E+01
8.00E+02	4.86E+00	1.99E+01	1.89E+01
1.00E+03	3.72E+00	1.77E+01	1.66E+01
1.20E+03	2.92E+00	1.59E+01	1.48E+01

O III + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+00	2.27E-04		5.36E-01
4.00E+00	7.80E-03	6.82E-01	4.61E+00
5.00E+00	6.97E-02	3.65E+00	1.44E+01
6.00E+00	3.03E-01	1.06E+01	2.71E+01
7.00E+00	8.62E-01	2.03E+01	3.95E+01
8.00E+00	1.87E+00	3.05E+01	4.93E+01
9.00E+00	3.36E+00	3.93E+01	5.61E+01
1.00E+01	5.27E+00	4.60E+01	5.98E+01
1.10E+01	7.42E+00	5.07E+01	6.13E+01
1.20E+01	9.58E+00	5.37E+01	6.15E+01
1.30E+01	1.15E+01	5.58E+01	6.12E+01
1.40E+01	1.31E+01	5.75E+01	6.09E+01
1.50E+01	1.43E+01	5.90E+01	6.07E+01
1.60E+01	1.51E+01	6.03E+01	6.06E+01
1.70E+01	1.58E+01	6.11E+01	6.03E+01
1.80E+01	1.63E+01	6.15E+01	5.97E+01
1.90E+01	1.67E+01	6.14E+01	5.89E+01
2.00E+01	1.71E+01	6.12E+01	5.79E+01
2.50E+01	1.79E+01	5.98E+01	5.45E+01
3.00E+01	1.78E+01	5.73E+01	5.12E+01
4.00E+01	1.67E+01	5.24E+01	4.60E+01
5.00E+01	1.56E+01	4.83E+01	4.21E+01
6.00E+01	1.45E+01	4.48E+01	3.89E+01
7.00E+01	1.35E+01	4.20E+01	3.65E+01
8.00E+01	1.26E+01	4.00E+01	3.46E+01
9.00E+01	1.22E+01	3.77E+01	3.27E+01
1.00E+02	1.18E+01	3.57E+01	3.11E+01
1.10E+02	1.11E+01	3.44E+01	2.98E+01
1.20E+02	1.03E+01	3.32E+01	2.87E+01
1.30E+02	9.75E+00	3.20E+01	2.76E+01
1.40E+02	9.44E+00	3.08E+01	2.66E+01
1.50E+02	9.30E+00	2.97E+01	2.57E+01
1.60E+02	9.22E+00	2.86E+01	2.49E+01
1.80E+02	9.04E+00	2.68E+01	2.35E+01
2.00E+02	8.73E+00	2.53E+01	2.23E+01
2.67E+02	7.34E+00	2.20E+01	1.94E+01
3.33E+02	6.33E+00	1.99E+01	1.74E+01
4.00E+02	5.67E+00	1.85E+01	1.61E+01
6.00E+02	4.28E+00	1.57E+01	1.35E+01
8.00E+02	3.26E+00	1.38E+01	1.17E+01
1.00E+03	2.52E+00	1.24E+01	1.03E+01
1.25E+03	1.88E+00	1.09E+01	8.90E+00
1.50E+03	1.44E+00	9.68E+00	7.84E+00
1.75E+03	1.14E+00	8.71E+00	6.99E+00
2.00E+03	9.20E-01	7.92E+00	6.31E+00

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

See page 5 for Explanation of Tables

Ne V + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.40E+01	6.98E-04		6.90E-01
1.60E+01	3.03E-03	2.36E-01	1.58E+00
1.80E+01	9.61E-03	6.33E-01	2.87E+00
2.00E+01	2.43E-02	1.31E+00	4.43E+00
2.20E+01	5.22E-02	2.27E+00	6.12E+00
2.40E+01	9.80E-02	3.45E+00	7.84E+00
2.60E+01	1.68E-01	4.79E+00	9.48E+00
2.80E+01	2.64E-01	6.19E+00	1.10E+01
3.00E+01	3.93E-01	7.59E+00	1.23E+01
3.20E+01	5.53E-01	8.90E+00	1.34E+01
3.40E+01	7.45E-01	1.01E+01	1.42E+01
3.60E+01	9.67E-01	1.11E+01	1.49E+01
3.80E+01	1.21E+00	1.20E+01	1.54E+01
4.00E+01	1.48E+00	1.27E+01	1.57E+01
4.50E+01	2.19E+00	1.40E+01	1.59E+01
5.00E+01	2.86E+00	1.46E+01	1.58E+01
5.50E+01	3.40E+00	1.51E+01	1.56E+01
6.00E+01	3.78E+00	1.55E+01	1.55E+01
6.50E+01	4.02E+00	1.58E+01	1.54E+01
7.00E+01	4.18E+00	1.59E+01	1.53E+01
7.50E+01	4.30E+00	1.59E+01	1.50E+01
8.00E+01	4.41E+00	1.58E+01	1.47E+01
9.00E+01	4.56E+00	1.55E+01	1.42E+01
1.00E+02	4.60E+00	1.52E+01	1.38E+01
1.40E+02	4.38E+00	1.40E+01	1.23E+01
1.80E+02	4.11E+00	1.27E+01	1.11E+01
2.20E+02	3.90E+00	1.16E+01	1.02E+01
2.60E+02	3.59E+00	1.09E+01	9.47E+00
3.00E+02	3.23E+00	1.03E+01	8.94E+00
4.00E+02	2.66E+00	9.32E+00	7.97E+00
5.00E+02	2.35E+00	8.55E+00	7.29E+00
7.50E+02	1.72E+00	7.22E+00	6.05E+00
1.00E+03	1.25E+00	6.25E+00	5.15E+00
1.25E+03	9.33E-01	5.48E+00	4.45E+00
1.50E+03	7.16E-01	4.87E+00	3.92E+00
1.75E+03	5.64E-01	4.38E+00	3.49E+00
2.00E+03	4.55E-01	3.97E+00	3.15E+00
2.50E+03	3.13E-01	3.35E+00	2.63E+00
3.00E+03	2.27E-01	2.89E+00	2.25E+00
3.50E+03	1.72E-01	2.55E+00	1.97E+00
4.00E+03	1.35E-01	2.27E+00	1.75E+00
4.50E+03	1.09E-01	2.05E+00	1.58E+00
5.00E+03	8.92E-02	1.87E+00	1.44E+00
5.50E+03	7.45E-02	1.72E+00	1.32E+00
6.00E+03	6.32E-02	1.59E+00	1.21E+00

Mg VII + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+01	4.37E-05		8.63E-02
4.00E+01	1.33E-03	8.81E-02	6.43E-01
5.00E+01	1.07E-02	4.98E-01	1.79E+00
6.00E+01	4.31E-02	1.32E+00	3.14E+00
7.00E+01	1.15E-01	2.37E+00	4.36E+00
8.00E+01	2.38E-01	3.39E+00	5.26E+00
9.00E+01	4.11E-01	4.23E+00	5.81E+00
1.00E+02	6.20E-01	4.83E+00	6.07E+00
1.10E+02	8.43E-01	5.22E+00	6.15E+00
1.20E+02	1.06E+00	5.47E+00	6.12E+00
1.30E+02	1.24E+00	5.66E+00	6.07E+00
1.40E+02	1.38E+00	5.80E+00	6.03E+00
1.50E+02	1.49E+00	5.93E+00	6.00E+00
1.60E+02	1.56E+00	6.02E+00	5.97E+00
1.70E+02	1.61E+00	6.09E+00	5.93E+00
1.80E+02	1.65E+00	6.12E+00	5.87E+00
1.90E+02	1.67E+00	6.12E+00	5.79E+00
2.00E+02	1.70E+00	6.10E+00	5.71E+00
2.25E+02	1.73E+00	6.01E+00	5.51E+00
2.50E+02	1.73E+00	5.89E+00	5.32E+00
2.75E+02	1.71E+00	5.76E+00	5.15E+00
3.00E+02	1.68E+00	5.65E+00	5.00E+00
3.50E+02	1.59E+00	5.43E+00	4.74E+00
4.00E+02	1.50E+00	5.23E+00	4.52E+00
4.50E+02	1.43E+00	5.03E+00	4.33E+00
5.00E+02	1.37E+00	4.84E+00	4.15E+00
5.50E+02	1.33E+00	4.67E+00	4.00E+00
6.00E+02	1.27E+00	4.52E+00	3.86E+00
7.00E+02	1.16E+00	4.26E+00	3.61E+00
8.00E+02	1.04E+00	4.04E+00	3.39E+00
9.00E+02	9.20E-01	3.84E+00	3.19E+00
1.00E+03	8.13E-01	3.66E+00	3.01E+00
1.25E+03	6.02E-01	3.25E+00	2.63E+00
1.50E+03	4.57E-01	2.91E+00	2.32E+00
1.75E+03	3.58E-01	2.62E+00	2.08E+00
2.00E+03	2.87E-01	2.38E+00	1.87E+00
2.50E+03	1.96E-01	2.01E+00	1.57E+00
3.00E+03	1.43E-01	1.74E+00	1.35E+00
3.50E+03	1.08E-01	1.53E+00	1.18E+00
4.00E+03	8.46E-02	1.37E+00	1.05E+00
5.00E+03	5.58E-02	1.13E+00	8.62E-01
6.00E+03	3.95E-02	9.60E-01	7.31E-01
7.00E+03	2.94E-02	8.35E-01	6.35E-01
8.00E+03	2.27E-02	7.39E-01	5.61E-01
1.00E+04	1.47E-02	6.01E-01	4.55E-01

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

See page 5 for Explanation of Tables

Si IX + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
6.00E+01	1.98E-05		4.14E-02
6.50E+01	5.59E-05		7.76E-02
7.00E+01	1.41E-04	1.87E-02	1.34E-01
7.50E+01	3.17E-04	2.67E-02	2.12E-01
8.00E+01	6.41E-04	4.24E-02	3.13E-01
8.50E+01	1.20E-03	5.97E-02	4.32E-01
9.00E+01	2.11E-03	9.64E-02	5.68E-01
9.50E+01	3.47E-03	1.45E-01	7.18E-01
1.00E+02	5.41E-03	2.07E-01	8.78E-01
1.10E+02	1.17E-02	3.68E-01	1.21E+00
1.20E+02	2.22E-02	5.72E-01	1.54E+00
1.30E+02	3.80E-02	8.04E-01	1.86E+00
1.40E+02	5.98E-02	1.05E+00	2.13E+00
1.50E+02	8.83E-02	1.29E+00	2.37E+00
1.60E+02	1.23E-01	1.52E+00	2.55E+00
1.70E+02	1.64E-01	1.73E+00	2.70E+00
1.80E+02	2.11E-01	1.91E+00	2.80E+00
1.90E+02	2.61E-01	2.06E+00	2.87E+00
2.00E+02	3.14E-01	2.19E+00	2.92E+00
2.20E+02	4.22E-01	2.39E+00	2.95E+00
2.40E+02	5.21E-01	2.53E+00	2.94E+00
2.60E+02	6.05E-01	2.63E+00	2.92E+00
2.80E+02	6.71E-01	2.71E+00	2.90E+00
3.00E+02	7.22E-01	2.77E+00	2.88E+00
3.50E+02	7.95E-01	2.86E+00	2.82E+00
4.00E+02	8.26E-01	2.88E+00	2.73E+00
4.50E+02	8.35E-01	2.86E+00	2.64E+00
5.00E+02	8.35E-01	2.81E+00	2.56E+00
5.50E+02	8.29E-01	2.76E+00	2.47E+00
6.00E+02	8.22E-01	2.69E+00	2.40E+00
6.50E+02	8.11E-01	2.63E+00	2.32E+00
7.00E+02	7.97E-01	2.57E+00	2.26E+00
8.00E+02	7.53E-01	2.47E+00	2.14E+00
9.00E+02	6.94E-01	2.38E+00	2.03E+00
1.00E+03	6.29E-01	2.29E+00	1.94E+00
1.50E+03	3.57E-01	1.91E+00	1.53E+00
2.00E+03	2.16E-01	1.59E+00	1.24E+00
3.00E+03	1.02E-01	1.17E+00	8.98E-01
4.00E+03	5.99E-02	9.22E-01	7.02E-01
5.00E+03	3.93E-02	7.60E-01	5.77E-01
6.00E+03	2.78E-02	6.47E-01	4.90E-01
7.00E+03	2.07E-02	5.63E-01	4.26E-01
8.00E+03	1.60E-02	4.99E-01	3.77E-01
1.00E+04	1.03E-02	4.06E-01	3.06E-01
1.20E+04	7.21E-03	3.42E-01	2.58E-01

S XI + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+02	4.44E-06		1.63E-02
1.10E+02	1.69E-05		3.13E-02
1.20E+02	5.27E-05		6.29E-02
1.30E+02	1.41E-04		1.10E-01
1.40E+02	3.26E-04	1.38E-02	1.72E-01
1.50E+02	6.79E-04	2.70E-02	2.49E-01
1.60E+02	1.29E-03	4.73E-02	3.38E-01
1.70E+02	2.26E-03	7.55E-02	4.35E-01
1.80E+02	3.71E-03	1.12E-01	5.38E-01
1.90E+02	5.77E-03	1.57E-01	6.45E-01
2.00E+02	8.58E-03	2.10E-01	7.51E-01
2.10E+02	1.23E-02	2.70E-01	8.54E-01
2.20E+02	1.70E-02	3.35E-01	9.54E-01
2.30E+02	2.27E-02	4.04E-01	1.05E+00
2.40E+02	2.96E-02	4.75E-01	1.13E+00
2.50E+02	3.77E-02	5.47E-01	1.21E+00
2.60E+02	4.71E-02	6.18E-01	1.28E+00
2.70E+02	5.75E-02	6.88E-01	1.35E+00
2.80E+02	6.91E-02	7.55E-01	1.40E+00
2.90E+02	8.18E-02	8.19E-01	1.45E+00
3.00E+02	9.55E-02	8.79E-01	1.48E+00
3.20E+02	1.25E-01	9.87E-01	1.54E+00
3.40E+02	1.57E-01	1.08E+00	1.58E+00
3.60E+02	1.90E-01	1.16E+00	1.60E+00
3.80E+02	2.22E-01	1.22E+00	1.60E+00
4.00E+02	2.54E-01	1.27E+00	1.61E+00
5.00E+02	3.73E-01	1.44E+00	1.58E+00
6.00E+02	4.36E-01	1.50E+00	1.52E+00
7.00E+02	4.65E-01	1.51E+00	1.46E+00
8.00E+02	4.75E-01	1.50E+00	1.40E+00
9.00E+02	4.70E-01	1.48E+00	1.35E+00
1.00E+03	4.53E-01	1.45E+00	1.29E+00
1.50E+03	3.01E-01	1.29E+00	1.06E+00
2.00E+03	1.84E-01	1.11E+00	8.74E-01
3.00E+03	8.26E-02	8.36E-01	6.35E-01
4.00E+03	4.61E-02	6.60E-01	4.97E-01
5.00E+03	2.96E-02	5.44E-01	4.08E-01
6.00E+03	2.07E-02	4.63E-01	3.47E-01
7.00E+03	1.53E-02	4.03E-01	3.02E-01
8.00E+03	1.18E-02	3.57E-01	2.67E-01
9.00E+03	9.37E-03	3.20E-01	2.40E-01
1.00E+04	7.62E-03	2.90E-01	2.18E-01
1.10E+04	6.31E-03	2.66E-01	1.99E-01
1.20E+04	5.31E-03	2.45E-01	1.84E-01
1.40E+04	3.91E-03	2.12E-01	1.59E-01

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

See page 5 for Explanation of Tables

Ar XIII + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.60E+02	2.04E-06		9.07E-03
1.80E+02	1.10E-05		2.33E-02
2.00E+02	4.51E-05		5.21E-02
2.20E+02	1.43E-04	4.77E-03	9.61E-02
2.40E+02	3.74E-04	1.18E-02	1.54E-01
2.60E+02	8.50E-04	2.45E-02	2.24E-01
2.80E+02	1.69E-03	4.38E-02	3.01E-01
3.00E+02	3.07E-03	7.06E-02	3.82E-01
3.20E+02	5.14E-03	1.04E-01	4.64E-01
3.40E+02	8.07E-03	1.45E-01	5.43E-01
3.60E+02	1.20E-02	1.90E-01	6.16E-01
3.80E+02	1.70E-02	2.38E-01	6.83E-01
4.00E+02	2.31E-02	2.87E-01	7.42E-01
4.50E+02	4.33E-02	4.10E-01	8.55E-01
5.00E+02	6.92E-02	5.18E-01	9.22E-01
5.50E+02	9.84E-02	6.07E-01	9.56E-01
6.00E+02	1.28E-01	6.77E-01	9.70E-01
6.50E+02	1.55E-01	7.33E-01	9.73E-01
7.00E+02	1.80E-01	7.76E-01	9.70E-01
7.50E+02	2.01E-01	8.10E-01	9.63E-01
8.00E+02	2.19E-01	8.36E-01	9.53E-01
8.50E+02	2.33E-01	8.56E-01	9.43E-01
9.00E+02	2.45E-01	8.71E-01	9.31E-01
9.50E+02	2.54E-01	8.82E-01	9.19E-01
1.00E+03	2.60E-01	8.90E-01	9.06E-01
1.33E+03	2.56E-01	8.97E-01	8.20E-01
1.67E+03	2.11E-01	8.63E-01	7.35E-01
2.00E+03	1.63E-01	8.08E-01	6.56E-01
2.33E+03	1.24E-01	7.47E-01	5.88E-01
2.67E+03	9.54E-02	6.88E-01	5.30E-01
3.00E+03	7.48E-02	6.34E-01	4.82E-01
4.00E+03	4.03E-02	5.05E-01	3.77E-01
5.00E+03	2.50E-02	4.17E-01	3.09E-01
6.00E+03	1.71E-02	3.54E-01	2.63E-01
7.00E+03	1.25E-02	3.08E-01	2.28E-01
8.00E+03	9.51E-03	2.73E-01	2.02E-01
9.00E+03	7.52E-03	2.45E-01	1.82E-01
1.00E+04	6.09E-03	2.22E-01	1.65E-01
1.20E+04	4.24E-03	1.87E-01	1.39E-01
1.40E+04	3.12E-03	1.62E-01	1.21E-01
1.60E+04	2.39E-03	1.43E-01	1.06E-01
1.80E+04	1.89E-03	1.28E-01	9.51E-02
2.00E+04	1.53E-03	1.15E-01	8.60E-02
2.20E+04	1.26E-03	1.05E-01	7.86E-02
2.40E+04	1.06E-03	9.70E-02	7.23E-02

Ca XV + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.50E+02	1.85E-06		8.73E-03
2.75E+02	7.51E-06		1.94E-02
3.00E+02	2.46E-05		3.59E-02
3.25E+02	6.89E-05		5.96E-02
3.50E+02	1.65E-04		8.94E-02
3.75E+02	3.47E-04	9.23E-03	1.25E-01
4.00E+02	6.65E-04	1.64E-02	1.64E-01
4.25E+02	1.17E-03	2.67E-02	2.05E-01
4.50E+02	1.95E-03	4.03E-02	2.48E-01
4.75E+02	3.04E-03	5.70E-02	2.90E-01
5.00E+02	4.50E-03	7.65E-02	3.31E-01
5.25E+02	6.40E-03	9.87E-02	3.70E-01
5.50E+02	8.78E-03	1.23E-01	4.06E-01
5.75E+02	1.17E-02	1.48E-01	4.38E-01
6.00E+02	1.50E-02	1.75E-01	4.67E-01
6.50E+02	2.32E-02	2.27E-01	5.15E-01
7.00E+02	3.31E-02	2.78E-01	5.50E-01
7.50E+02	4.42E-02	3.25E-01	5.73E-01
8.00E+02	5.61E-02	3.68E-01	5.88E-01
8.50E+02	6.80E-02	4.05E-01	5.97E-01
9.00E+02	7.97E-02	4.37E-01	6.02E-01
9.50E+02	9.07E-02	4.66E-01	6.03E-01
1.00E+03	1.01E-01	4.91E-01	6.02E-01
1.25E+03	1.37E-01	5.71E-01	5.82E-01
1.50E+03	1.49E-01	6.05E-01	5.53E-01
1.75E+03	1.44E-01	6.15E-01	5.19E-01
2.00E+03	1.30E-01	6.09E-01	4.84E-01
2.50E+03	9.62E-02	5.70E-01	4.18E-01
3.00E+03	6.92E-02	5.18E-01	3.64E-01
4.00E+03	3.78E-02	4.23E-01	2.84E-01
5.00E+03	2.30E-02	3.51E-01	2.33E-01
6.00E+03	1.54E-02	2.99E-01	1.97E-01
7.00E+03	1.10E-02	2.60E-01	1.71E-01
8.00E+03	8.31E-03	2.30E-01	1.52E-01
9.00E+03	6.50E-03	2.06E-01	1.36E-01
1.00E+04	5.24E-03	1.87E-01	1.23E-01
1.20E+04	3.62E-03	1.58E-01	1.04E-01
1.40E+04	2.65E-03	1.36E-01	9.04E-02
1.60E+04	2.03E-03	1.20E-01	7.98E-02
1.80E+04	1.60E-03	1.07E-01	7.14E-02
2.00E+04	1.29E-03	9.72E-02	6.47E-02
2.25E+04	1.02E-03	8.69E-02	5.78E-02
2.50E+04	8.25E-04	7.85E-02	5.23E-02
2.75E+04	6.81E-04	7.16E-02	4.78E-02
3.00E+04	5.71E-04	6.59E-02	4.39E-02

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

See page 5 for Explanation of Tables

Ti XVII + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.50E+02	6.20E-07		6.02E-03
4.15E+02	8.69E-06		2.24E-02
4.80E+02	6.00E-05		5.40E-02
5.45E+02	2.58E-04	5.88E-03	9.80E-02
6.10E+02	7.87E-04	1.57E-02	1.49E-01
6.75E+02	1.89E-03	3.22E-02	2.00E-01
7.40E+02	3.84E-03	5.53E-02	2.48E-01
8.05E+02	6.76E-03	8.31E-02	2.89E-01
8.70E+02	1.08E-02	1.14E-01	3.22E-01
9.35E+02	1.57E-02	1.46E-01	3.48E-01
1.00E+03	2.15E-02	1.77E-01	3.67E-01
1.10E+03	3.13E-02	2.21E-01	3.85E-01
1.20E+03	4.13E-02	2.61E-01	3.94E-01
1.30E+03	5.09E-02	2.95E-01	3.97E-01
1.40E+03	5.95E-02	3.23E-01	3.97E-01
1.50E+03	6.67E-02	3.47E-01	3.94E-01
1.60E+03	7.25E-02	3.67E-01	3.89E-01
1.70E+03	7.68E-02	3.82E-01	3.84E-01
1.80E+03	7.97E-02	3.95E-01	3.77E-01
1.90E+03	8.13E-02	4.05E-01	3.70E-01
2.00E+03	8.18E-02	4.12E-01	3.63E-01
2.25E+03	7.93E-02	4.22E-01	3.43E-01
2.50E+03	7.33E-02	4.22E-01	3.22E-01
2.75E+03	6.59E-02	4.16E-01	3.03E-01
3.00E+03	5.83E-02	4.05E-01	2.84E-01
4.00E+03	3.45E-02	3.48E-01	2.24E-01
5.00E+03	2.13E-02	2.95E-01	1.83E-01
6.00E+03	1.41E-02	2.53E-01	1.54E-01
7.00E+03	9.94E-03	2.20E-01	1.33E-01
8.00E+03	7.38E-03	1.95E-01	1.18E-01
1.04E+04	4.18E-03	1.53E-01	9.22E-02
1.28E+04	2.71E-03	1.25E-01	7.60E-02
1.52E+04	1.90E-03	1.07E-01	6.47E-02
1.76E+04	1.41E-03	9.27E-02	5.64E-02
2.00E+04	1.09E-03	8.20E-02	5.01E-02
2.20E+04	9.00E-04	7.49E-02	4.58E-02
2.40E+04	7.55E-04	6.89E-02	4.22E-02
2.60E+04	6.42E-04	6.38E-02	3.91E-02
2.80E+04	5.52E-04	5.94E-02	3.64E-02
3.00E+04	4.80E-04	5.56E-02	3.41E-02
3.20E+04	4.22E-04	5.23E-02	3.21E-02
3.40E+04	3.73E-04	4.93E-02	3.02E-02
3.60E+04	3.32E-04	4.66E-02	2.86E-02
3.80E+04	2.98E-04	4.42E-02	2.72E-02
4.00E+04	2.68E-04	4.21E-02	2.59E-02

Cr XIX + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
4.50E+02	7.96E-08	1.19E-03	3.19E-03
5.00E+02	6.06E-07	1.09E-03	7.72E-03
6.00E+02	1.04E-05	1.17E-03	2.64E-02
7.00E+02	7.61E-05	1.70E-03	5.76E-02
8.00E+02	3.30E-04	6.48E-03	9.62E-02
8.50E+02	5.89E-04	1.07E-02	1.16E-01
9.00E+02	9.79E-04	1.65E-02	1.36E-01
9.50E+02	1.53E-03	2.36E-02	1.55E-01
1.00E+03	2.26E-03	3.22E-02	1.72E-01
1.05E+03	3.20E-03	4.20E-02	1.88E-01
1.10E+03	4.36E-03	5.27E-02	2.02E-01
1.15E+03	5.72E-03	6.41E-02	2.15E-01
1.20E+03	7.27E-03	7.60E-02	2.26E-01
1.25E+03	9.01E-03	8.83E-02	2.35E-01
1.30E+03	1.09E-02	1.01E-01	2.42E-01
1.35E+03	1.29E-02	1.13E-01	2.49E-01
1.40E+03	1.50E-02	1.25E-01	2.54E-01
1.45E+03	1.72E-02	1.37E-01	2.58E-01
1.50E+03	1.94E-02	1.49E-01	2.61E-01
1.55E+03	2.16E-02	1.60E-01	2.63E-01
1.60E+03	2.38E-02	1.71E-01	2.65E-01
1.70E+03	2.80E-02	1.91E-01	2.67E-01
1.80E+03	3.19E-02	2.09E-01	2.67E-01
1.90E+03	3.53E-02	2.25E-01	2.66E-01
2.00E+03	3.82E-02	2.39E-01	2.63E-01
2.20E+03	4.23E-02	2.61E-01	2.57E-01
2.40E+03	4.44E-02	2.78E-01	2.49E-01
2.60E+03	4.47E-02	2.89E-01	2.40E-01
2.80E+03	4.38E-02	2.95E-01	2.30E-01
3.00E+03	4.20E-02	2.98E-01	2.20E-01
4.00E+03	2.91E-02	2.82E-01	1.77E-01
5.00E+03	1.90E-02	2.48E-01	1.45E-01
6.00E+03	1.28E-02	2.17E-01	1.22E-01
7.00E+03	9.02E-03	1.91E-01	1.05E-01
8.00E+03	6.64E-03	1.69E-01	9.23E-02
9.00E+03	5.08E-03	1.52E-01	8.24E-02
1.00E+04	4.01E-03	1.38E-01	7.45E-02
1.50E+04	1.67E-03	9.36E-02	5.08E-02
2.00E+04	9.25E-04	7.11E-02	3.88E-02
2.50E+04	5.87E-04	5.74E-02	3.14E-02
3.00E+04	4.06E-04	4.82E-02	2.65E-02
3.50E+04	2.97E-04	4.15E-02	2.28E-02
4.00E+04	2.26E-04	3.65E-02	2.01E-02
4.50E+04	1.78E-04	3.25E-02	1.80E-02
5.00E+04	1.44E-04	2.94E-02	1.62E-02

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

See page 5 for Explanation of Tables

Fe XXI + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
5.00E+02	8.89E-10		8.80E-04
7.00E+02	7.62E-07		1.15E-02
8.00E+02	6.57E-06		2.49E-02
9.00E+02	3.25E-05	1.33E-03	4.29E-02
1.00E+03	1.12E-04	2.51E-03	6.36E-02
1.10E+03	3.05E-04	5.66E-03	8.49E-02
1.20E+03	6.75E-04	1.12E-02	1.05E-01
1.25E+03	9.49E-04	1.48E-02	1.15E-01
1.30E+03	1.29E-03	1.90E-02	1.24E-01
1.35E+03	1.70E-03	2.38E-02	1.32E-01
1.40E+03	2.19E-03	2.90E-02	1.39E-01
1.45E+03	2.75E-03	3.46E-02	1.46E-01
1.50E+03	3.40E-03	4.06E-02	1.52E-01
1.55E+03	4.11E-03	4.69E-02	1.58E-01
1.60E+03	4.88E-03	5.33E-02	1.62E-01
1.65E+03	5.71E-03	5.99E-02	1.66E-01
1.70E+03	6.59E-03	6.67E-02	1.70E-01
1.75E+03	7.52E-03	7.35E-02	1.73E-01
1.80E+03	8.48E-03	8.03E-02	1.75E-01
1.90E+03	1.04E-02	9.38E-02	1.79E-01
2.00E+03	1.25E-02	1.07E-01	1.82E-01
2.25E+03	1.72E-02	1.37E-01	1.83E-01
2.50E+03	2.09E-02	1.61E-01	1.80E-01
2.75E+03	2.34E-02	1.81E-01	1.75E-01
3.00E+03	2.46E-02	1.95E-01	1.69E-01
3.50E+03	2.42E-02	2.11E-01	1.54E-01
4.00E+03	2.17E-02	2.15E-01	1.40E-01
5.00E+03	1.57E-02	2.03E-01	1.16E-01
6.00E+03	1.10E-02	1.84E-01	9.72E-02
7.00E+03	7.91E-03	1.65E-01	8.35E-02
8.00E+03	5.87E-03	1.48E-01	7.31E-02
1.00E+04	3.53E-03	1.21E-01	5.87E-02
1.25E+04	2.15E-03	9.86E-02	4.72E-02
1.50E+04	1.44E-03	8.29E-02	3.96E-02
1.75E+04	1.04E-03	7.16E-02	3.43E-02
2.00E+04	7.90E-04	6.30E-02	3.02E-02
2.50E+04	5.00E-04	5.08E-02	2.45E-02
3.00E+04	3.44E-04	4.26E-02	2.06E-02
3.50E+04	2.52E-04	3.67E-02	1.78E-02
4.00E+04	1.92E-04	3.23E-02	1.57E-02
4.50E+04	1.51E-04	2.88E-02	1.40E-02
5.00E+04	1.22E-04	2.60E-02	1.27E-02
5.50E+04	1.01E-04	2.37E-02	1.16E-02
6.00E+04	8.43E-05	2.18E-02	1.06E-02
6.50E+04	7.16E-05	2.01E-02	9.83E-03

Ni XXIII + t			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
8.00E+02	2.70E-08		4.88E-03
1.00E+03	2.03E-06		1.88E-02
1.12E+03	1.16E-05	7.87E-04	3.17E-02
1.25E+03	4.68E-05	1.41E-03	4.63E-02
1.38E+03	1.36E-04	2.58E-03	6.13E-02
1.50E+03	3.19E-04	5.47E-03	7.54E-02
1.62E+03	6.36E-04	9.87E-03	8.81E-02
1.75E+03	1.11E-03	1.58E-02	9.89E-02
1.88E+03	1.77E-03	2.30E-02	1.08E-01
2.00E+03	2.60E-03	3.13E-02	1.15E-01
2.25E+03	4.62E-03	4.98E-02	1.23E-01
2.50E+03	6.89E-03	6.91E-02	1.27E-01
2.75E+03	9.05E-03	8.74E-02	1.28E-01
3.00E+03	1.09E-02	1.04E-01	1.26E-01
3.25E+03	1.23E-02	1.18E-01	1.23E-01
3.50E+03	1.31E-02	1.29E-01	1.20E-01
3.75E+03	1.36E-02	1.38E-01	1.15E-01
4.00E+03	1.36E-02	1.45E-01	1.11E-01
5.00E+03	1.17E-02	1.55E-01	9.36E-02
6.00E+03	8.97E-03	1.50E-01	7.92E-02
7.00E+03	6.74E-03	1.39E-01	6.81E-02
8.00E+03	5.12E-03	1.28E-01	5.95E-02
9.00E+03	3.96E-03	1.17E-01	5.28E-02
1.00E+04	3.13E-03	1.07E-01	4.75E-02
1.20E+04	2.08E-03	9.16E-02	3.95E-02
1.40E+04	1.47E-03	7.95E-02	3.39E-02
1.60E+04	1.10E-03	7.01E-02	2.98E-02
1.80E+04	8.51E-04	6.27E-02	2.65E-02
2.00E+04	6.81E-04	5.66E-02	2.40E-02
2.25E+04	5.32E-04	5.06E-02	2.15E-02
2.50E+04	4.28E-04	4.57E-02	1.94E-02
2.75E+04	3.52E-04	4.17E-02	1.77E-02
3.00E+04	2.94E-04	3.84E-02	1.63E-02
3.25E+04	2.50E-04	3.55E-02	1.51E-02
3.50E+04	2.15E-04	3.31E-02	1.41E-02
3.75E+04	1.87E-04	3.09E-02	1.32E-02
4.00E+04	1.64E-04	2.91E-02	1.24E-02
4.50E+04	1.29E-04	2.59E-02	1.11E-02
5.00E+04	1.04E-04	2.34E-02	1.01E-02
5.50E+04	8.60E-05	2.13E-02	9.18E-03
6.00E+04	7.20E-05	1.96E-02	8.45E-03
6.50E+04	6.12E-05	1.81E-02	7.82E-03
7.00E+04	5.27E-05	1.69E-02	7.28E-03
7.50E+04	4.58E-05	1.58E-02	6.82E-03
8.00E+04	4.02E-05	1.48E-02	6.40E-03

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

See page 5 for Explanation of Tables

N II + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.50E+00	2.55E-04		
1.75E+00	2.27E-03		2.70E+00
2.00E+00	1.31E-02		8.67E+00
2.25E+00	5.41E-02	1.29E+00	2.09E+01
2.50E+00	1.69E-01	3.82E+00	4.01E+01
2.75E+00	4.37E-01	8.78E+00	6.55E+01
3.00E+00	9.55E-01	1.66E+01	9.49E+01
3.25E+00	1.84E+00	2.74E+01	1.26E+02
3.50E+00	3.21E+00	4.06E+01	1.57E+02
3.75E+00	5.15E+00	5.57E+01	1.85E+02
4.00E+00	7.73E+00	7.16E+01	2.11E+02
4.25E+00	1.09E+01	8.75E+01	2.32E+02
4.50E+00	1.47E+01	1.03E+02	2.49E+02
4.75E+00	1.90E+01	1.18E+02	2.63E+02
5.00E+00	2.37E+01	1.31E+02	2.73E+02
6.00E+00	4.30E+01	1.73E+02	2.98E+02
7.00E+00	5.76E+01	2.05E+02	3.11E+02
8.00E+00	6.69E+01	2.26E+02	3.13E+02
9.00E+00	7.39E+01	2.37E+02	3.07E+02
1.00E+01	7.84E+01	2.44E+02	3.03E+02
1.50E+01	8.20E+01	2.44E+02	2.70E+02
2.00E+01	7.69E+01	2.28E+02	2.42E+02
2.50E+01	7.12E+01	2.12E+02	2.21E+02
3.00E+01	6.62E+01	1.97E+02	2.04E+02
3.50E+01	6.20E+01	1.85E+02	1.90E+02
4.00E+01	5.85E+01	1.75E+02	1.79E+02
5.00E+01	5.27E+01	1.58E+02	1.61E+02
6.00E+01	4.86E+01	1.45E+02	1.48E+02
7.00E+01	4.56E+01	1.35E+02	1.37E+02
8.00E+01	4.25E+01	1.26E+02	1.29E+02
9.00E+01	4.02E+01	1.20E+02	1.22E+02
1.00E+02	3.86E+01	1.14E+02	1.16E+02
1.25E+02	3.38E+01	1.02E+02	1.04E+02
1.50E+02	3.14E+01	9.36E+01	9.46E+01
2.00E+02	2.71E+01	7.99E+01	8.19E+01
2.50E+02	2.45E+01	7.09E+01	7.27E+01
3.00E+02	2.33E+01	6.46E+01	6.61E+01
4.00E+02	2.03E+01	5.59E+01	5.74E+01
5.00E+02	1.74E+01	4.99E+01	5.12E+01
6.00E+02	1.55E+01	4.56E+01	4.65E+01
7.00E+02	1.43E+01	4.24E+01	4.29E+01
8.00E+02	1.34E+01	4.00E+01	4.01E+01
1.00E+03	1.21E+01	3.63E+01	3.61E+01
1.20E+03	1.09E+01	3.35E+01	3.32E+01
1.40E+03	9.75E+00	3.13E+01	3.09E+01

O III + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
6.00E+00	5.48E-03	6.32E-01	3.95E+00
7.00E+00	3.16E-02	1.57E+00	1.10E+01
8.00E+00	1.18E-01	4.29E+00	2.20E+01
9.00E+00	3.30E-01	9.65E+00	3.56E+01
1.00E+01	7.50E-01	1.74E+01	5.01E+01
1.10E+01	1.45E+00	2.67E+01	6.40E+01
1.20E+01	2.50E+00	3.69E+01	7.63E+01
1.30E+01	3.91E+00	4.69E+01	8.64E+01
1.40E+01	5.69E+00	5.62E+01	9.41E+01
1.50E+01	7.78E+00	6.43E+01	9.97E+01
1.60E+01	1.01E+01	7.11E+01	1.03E+02
1.70E+01	1.25E+01	7.68E+01	1.05E+02
1.80E+01	1.49E+01	8.15E+01	1.07E+02
1.90E+01	1.73E+01	8.55E+01	1.07E+02
2.00E+01	1.94E+01	8.90E+01	1.08E+02
2.50E+01	2.60E+01	1.02E+02	1.09E+02
3.00E+01	2.92E+01	1.05E+02	1.05E+02
4.00E+01	3.12E+01	1.05E+02	9.69E+01
5.00E+01	3.06E+01	1.00E+02	8.97E+01
6.00E+01	2.94E+01	9.49E+01	8.37E+01
7.00E+01	2.80E+01	9.00E+01	7.86E+01
8.00E+01	2.67E+01	8.56E+01	7.44E+01
9.00E+01	2.56E+01	8.16E+01	7.06E+01
1.00E+02	2.44E+01	7.80E+01	6.74E+01
1.10E+02	2.31E+01	7.53E+01	6.48E+01
1.20E+02	2.26E+01	7.19E+01	6.20E+01
1.30E+02	2.20E+01	6.93E+01	5.98E+01
1.40E+02	2.10E+01	6.74E+01	5.80E+01
1.50E+02	1.99E+01	6.56E+01	5.62E+01
1.60E+02	1.92E+01	6.38E+01	5.47E+01
1.80E+02	1.85E+01	5.99E+01	5.16E+01
2.00E+02	1.77E+01	5.68E+01	4.88E+01
2.67E+02	1.49E+01	4.92E+01	4.23E+01
3.33E+02	1.41E+01	4.37E+01	3.81E+01
4.00E+02	1.31E+01	3.99E+01	3.49E+01
5.00E+02	1.13E+01	3.57E+01	3.11E+01
6.00E+02	1.01E+01	3.26E+01	2.83E+01
7.00E+02	9.33E+00	3.01E+01	2.62E+01
8.00E+02	8.81E+00	2.82E+01	2.46E+01
1.00E+03	7.99E+00	2.54E+01	2.22E+01
1.40E+03	6.47E+00	2.19E+01	1.90E+01
1.80E+03	5.16E+00	1.95E+01	1.67E+01
2.20E+03	4.13E+00	1.76E+01	1.48E+01
2.60E+03	3.35E+00	1.60E+01	1.34E+01
3.00E+03	2.76E+00	1.47E+01	1.21E+01

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

See page 5 for Explanation of Tables

Ne V + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.00E+01	2.33E-04		3.49E-01
2.25E+01	1.04E-03	0	8.87E-01
2.50E+01	3.55E-03	0	1.89E+00
2.75E+01	9.94E-03	4.67E-01	3.33E+00
3.00E+01	2.34E-02	9.81E-01	5.19E+00
3.20E+01	4.18E-02	1.58E+00	6.90E+00
3.40E+01	7.05E-02	2.36E+00	8.75E+00
3.60E+01	1.11E-01	3.31E+00	1.07E+01
3.80E+01	1.68E-01	4.42E+00	1.26E+01
4.00E+01	2.42E-01	5.65E+00	1.45E+01
4.50E+01	5.20E-01	9.05E+00	1.89E+01
5.00E+01	9.48E-01	1.25E+01	2.24E+01
5.50E+01	1.52E+00	1.56E+01	2.49E+01
6.00E+01	2.22E+00	1.82E+01	2.65E+01
6.50E+01	3.00E+00	2.03E+01	2.73E+01
7.00E+01	3.80E+00	2.18E+01	2.77E+01
7.50E+01	4.56E+00	2.30E+01	2.78E+01
8.00E+01	5.23E+00	2.40E+01	2.78E+01
9.00E+01	6.24E+00	2.56E+01	2.79E+01
1.00E+02	6.85E+00	2.68E+01	2.78E+01
1.40E+02	7.93E+00	2.73E+01	2.56E+01
1.80E+02	7.90E+00	2.61E+01	2.35E+01
2.20E+02	7.64E+00	2.47E+01	2.18E+01
2.60E+02	7.26E+00	2.34E+01	2.04E+01
3.00E+02	6.70E+00	2.24E+01	1.93E+01
3.50E+02	6.45E+00	2.07E+01	1.79E+01
4.00E+02	6.38E+00	1.93E+01	1.68E+01
4.50E+02	6.10E+00	1.84E+01	1.60E+01
5.00E+02	5.63E+00	1.78E+01	1.53E+01
7.50E+02	4.18E+00	1.51E+01	1.28E+01
1.00E+03	3.94E+00	1.30E+01	1.12E+01
1.25E+03	3.59E+00	1.17E+01	1.01E+01
1.50E+03	3.14E+00	1.07E+01	9.24E+00
1.75E+03	2.72E+00	9.95E+00	8.51E+00
2.00E+03	2.34E+00	9.30E+00	7.88E+00
2.50E+03	1.76E+00	8.23E+00	6.85E+00
3.00E+03	1.36E+00	7.37E+00	6.05E+00
3.50E+03	1.08E+00	6.66E+00	5.41E+00
4.00E+03	8.70E-01	6.07E+00	4.88E+00
5.00E+03	6.00E-01	5.15E+00	4.09E+00
6.00E+03	4.38E-01	4.46E+00	3.51E+00
7.00E+03	3.33E-01	3.94E+00	3.08E+00
8.00E+03	2.62E-01	3.52E+00	2.74E+00
9.00E+03	2.11E-01	3.18E+00	2.47E+00
1.00E+04	1.74E-01	2.90E+00	2.24E+00

Mg VII + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
5.00E+01	9.80E-05		1.35E-01
6.00E+01	9.50E-04	8.21E-02	5.71E-01
7.00E+01	5.08E-03	1.99E-01	1.47E+00
8.00E+01	1.79E-02	5.80E-01	2.75E+00
9.00E+01	4.77E-02	1.23E+00	4.23E+00
1.00E+02	1.03E-01	2.10E+00	5.73E+00
1.10E+02	1.92E-01	3.11E+00	7.10E+00
1.20E+02	3.19E-01	4.16E+00	8.24E+00
1.30E+02	4.84E-01	5.16E+00	9.14E+00
1.40E+02	6.84E-01	6.05E+00	9.79E+00
1.50E+02	9.10E-01	6.82E+00	1.02E+01
1.60E+02	1.15E+00	7.45E+00	1.05E+01
1.70E+02	1.40E+00	7.96E+00	1.06E+01
1.80E+02	1.64E+00	8.39E+00	1.07E+01
1.90E+02	1.86E+00	8.76E+00	1.07E+01
2.00E+02	2.05E+00	9.07E+00	1.07E+01
2.25E+02	2.42E+00	9.73E+00	1.07E+01
2.50E+02	2.64E+00	1.02E+01	1.07E+01
2.75E+02	2.78E+00	1.04E+01	1.05E+01
3.00E+02	2.88E+00	1.05E+01	1.03E+01
3.50E+02	3.01E+00	1.04E+01	9.77E+00
4.00E+02	3.04E+00	1.02E+01	9.34E+00
4.50E+02	3.02E+00	9.91E+00	8.94E+00
5.00E+02	2.98E+00	9.61E+00	8.57E+00
5.50E+02	2.89E+00	9.37E+00	8.28E+00
6.00E+02	2.74E+00	9.21E+00	8.05E+00
7.00E+02	2.47E+00	8.86E+00	7.60E+00
8.00E+02	2.32E+00	8.45E+00	7.19E+00
9.00E+02	2.19E+00	8.11E+00	6.87E+00
1.00E+03	2.08E+00	7.78E+00	6.57E+00
1.50E+03	1.75E+00	6.38E+00	5.41E+00
2.00E+03	1.38E+00	5.49E+00	4.61E+00
2.50E+03	1.06E+00	4.86E+00	4.01E+00
3.00E+03	8.20E-01	4.35E+00	3.55E+00
3.50E+03	6.47E-01	3.94E+00	3.17E+00
4.00E+03	5.21E-01	3.59E+00	2.87E+00
5.00E+03	3.57E-01	3.05E+00	2.41E+00
6.00E+03	2.59E-01	2.65E+00	2.07E+00
7.00E+03	1.96E-01	2.34E+00	1.82E+00
8.00E+03	1.53E-01	2.09E+00	1.62E+00
1.00E+04	1.01E-01	1.72E+00	1.33E+00
1.20E+04	7.17E-02	1.47E+00	1.12E+00
1.40E+04	5.34E-02	1.28E+00	9.74E-01
1.60E+04	4.13E-02	1.13E+00	8.60E-01
1.80E+04	3.29E-02	1.01E+00	7.69E-01

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

See page 5 for Explanation of Tables

Si IX + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+02	4.22E-05		6.32E-02
1.10E+02	1.49E-04		1.40E-01
1.20E+02	4.32E-04	3.80E-02	2.71E-01
1.30E+02	1.08E-03	5.61E-02	4.60E-01
1.40E+02	2.42E-03	9.32E-02	7.05E-01
1.50E+02	4.79E-03	1.39E-01	9.98E-01
1.60E+02	8.71E-03	2.30E-01	1.33E+00
1.70E+02	1.47E-02	3.51E-01	1.68E+00
1.80E+02	2.35E-02	5.02E-01	2.05E+00
1.90E+02	3.55E-02	6.81E-01	2.41E+00
2.00E+02	5.13E-02	8.81E-01	2.77E+00
2.10E+02	7.12E-02	1.10E+00	3.11E+00
2.20E+02	9.56E-02	1.33E+00	3.42E+00
2.30E+02	1.25E-01	1.56E+00	3.71E+00
2.40E+02	1.59E-01	1.80E+00	3.96E+00
2.50E+02	1.98E-01	2.03E+00	4.19E+00
2.60E+02	2.41E-01	2.25E+00	4.38E+00
2.70E+02	2.88E-01	2.46E+00	4.54E+00
2.80E+02	3.39E-01	2.66E+00	4.68E+00
2.90E+02	3.93E-01	2.84E+00	4.79E+00
3.00E+02	4.49E-01	3.02E+00	4.88E+00
3.25E+02	5.94E-01	3.39E+00	5.02E+00
3.50E+02	7.37E-01	3.69E+00	5.08E+00
3.75E+02	8.68E-01	3.94E+00	5.11E+00
4.00E+02	9.81E-01	4.15E+00	5.12E+00
4.50E+02	1.15E+00	4.49E+00	5.13E+00
5.00E+02	1.25E+00	4.72E+00	5.10E+00
5.50E+02	1.31E+00	4.86E+00	5.02E+00
6.00E+02	1.35E+00	4.92E+00	4.92E+00
6.50E+02	1.38E+00	4.95E+00	4.81E+00
7.00E+02	1.38E+00	4.95E+00	4.70E+00
8.00E+02	1.36E+00	4.91E+00	4.51E+00
9.00E+02	1.33E+00	4.82E+00	4.33E+00
1.00E+03	1.32E+00	4.67E+00	4.14E+00
2.00E+03	8.89E-01	3.63E+00	3.02E+00
3.00E+03	5.54E-01	2.88E+00	2.33E+00
4.00E+03	3.59E-01	2.38E+00	1.89E+00
5.00E+03	2.46E-01	2.03E+00	1.59E+00
6.00E+03	1.78E-01	1.77E+00	1.37E+00
8.00E+03	1.05E-01	1.40E+00	1.07E+00
1.00E+04	6.90E-02	1.16E+00	8.83E-01
1.20E+04	4.87E-02	9.84E-01	7.49E-01
1.40E+04	3.62E-02	8.57E-01	6.51E-01
1.70E+04	2.48E-02	7.17E-01	5.43E-01
2.00E+04	1.81E-02	6.17E-01	4.66E-01

S XI + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
2.00E+02	1.12E-04		1.02E-01
2.20E+02	3.56E-04		2.01E-01
2.40E+02	9.64E-04	2.44E-02	3.42E-01
2.60E+02	2.20E-03	5.25E-02	5.19E-01
2.80E+02	4.48E-03	9.75E-02	7.23E-01
3.00E+02	8.21E-03	1.61E-01	9.45E-01
3.20E+02	1.40E-02	2.45E-01	1.17E+00
3.40E+02	2.22E-02	3.46E-01	1.40E+00
3.60E+02	3.32E-02	4.61E-01	1.61E+00
3.80E+02	4.73E-02	5.87E-01	1.81E+00
4.00E+02	6.49E-02	7.20E-01	1.99E+00
4.20E+02	8.58E-02	8.54E-01	2.15E+00
4.40E+02	1.10E-01	9.88E-01	2.28E+00
4.60E+02	1.37E-01	1.12E+00	2.40E+00
4.80E+02	1.67E-01	1.24E+00	2.49E+00
5.00E+02	1.99E-01	1.36E+00	2.56E+00
5.50E+02	2.85E-01	1.61E+00	2.68E+00
6.00E+02	3.73E-01	1.82E+00	2.74E+00
6.50E+02	4.54E-01	1.99E+00	2.76E+00
7.00E+02	5.24E-01	2.13E+00	2.77E+00
7.50E+02	5.81E-01	2.24E+00	2.77E+00
8.00E+02	6.27E-01	2.34E+00	2.75E+00
8.50E+02	6.62E-01	2.42E+00	2.75E+00
9.00E+02	6.90E-01	2.48E+00	2.73E+00
9.50E+02	7.12E-01	2.52E+00	2.70E+00
1.00E+03	7.29E-01	2.55E+00	2.67E+00
1.25E+03	7.85E-01	2.58E+00	2.49E+00
1.50E+03	8.25E-01	2.51E+00	2.34E+00
1.75E+03	7.88E-01	2.48E+00	2.23E+00
2.00E+03	6.87E-01	2.43E+00	2.10E+00
3.00E+03	3.87E-01	2.02E+00	1.62E+00
4.00E+03	2.52E-01	1.68E+00	1.31E+00
5.00E+03	1.75E-01	1.43E+00	1.11E+00
6.00E+03	1.27E-01	1.24E+00	9.56E-01
7.00E+03	9.58E-02	1.10E+00	8.41E-01
8.00E+03	7.46E-02	9.86E-01	7.51E-01
1.00E+04	4.88E-02	8.16E-01	6.18E-01
1.20E+04	3.43E-02	6.96E-01	5.25E-01
1.40E+04	2.54E-02	6.06E-01	4.57E-01
1.60E+04	1.96E-02	5.37E-01	4.04E-01
1.80E+04	1.55E-02	4.81E-01	3.62E-01
2.00E+04	1.26E-02	4.37E-01	3.28E-01
2.25E+04	1.00E-02	3.91E-01	2.93E-01
2.50E+04	8.12E-03	3.54E-01	2.66E-01
2.75E+04	6.73E-03	3.23E-01	2.42E-01

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

See page 5 for Explanation of Tables

Ar XIII + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
3.00E+02	2.20E-05		3.73E-02
3.25E+02	6.58E-05		6.98E-02
3.50E+02	1.70E-04		1.18E-01
3.75E+02	3.86E-04		1.82E-01
4.00E+02	7.88E-04	1.51E-02	2.61E-01
4.25E+02	1.48E-03	2.72E-02	3.51E-01
4.50E+02	2.57E-03	4.46E-02	4.50E-01
4.75E+02	4.23E-03	6.84E-02	5.56E-01
5.00E+02	6.59E-03	9.85E-02	6.64E-01
5.25E+02	9.76E-03	1.35E-01	7.72E-01
5.50E+02	1.39E-02	1.77E-01	8.78E-01
5.75E+02	1.91E-02	2.24E-01	9.78E-01
6.00E+02	2.55E-02	2.75E-01	1.07E+00
6.50E+02	4.21E-02	3.86E-01	1.24E+00
7.00E+02	6.34E-02	5.01E-01	1.37E+00
7.50E+02	8.93E-02	6.14E-01	1.47E+00
8.00E+02	1.19E-01	7.20E-01	1.54E+00
8.50E+02	1.50E-01	8.18E-01	1.59E+00
9.00E+02	1.82E-01	9.05E-01	1.62E+00
9.50E+02	2.15E-01	9.85E-01	1.64E+00
1.00E+03	2.45E-01	1.05E+00	1.66E+00
1.33E+03	3.94E-01	1.36E+00	1.65E+00
1.67E+03	4.70E-01	1.47E+00	1.57E+00
2.00E+03	5.00E-01	1.51E+00	1.49E+00
2.33E+03	4.65E-01	1.53E+00	1.42E+00
2.67E+03	3.94E-01	1.52E+00	1.33E+00
3.00E+03	3.25E-01	1.47E+00	1.23E+00
4.00E+03	1.98E-01	1.26E+00	9.93E-01
5.00E+03	1.37E-01	1.08E+00	8.33E-01
6.00E+03	9.99E-02	9.42E-01	7.19E-01
7.00E+03	7.58E-02	8.36E-01	6.34E-01
8.00E+03	5.92E-02	7.50E-01	5.66E-01
9.00E+03	4.74E-02	6.80E-01	5.12E-01
1.00E+04	3.87E-02	6.22E-01	4.67E-01
1.10E+04	3.22E-02	5.73E-01	4.30E-01
1.20E+04	2.72E-02	5.31E-01	3.98E-01
1.30E+04	2.33E-02	4.95E-01	3.70E-01
1.40E+04	2.01E-02	4.63E-01	3.46E-01
1.50E+04	1.76E-02	4.35E-01	3.25E-01
1.75E+04	1.30E-02	3.78E-01	2.82E-01
2.00E+04	9.94E-03	3.34E-01	2.49E-01
2.25E+04	7.87E-03	3.00E-01	2.23E-01
2.50E+04	6.38E-03	2.71E-01	2.02E-01
2.75E+04	5.28E-03	2.48E-01	1.85E-01
3.00E+04	4.44E-03	2.28E-01	1.70E-01

Ca XV + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
4.50E+02	1.10E-05		2.64E-02
5.00E+02	4.85E-05		5.83E-02
5.50E+02	1.67E-04		1.08E-01
6.00E+02	4.58E-04		1.74E-01
6.50E+02	1.08E-03	1.72E-02	2.53E-01
7.00E+02	2.21E-03	3.26E-02	3.40E-01
7.50E+02	4.08E-03	5.49E-02	4.30E-01
8.00E+02	6.91E-03	8.44E-02	5.19E-01
8.50E+02	1.09E-02	1.21E-01	6.04E-01
9.00E+02	1.63E-02	1.62E-01	6.81E-01
9.50E+02	2.31E-02	2.07E-01	7.50E-01
1.00E+03	3.12E-02	2.55E-01	8.09E-01
1.10E+03	5.17E-02	3.53E-01	9.01E-01
1.20E+03	7.62E-02	4.47E-01	9.60E-01
1.30E+03	1.03E-01	5.34E-01	9.95E-01
1.40E+03	1.30E-01	6.11E-01	1.01E+00
1.50E+03	1.56E-01	6.80E-01	1.02E+00
1.75E+03	2.12E-01	8.14E-01	1.02E+00
2.00E+03	2.54E-01	9.03E-01	1.01E+00
2.25E+03	2.83E-01	9.62E-01	9.86E-01
2.50E+03	2.98E-01	1.00E+00	9.63E-01
2.75E+03	2.98E-01	1.04E+00	9.39E-01
3.00E+03	2.84E-01	1.06E+00	9.08E-01
4.00E+03	1.85E-01	1.02E+00	7.55E-01
5.00E+03	1.23E-01	9.10E-01	6.29E-01
6.00E+03	8.86E-02	8.05E-01	5.40E-01
7.00E+03	6.75E-02	7.19E-01	4.75E-01
8.00E+03	5.31E-02	6.49E-01	4.24E-01
9.00E+03	4.28E-02	5.91E-01	3.83E-01
1.00E+04	3.51E-02	5.42E-01	3.50E-01
1.20E+04	2.48E-02	4.65E-01	2.98E-01
1.40E+04	1.83E-02	4.06E-01	2.60E-01
1.60E+04	1.41E-02	3.61E-01	2.30E-01
1.80E+04	1.12E-02	3.25E-01	2.07E-01
2.00E+04	9.07E-03	2.95E-01	1.88E-01
2.20E+04	7.51E-03	2.70E-01	1.72E-01
2.40E+04	6.31E-03	2.49E-01	1.58E-01
2.60E+04	5.38E-03	2.32E-01	1.47E-01
2.80E+04	4.64E-03	2.16E-01	1.37E-01
3.00E+04	4.04E-03	2.02E-01	1.28E-01
3.20E+04	3.55E-03	1.90E-01	1.21E-01
3.40E+04	3.15E-03	1.80E-01	1.14E-01
3.60E+04	2.81E-03	1.70E-01	1.08E-01
3.80E+04	2.52E-03	1.62E-01	1.03E-01
4.00E+04	2.27E-03	1.54E-01	9.77E-02

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

See page 5 for Explanation of Tables

Ti XVII + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
6.00E+02	1.81E-06		1.18E-02
6.50E+02	6.45E-06		2.25E-02
7.00E+02	1.91E-05		3.93E-02
7.50E+02	5.11E-05		6.18E-02
8.00E+02	1.15E-04		8.98E-02
8.50E+02	2.43E-04		1.23E-01
9.00E+02	4.63E-04	6.63E-03	1.60E-01
9.50E+02	8.11E-04	1.16E-02	2.00E-01
1.00E+03	1.36E-03	1.78E-02	2.42E-01
1.10E+03	3.20E-03	3.73E-02	3.25E-01
1.20E+03	6.40E-03	6.56E-02	4.05E-01
1.30E+03	1.13E-02	1.01E-01	4.74E-01
1.40E+03	1.80E-02	1.43E-01	5.32E-01
1.50E+03	2.65E-02	1.87E-01	5.77E-01
1.60E+03	3.65E-02	2.33E-01	6.11E-01
1.70E+03	4.76E-02	2.78E-01	6.36E-01
1.80E+03	5.95E-02	3.21E-01	6.53E-01
1.90E+03	7.17E-02	3.62E-01	6.64E-01
2.00E+03	8.38E-02	4.01E-01	6.72E-01
2.25E+03	1.12E-01	4.85E-01	6.78E-01
2.50E+03	1.36E-01	5.52E-01	6.74E-01
2.75E+03	1.55E-01	6.05E-01	6.66E-01
3.00E+03	1.68E-01	6.49E-01	6.55E-01
4.00E+03	1.55E-01	7.42E-01	5.84E-01
5.00E+03	1.08E-01	7.22E-01	4.92E-01
6.00E+03	7.54E-02	6.60E-01	4.19E-01
7.00E+03	5.63E-02	5.98E-01	3.65E-01
8.00E+03	4.40E-02	5.44E-01	3.24E-01
1.04E+04	2.71E-02	4.44E-01	2.57E-01
1.28E+04	1.83E-02	3.74E-01	2.14E-01
1.52E+04	1.31E-02	3.22E-01	1.83E-01
1.76E+04	9.79E-03	2.83E-01	1.60E-01
2.00E+04	7.60E-03	2.53E-01	1.43E-01
2.20E+04	6.29E-03	2.32E-01	1.31E-01
2.40E+04	5.28E-03	2.14E-01	1.21E-01
2.60E+04	4.50E-03	1.99E-01	1.12E-01
2.80E+04	3.88E-03	1.85E-01	1.04E-01
3.00E+04	3.38E-03	1.74E-01	9.78E-02
3.20E+04	2.97E-03	1.64E-01	9.20E-02
3.40E+04	2.63E-03	1.55E-01	8.69E-02
3.60E+04	2.34E-03	1.46E-01	8.23E-02
3.80E+04	2.10E-03	1.39E-01	7.82E-02
4.00E+04	1.90E-03	1.32E-01	7.45E-02
4.50E+04	1.50E-03	1.18E-01	6.66E-02
4.75E+04	1.34E-03	1.12E-01	6.32E-02

Cr XIX + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
8.00E+02	4.85E-07		8.65E-03
9.00E+02	3.73E-06		2.15E-02
1.00E+03	1.82E-05		4.34E-02
1.10E+03	6.99E-05		7.36E-02
1.20E+03	2.00E-04	2.73E-03	1.10E-01
1.25E+03	3.22E-04	4.29E-03	1.30E-01
1.30E+03	4.94E-04	6.39E-03	1.51E-01
1.35E+03	7.27E-04	9.14E-03	1.72E-01
1.40E+03	1.03E-03	1.25E-02	1.93E-01
1.45E+03	1.44E-03	1.68E-02	2.14E-01
1.50E+03	1.95E-03	2.19E-02	2.35E-01
1.55E+03	2.58E-03	2.77E-02	2.55E-01
1.60E+03	3.34E-03	3.43E-02	2.74E-01
1.70E+03	5.28E-03	4.99E-02	3.10E-01
1.80E+03	7.85E-03	6.82E-02	3.41E-01
1.90E+03	1.11E-02	8.87E-02	3.68E-01
2.00E+03	1.49E-02	1.11E-01	3.90E-01
2.20E+03	2.42E-02	1.57E-01	4.23E-01
2.40E+03	3.49E-02	2.04E-01	4.42E-01
2.60E+03	4.63E-02	2.50E-01	4.53E-01
2.80E+03	5.75E-02	2.92E-01	4.58E-01
3.00E+03	6.80E-02	3.31E-01	4.59E-01
4.00E+03	9.84E-02	4.71E-01	4.36E-01
5.00E+03	8.82E-02	5.33E-01	3.85E-01
6.00E+03	6.56E-02	5.29E-01	3.29E-01
7.00E+03	4.84E-02	4.97E-01	2.85E-01
8.00E+03	3.71E-02	4.61E-01	2.51E-01
9.00E+03	2.96E-02	4.26E-01	2.25E-01
1.00E+04	2.43E-02	3.95E-01	2.04E-01
1.20E+04	1.73E-02	3.43E-01	1.73E-01
1.40E+04	1.29E-02	3.03E-01	1.50E-01
1.60E+04	9.98E-03	2.70E-01	1.33E-01
1.80E+04	7.93E-03	2.44E-01	1.19E-01
2.00E+04	6.44E-03	2.23E-01	1.08E-01
2.50E+04	4.13E-03	1.82E-01	8.82E-02
3.00E+04	2.87E-03	1.54E-01	7.43E-02
3.50E+04	2.10E-03	1.34E-01	6.43E-02
4.00E+04	1.61E-03	1.18E-01	5.66E-02
4.50E+04	1.27E-03	1.05E-01	5.06E-02
5.00E+04	1.03E-03	9.52E-02	4.58E-02
6.00E+04	7.11E-04	8.00E-02	3.84E-02
7.00E+04	5.22E-04	6.89E-02	3.31E-02
8.00E+04	3.99E-04	6.05E-02	2.91E-02
9.00E+04	3.15E-04	5.40E-02	2.59E-02
1.00E+05	2.54E-04	4.87E-02	2.34E-02

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

See page 5 for Explanation of Tables

Fe XXI + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.00E+03	5.83E-08		5.82E-03
1.20E+03	2.14E-06		2.24E-02
1.40E+03	2.29E-05		5.34E-02
1.50E+03	5.90E-05		7.31E-02
1.60E+03	1.30E-04		9.46E-02
1.70E+03	2.64E-04	3.47E-03	1.17E-01
1.80E+03	4.91E-04	6.15E-03	1.40E-01
1.90E+03	8.25E-04	9.84E-03	1.62E-01
2.00E+03	1.33E-03	1.49E-02	1.83E-01
2.10E+03	2.01E-03	2.13E-02	2.03E-01
2.20E+03	2.90E-03	2.89E-02	2.21E-01
2.30E+03	4.01E-03	3.78E-02	2.37E-01
2.40E+03	5.38E-03	4.79E-02	2.52E-01
2.50E+03	6.98E-03	5.88E-02	2.65E-01
2.60E+03	8.79E-03	7.06E-02	2.76E-01
2.70E+03	1.08E-02	8.31E-02	2.85E-01
2.80E+03	1.31E-02	9.60E-02	2.92E-01
2.90E+03	1.55E-02	1.09E-01	2.99E-01
3.00E+03	1.80E-02	1.23E-01	3.04E-01
3.50E+03	3.15E-02	1.89E-01	3.17E-01
4.00E+03	4.39E-02	2.49E-01	3.16E-01
4.50E+03	5.27E-02	2.99E-01	3.08E-01
5.00E+03	5.67E-02	3.40E-01	2.96E-01
5.50E+03	5.62E-02	3.70E-01	2.80E-01
6.00E+03	5.24E-02	3.88E-01	2.62E-01
7.00E+03	4.16E-02	3.96E-01	2.27E-01
8.00E+03	3.22E-02	3.83E-01	1.99E-01
9.00E+03	2.56E-02	3.62E-01	1.76E-01
1.00E+04	2.09E-02	3.41E-01	1.59E-01
1.20E+04	1.49E-02	3.01E-01	1.33E-01
1.40E+04	1.12E-02	2.69E-01	1.16E-01
1.60E+04	8.71E-03	2.42E-01	1.02E-01
1.80E+04	6.96E-03	2.20E-01	9.17E-02
2.00E+04	5.68E-03	2.01E-01	8.32E-02
3.00E+04	2.55E-03	1.40E-01	5.71E-02
4.00E+04	1.43E-03	1.08E-01	4.36E-02
5.00E+04	9.13E-04	8.73E-02	3.52E-02
6.00E+04	6.32E-04	7.34E-02	2.96E-02
7.00E+04	4.63E-04	6.33E-02	2.55E-02
8.00E+04	3.54E-04	5.56E-02	2.24E-02
9.00E+04	2.79E-04	4.96E-02	2.00E-02
1.00E+05	2.26E-04	4.48E-02	1.80E-02
1.10E+05	1.86E-04	4.08E-02	1.64E-02
1.20E+05	1.56E-04	3.75E-02	1.51E-02
1.30E+05	1.33E-04	3.47E-02	1.40E-02

Ni XXIII + α			
E (eV)	Cross Section (a_0^2)		
	0→1	0→2	1→2
1.20E+03	5.74E-09		3.36E-03
1.40E+03	1.58E-07		1.13E-02
1.60E+03	1.75E-06		2.57E-02
1.80E+03	1.16E-05		4.61E-02
2.00E+03	5.16E-05	1.67E-03	7.04E-02
2.25E+03	2.15E-04	3.56E-03	1.02E-01
2.50E+03	6.32E-04	7.30E-03	1.33E-01
2.75E+03	1.48E-03	1.53E-02	1.60E-01
3.00E+03	2.87E-03	2.69E-02	1.82E-01
3.25E+03	4.86E-03	4.17E-02	1.98E-01
3.50E+03	7.40E-03	5.89E-02	2.10E-01
3.75E+03	1.04E-02	7.80E-02	2.18E-01
4.00E+03	1.37E-02	9.78E-02	2.23E-01
4.25E+03	1.71E-02	1.18E-01	2.26E-01
4.50E+03	2.04E-02	1.38E-01	2.26E-01
4.75E+03	2.36E-02	1.58E-01	2.26E-01
5.00E+03	2.64E-02	1.77E-01	2.24E-01
5.25E+03	2.88E-02	1.94E-01	2.21E-01
5.50E+03	3.07E-02	2.11E-01	2.18E-01
5.75E+03	3.20E-02	2.26E-01	2.13E-01
6.00E+03	3.28E-02	2.40E-01	2.09E-01
7.00E+03	3.16E-02	2.80E-01	1.86E-01
8.00E+03	2.68E-02	2.96E-01	1.64E-01
9.00E+03	2.18E-02	2.96E-01	1.45E-01
1.00E+04	1.78E-02	2.87E-01	1.30E-01
1.20E+04	1.26E-02	2.63E-01	1.07E-01
1.40E+04	9.48E-03	2.39E-01	9.22E-02
1.60E+04	7.42E-03	2.18E-01	8.12E-02
1.80E+04	5.97E-03	1.99E-01	7.27E-02
2.00E+04	4.90E-03	1.83E-01	6.59E-02
2.50E+04	3.20E-03	1.52E-01	5.35E-02
3.00E+04	2.24E-03	1.30E-01	4.51E-02
3.50E+04	1.65E-03	1.13E-01	3.90E-02
4.00E+04	1.26E-03	1.00E-01	3.44E-02
5.00E+04	8.08E-04	8.14E-02	2.78E-02
6.00E+04	5.61E-04	6.85E-02	2.33E-02
7.00E+04	4.11E-04	5.92E-02	2.01E-02
8.00E+04	3.14E-04	5.21E-02	1.77E-02
9.00E+04	2.48E-04	4.65E-02	1.58E-02
1.00E+05	2.01E-04	4.20E-02	1.43E-02
1.10E+05	1.66E-04	3.83E-02	1.30E-02
1.20E+05	1.39E-04	3.52E-02	1.19E-02
1.30E+05	1.18E-04	3.25E-02	1.10E-02
1.40E+05	1.02E-04	3.03E-02	1.03E-02
1.60E+05	7.80E-05	2.66E-02	9.01E-03

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

See page 5 for Explanation of Tables

N II + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+03	1.12E-12	6.17E-11	1.45E-10
5.00E+03	3.86E-12	1.51E-10	3.03E-10
6.00E+03	9.61E-12	2.83E-10	5.11E-10
8.00E+03	3.39E-11	6.50E-10	1.02E-09
1.00E+04	7.80E-11	1.10E-09	1.59E-09
1.50E+04	2.63E-10	2.30E-09	2.95E-09
2.00E+04	5.09E-10	3.37E-09	4.08E-09
3.00E+04	1.02E-09	5.02E-09	5.73E-09
4.00E+04	1.47E-09	6.16E-09	6.84E-09
6.00E+04	2.15E-09	7.61E-09	8.23E-09
8.00E+04	2.61E-09	8.49E-09	9.08E-09
1.00E+05	2.94E-09	9.09E-09	9.65E-09
1.50E+05	3.44E-09	1.00E-08	1.05E-08
2.00E+05	3.71E-09	1.05E-08	1.10E-08
3.00E+05	4.01E-09	1.11E-08	1.15E-08
5.00E+05	4.22E-09	1.17E-08	1.20E-08
7.50E+05	4.25E-09	1.21E-08	1.23E-08
1.00E+06	4.18E-09	1.24E-08	1.24E-08
2.00E+06	3.67E-09	1.28E-08	1.25E-08
4.00E+06	2.78E-09	1.26E-08	1.20E-08

O III + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+04	1.79E-13	2.13E-11	4.45E-11
1.50E+04	1.83E-12	1.14E-10	1.76E-10
2.00E+04	7.48E-12	2.89E-10	3.82E-10
3.00E+04	3.90E-11	7.94E-10	8.96E-10
4.00E+04	1.00E-10	1.36E-09	1.42E-09
5.00E+04	1.84E-10	1.90E-09	1.91E-09
6.00E+04	2.81E-10	2.39E-09	2.33E-09
8.00E+04	4.90E-10	3.20E-09	3.02E-09
1.00E+05	6.94E-10	3.83E-09	3.54E-09
1.50E+05	1.12E-09	4.90E-09	4.43E-09
2.00E+05	1.43E-09	5.56E-09	4.99E-09
4.00E+05	2.07E-09	6.83E-09	6.06E-09
6.00E+05	2.31E-09	7.41E-09	6.53E-09
8.00E+05	2.40E-09	7.76E-09	6.81E-09
1.00E+06	2.42E-09	8.01E-09	7.00E-09
1.50E+06	2.37E-09	8.37E-09	7.23E-09
2.00E+06	2.25E-09	8.54E-09	7.31E-09
4.00E+06	1.76E-09	8.53E-09	7.10E-09
6.00E+06	1.42E-09	8.21E-09	6.73E-09
8.00E+06	1.18E-09	7.86E-09	6.37E-09

Ne V + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+04	1.02E-13	1.35E-11	2.57E-11
5.00E+04	3.77E-13	3.44E-11	5.59E-11
6.00E+04	9.99E-13	6.68E-11	9.74E-11
8.00E+04	3.97E-12	1.63E-10	2.06E-10
1.00E+05	1.02E-11	2.88E-10	3.34E-10
1.50E+05	4.22E-11	6.48E-10	6.70E-10
2.00E+05	9.37E-11	9.95E-10	9.75E-10
3.00E+05	2.22E-10	1.55E-09	1.45E-09
5.00E+05	4.62E-10	2.25E-09	2.03E-09
7.50E+05	6.73E-10	2.74E-09	2.44E-09
1.00E+06	8.04E-10	3.04E-09	2.69E-09
1.50E+06	9.28E-10	3.40E-09	2.97E-09
2.00E+06	9.58E-10	3.59E-09	3.11E-09
4.00E+06	8.38E-10	3.81E-09	3.19E-09
6.00E+06	6.92E-10	3.75E-09	3.09E-09
8.00E+06	5.80E-10	3.64E-09	2.95E-09
1.00E+07	4.96E-10	3.52E-09	2.83E-09
2.00E+07	2.78E-10	2.99E-09	2.35E-09
3.00E+07	1.88E-10	2.63E-09	2.05E-09
4.00E+07	1.40E-10	2.37E-09	1.84E-09

Mg VII + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
7.50E+04	1.10E-14	1.93E-12	5.21E-12
1.00E+05	7.10E-14	8.22E-12	1.67E-11
1.50E+05	6.79E-13	4.11E-11	6.21E-11
2.00E+05	2.65E-12	1.00E-10	1.30E-10
2.50E+05	6.69E-12	1.77E-10	2.09E-10
3.00E+05	1.31E-11	2.63E-10	2.93E-10
4.00E+05	3.28E-11	4.40E-10	4.55E-10
5.00E+05	5.95E-11	6.05E-10	6.00E-10
6.00E+05	9.04E-11	7.51E-10	7.25E-10
8.00E+05	1.56E-10	9.88E-10	9.25E-10
1.00E+06	2.17E-10	1.17E-09	1.07E-09
1.50E+06	3.35E-10	1.47E-09	1.32E-09
2.00E+06	4.04E-10	1.65E-09	1.46E-09
3.00E+06	4.54E-10	1.84E-09	1.60E-09
4.00E+06	4.51E-10	1.94E-09	1.65E-09
6.00E+06	4.04E-10	1.99E-09	1.66E-09
8.00E+06	3.51E-10	1.97E-09	1.62E-09
1.00E+07	3.06E-10	1.93E-09	1.57E-09
1.50E+07	2.27E-10	1.81E-09	1.44E-09
2.00E+07	1.78E-10	1.70E-09	1.34E-09

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

See page 5 for Explanation of Tables

Si IX + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+05	5.33E-14	5.35E-12	1.15E-11
3.00E+05	5.07E-13	2.71E-11	4.33E-11
4.00E+05	1.95E-12	6.65E-11	9.05E-11
5.00E+05	4.83E-12	1.18E-10	1.46E-10
6.00E+05	9.31E-12	1.76E-10	2.03E-10
8.00E+05	2.26E-11	2.95E-10	3.14E-10
1.00E+06	3.99E-11	4.06E-10	4.12E-10
1.25E+06	6.39E-11	5.28E-10	5.15E-10
1.50E+06	8.80E-11	6.30E-10	5.99E-10
2.00E+06	1.30E-10	7.86E-10	7.24E-10
2.50E+06	1.62E-10	8.98E-10	8.09E-10
3.00E+06	1.84E-10	9.79E-10	8.69E-10
4.00E+06	2.08E-10	1.08E-09	9.40E-10
5.00E+06	2.15E-10	1.14E-09	9.74E-10
6.00E+06	2.14E-10	1.18E-09	9.89E-10
8.00E+06	2.00E-10	1.20E-09	9.90E-10
1.00E+07	1.82E-10	1.19E-09	9.73E-10
1.50E+07	1.43E-10	1.15E-09	9.14E-10
2.00E+07	1.16E-10	1.09E-09	8.57E-10
3.00E+07	8.10E-11	9.84E-10	7.65E-10

S XI + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+05	1.54E-14	1.68E-12	4.67E-12
4.00E+05	8.99E-14	6.48E-12	1.37E-11
5.00E+05	3.01E-13	1.56E-11	2.78E-11
6.00E+05	7.30E-13	2.89E-11	4.57E-11
7.00E+05	1.44E-12	4.59E-11	6.65E-11
8.00E+05	2.49E-12	6.57E-11	8.90E-11
1.00E+06	5.59E-12	1.11E-10	1.36E-10
1.25E+06	1.12E-11	1.71E-10	1.94E-10
1.50E+06	1.81E-11	2.30E-10	2.48E-10
2.00E+06	3.38E-11	3.37E-10	3.40E-10
3.00E+06	6.25E-11	4.96E-10	4.65E-10
4.00E+06	8.23E-11	5.98E-10	5.40E-10
5.00E+06	9.41E-11	6.65E-10	5.84E-10
6.00E+06	1.00E-10	7.08E-10	6.10E-10
7.00E+06	1.03E-10	7.36E-10	6.25E-10
8.00E+06	1.03E-10	7.54E-10	6.33E-10
1.00E+07	1.00E-10	7.71E-10	6.36E-10
1.50E+07	8.57E-11	7.65E-10	6.14E-10
2.00E+07	7.22E-11	7.38E-10	5.83E-10
3.00E+07	5.30E-11	6.77E-10	5.26E-10

Ar XIII + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+05	3.49E-15	4.01E-13	1.67E-12
5.00E+05	1.60E-14	1.39E-12	4.37E-12
6.00E+05	4.94E-14	3.36E-12	8.68E-12
7.00E+05	1.18E-13	6.52E-12	1.46E-11
8.00E+05	2.38E-13	1.10E-11	2.18E-11
1.00E+06	6.82E-13	2.35E-11	3.97E-11
1.50E+06	3.29E-12	6.98E-11	9.39E-11
2.00E+06	7.81E-12	1.25E-10	1.49E-10
3.00E+06	1.93E-11	2.29E-10	2.41E-10
4.00E+06	3.00E-11	3.11E-10	3.05E-10
5.00E+06	3.84E-11	3.72E-10	3.49E-10
6.00E+06	4.43E-11	4.17E-10	3.80E-10
7.00E+06	4.83E-11	4.50E-10	4.00E-10
8.00E+06	5.08E-11	4.74E-10	4.14E-10
1.00E+07	5.29E-11	5.04E-10	4.29E-10
1.50E+07	5.02E-11	5.27E-10	4.31E-10
2.00E+07	4.47E-11	5.21E-10	4.17E-10
3.00E+07	3.48E-11	4.90E-10	3.83E-10
4.00E+07	2.78E-11	4.58E-10	3.54E-10
6.00E+07	1.92E-11	4.06E-10	3.10E-10

Ca XV + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
6.00E+05	2.88E-15	3.01E-13	1.35E-12
7.00E+05	8.46E-15	7.35E-13	2.64E-12
8.00E+05	2.01E-14	1.48E-12	4.48E-12
1.00E+06	7.46E-14	4.17E-12	9.80E-12
1.50E+06	5.44E-13	1.87E-11	3.07E-11
2.00E+06	1.67E-12	4.24E-11	5.75E-11
3.00E+06	5.61E-12	1.01E-10	1.12E-10
4.00E+06	1.05E-11	1.58E-10	1.58E-10
5.00E+06	1.52E-11	2.08E-10	1.94E-10
6.00E+06	1.92E-11	2.49E-10	2.22E-10
7.00E+06	2.23E-11	2.82E-10	2.42E-10
8.00E+06	2.48E-11	3.08E-10	2.58E-10
1.00E+07	2.79E-11	3.45E-10	2.78E-10
1.50E+07	2.97E-11	3.88E-10	2.95E-10
2.00E+07	2.82E-11	3.98E-10	2.93E-10
3.00E+07	2.36E-11	3.88E-10	2.77E-10
4.00E+07	1.95E-11	3.69E-10	2.59E-10
5.00E+07	1.64E-11	3.50E-10	2.43E-10
6.00E+07	1.41E-11	3.33E-10	2.29E-10
7.00E+07	1.22E-11	3.17E-10	2.17E-10

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

See page 5 for Explanation of Tables

Ti XVII + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
8.00E+05	1.41E-15	1.52E-13	8.60E-13
1.00E+06	6.93E-15	5.72E-13	2.27E-12
1.50E+06	7.81E-14	4.03E-12	9.51E-12
2.00E+06	3.13E-13	1.19E-11	2.11E-11
3.00E+06	1.45E-12	3.82E-11	5.00E-11
4.00E+06	3.29E-12	7.09E-11	7.91E-11
5.00E+06	5.42E-12	1.04E-10	1.05E-10
6.00E+06	7.53E-12	1.34E-10	1.26E-10
7.00E+06	9.44E-12	1.61E-10	1.44E-10
8.00E+06	1.11E-11	1.84E-10	1.58E-10
1.00E+07	1.36E-11	2.20E-10	1.78E-10
1.25E+07	1.55E-11	2.51E-10	1.93E-10
1.50E+07	1.65E-11	2.71E-10	2.02E-10
2.00E+07	1.68E-11	2.91E-10	2.07E-10
3.00E+07	1.52E-11	2.98E-10	2.02E-10
4.00E+07	1.31E-11	2.91E-10	1.92E-10
5.00E+07	1.13E-11	2.79E-10	1.81E-10
6.00E+07	9.89E-12	2.68E-10	1.72E-10
7.00E+07	8.71E-12	2.57E-10	1.64E-10
8.00E+07	7.75E-12	2.47E-10	1.57E-10

Cr XIX + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	5.58E-16	7.45E-14	5.05E-13
1.50E+06	1.01E-14	7.63E-13	2.82E-12
2.00E+06	5.33E-14	2.93E-12	7.38E-12
3.00E+06	3.47E-13	1.30E-11	2.13E-11
4.00E+06	9.64E-13	2.91E-11	3.79E-11
5.00E+06	1.82E-12	4.82E-11	5.43E-11
6.00E+06	2.80E-12	6.80E-11	6.92E-11
7.00E+06	3.79E-12	8.71E-11	8.22E-11
8.00E+06	4.74E-12	1.05E-10	9.34E-11
1.00E+07	6.37E-12	1.35E-10	1.11E-10
1.50E+07	8.84E-12	1.86E-10	1.35E-10
2.00E+07	9.74E-12	2.12E-10	1.45E-10
3.00E+07	9.57E-12	2.30E-10	1.47E-10
4.00E+07	8.68E-12	2.31E-10	1.42E-10
5.00E+07	7.73E-12	2.26E-10	1.36E-10
6.00E+07	6.88E-12	2.20E-10	1.30E-10
7.00E+07	6.16E-12	2.13E-10	1.24E-10
8.00E+07	5.55E-12	2.06E-10	1.19E-10
1.00E+08	4.58E-12	1.93E-10	1.10E-10
1.50E+08	3.11E-12	1.68E-10	9.50E-11

Fe XXI + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+06	1.15E-15	1.15E-13	8.63E-13
2.00E+06	8.24E-15	6.17E-13	2.62E-12
3.00E+06	7.66E-14	3.96E-12	9.03E-12
5.00E+06	5.77E-13	2.08E-11	2.76E-11
6.00E+06	9.86E-13	3.23E-11	3.72E-11
7.00E+06	1.45E-12	4.45E-11	4.62E-11
8.00E+06	1.93E-12	5.68E-11	5.43E-11
1.00E+07	2.87E-12	7.98E-11	6.79E-11
1.25E+07	3.86E-12	1.04E-10	8.06E-11
1.50E+07	4.61E-12	1.24E-10	8.94E-11
2.00E+07	5.51E-12	1.51E-10	9.97E-11
2.50E+07	5.87E-12	1.67E-10	1.04E-10
3.00E+07	5.93E-12	1.76E-10	1.06E-10
4.00E+07	5.65E-12	1.83E-10	1.05E-10
5.00E+07	5.20E-12	1.84E-10	1.01E-10
6.00E+07	4.73E-12	1.81E-10	9.77E-11
7.00E+07	4.31E-12	1.77E-10	9.41E-11
8.00E+07	3.93E-12	1.73E-10	9.06E-11
1.00E+08	3.31E-12	1.64E-10	8.45E-11
1.50E+08	2.30E-12	1.45E-10	7.32E-11

Ni XXIII + p			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+06	1.14E-16	1.34E-14	2.60E-13
2.00E+06	1.14E-15	1.06E-13	9.18E-13
3.00E+06	1.55E-14	1.04E-12	3.79E-12
4.00E+06	6.71E-14	3.65E-12	8.36E-12
5.00E+06	1.71E-13	8.08E-12	1.39E-11
6.00E+06	3.27E-13	1.40E-11	1.98E-11
7.00E+06	5.25E-13	2.10E-11	2.57E-11
8.00E+06	7.50E-13	2.86E-11	3.13E-11
1.00E+07	1.24E-12	4.42E-11	4.12E-11
1.50E+07	2.32E-12	7.90E-11	5.89E-11
2.00E+07	3.03E-12	1.04E-10	6.87E-11
3.00E+07	3.60E-12	1.32E-10	7.65E-11
4.00E+07	3.62E-12	1.44E-10	7.77E-11
5.00E+07	3.46E-12	1.48E-10	7.65E-11
6.00E+07	3.23E-12	1.49E-10	7.45E-11
7.00E+07	2.99E-12	1.47E-10	7.23E-11
8.00E+07	2.77E-12	1.45E-10	7.00E-11
1.00E+08	2.38E-12	1.40E-10	6.57E-11
1.50E+08	1.71E-12	1.26E-10	5.74E-11
2.00E+08	1.31E-12	1.15E-10	5.14E-11

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

See page 5 for Explanation of Tables

N II + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
4.00E+03	1.54E-12	3.55E-11	1.11E-10
5.00E+03	5.49E-12	9.53E-11	2.53E-10
6.00E+03	1.37E-11	1.91E-10	4.49E-10
8.00E+03	4.74E-11	4.78E-10	9.53E-10
1.00E+04	1.05E-10	8.54E-10	1.53E-09
1.50E+04	3.30E-10	1.93E-09	2.96E-09
2.00E+04	6.08E-10	2.97E-09	4.17E-09
3.00E+04	1.15E-09	4.67E-09	5.94E-09
4.00E+04	1.61E-09	5.91E-09	7.14E-09
6.00E+04	2.28E-09	7.54E-09	8.61E-09
8.00E+04	2.72E-09	8.55E-09	9.49E-09
1.00E+05	3.02E-09	9.24E-09	1.01E-08
1.50E+05	3.48E-09	1.03E-08	1.09E-08
2.00E+05	3.73E-09	1.08E-08	1.14E-08
3.00E+05	3.99E-09	1.15E-08	1.19E-08
5.00E+05	4.22E-09	1.20E-08	1.23E-08
7.50E+05	4.33E-09	1.22E-08	1.25E-08
1.00E+06	4.36E-09	1.24E-08	1.26E-08
2.50E+06	4.05E-09	1.29E-08	1.28E-08
5.00E+06	3.32E-09	1.30E-08	1.25E-08

O III + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.50E+04	2.86E-12	7.84E-11	1.54E-10
2.00E+04	1.18E-11	2.19E-10	3.62E-10
3.00E+04	5.81E-11	6.61E-10	9.08E-10
4.00E+04	1.40E-10	1.19E-09	1.48E-09
5.00E+04	2.45E-10	1.72E-09	2.00E-09
6.00E+04	3.60E-10	2.21E-09	2.46E-09
8.00E+04	5.94E-10	3.06E-09	3.20E-09
1.00E+05	8.11E-10	3.73E-09	3.77E-09
1.50E+05	1.24E-09	4.91E-09	4.71E-09
2.00E+05	1.55E-09	5.66E-09	5.29E-09
3.00E+05	1.94E-09	6.55E-09	5.97E-09
4.00E+05	2.17E-09	7.06E-09	6.35E-09
6.00E+05	2.42E-09	7.62E-09	6.78E-09
8.00E+05	2.54E-09	7.93E-09	7.02E-09
1.00E+06	2.60E-09	8.13E-09	7.17E-09
1.50E+06	2.64E-09	8.45E-09	7.41E-09
2.00E+06	2.61E-09	8.65E-09	7.53E-09
4.00E+06	2.30E-09	8.93E-09	7.62E-09
7.00E+06	1.85E-09	8.81E-09	7.35E-09
1.00E+07	1.53E-09	8.53E-09	7.02E-09

Ne V + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
4.00E+04	1.51E-13	7.78E-12	1.98E-11
5.00E+04	5.94E-13	2.23E-11	4.74E-11
6.00E+04	1.62E-12	4.70E-11	8.80E-11
8.00E+04	6.48E-12	1.26E-10	2.00E-10
1.00E+05	1.62E-11	2.37E-10	3.37E-10
1.50E+05	6.16E-11	5.75E-10	7.05E-10
2.00E+05	1.27E-10	9.17E-10	1.04E-09
3.00E+05	2.76E-10	1.49E-09	1.55E-09
5.00E+05	5.30E-10	2.25E-09	2.17E-09
7.50E+05	7.38E-10	2.79E-09	2.59E-09
1.00E+06	8.67E-10	3.13E-09	2.85E-09
1.50E+06	1.00E-09	3.54E-09	3.15E-09
2.00E+06	1.05E-09	3.78E-09	3.31E-09
4.00E+06	1.02E-09	4.16E-09	3.54E-09
6.00E+06	9.10E-10	4.22E-09	3.53E-09
8.00E+06	8.06E-10	4.18E-09	3.45E-09
1.00E+07	7.18E-10	4.11E-09	3.36E-09
2.00E+07	4.52E-10	3.68E-09	2.93E-09
3.00E+07	3.25E-10	3.35E-09	2.64E-09
4.00E+07	2.51E-10	3.11E-09	2.42E-09

Mg VII + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.00E+05	1.03E-13	4.75E-12	1.25E-11
1.50E+05	1.09E-12	2.86E-11	5.53E-11
2.00E+05	4.28E-12	7.66E-11	1.25E-10
2.50E+05	1.06E-11	1.43E-10	2.10E-10
3.00E+05	2.00E-11	2.21E-10	3.00E-10
4.00E+05	4.68E-11	3.89E-10	4.77E-10
5.00E+05	8.02E-11	5.52E-10	6.36E-10
6.00E+05	1.16E-10	7.02E-10	7.74E-10
8.00E+05	1.88E-10	9.57E-10	9.95E-10
1.00E+06	2.52E-10	1.16E-09	1.16E-09
1.50E+06	3.74E-10	1.51E-09	1.44E-09
2.00E+06	4.51E-10	1.73E-09	1.60E-09
3.00E+06	5.24E-10	2.00E-09	1.78E-09
4.00E+06	5.42E-10	2.14E-09	1.87E-09
6.00E+06	5.18E-10	2.26E-09	1.92E-09
8.00E+06	4.74E-10	2.29E-09	1.91E-09
1.00E+07	4.30E-10	2.28E-09	1.88E-09
1.50E+07	3.41E-10	2.20E-09	1.78E-09
2.00E+07	2.79E-10	2.11E-09	1.68E-09
3.00E+07	2.02E-10	1.93E-09	1.52E-09

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

See page 5 for Explanation of Tables

Si IX + d			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+05	7.59E-14	2.87E-12	8.71E-12
3.00E+05	7.95E-13	1.80E-11	3.84E-11
4.00E+05	3.09E-12	4.90E-11	8.65E-11
5.00E+05	7.56E-12	9.23E-11	1.45E-10
6.00E+05	1.43E-11	1.43E-10	2.06E-10
8.00E+05	3.31E-11	2.53E-10	3.26E-10
1.00E+06	5.65E-11	3.60E-10	4.33E-10
1.25E+06	8.80E-11	4.82E-10	5.46E-10
1.50E+06	1.19E-10	5.88E-10	6.38E-10
2.00E+06	1.74E-10	7.59E-10	7.78E-10
2.50E+06	2.17E-10	8.88E-10	8.77E-10
3.00E+06	2.49E-10	9.88E-10	9.49E-10
4.00E+06	2.87E-10	1.13E-09	1.04E-09
5.00E+06	3.03E-10	1.22E-09	1.10E-09
6.00E+06	3.07E-10	1.28E-09	1.13E-09
8.00E+06	2.98E-10	1.35E-09	1.16E-09
1.00E+07	2.79E-10	1.38E-09	1.16E-09
1.50E+07	2.31E-10	1.37E-09	1.12E-09
2.00E+07	1.93E-10	1.33E-09	1.07E-09
3.00E+07	1.41E-10	1.24E-09	9.79E-10

S XI + d			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+05	1.30E-13	3.59E-12	1.09E-11
5.00E+05	4.57E-13	9.69E-12	2.40E-11
6.00E+05	1.14E-12	1.94E-11	4.18E-11
7.00E+05	2.27E-12	3.26E-11	6.30E-11
8.00E+05	3.92E-12	4.87E-11	8.66E-11
1.00E+06	8.78E-12	8.68E-11	1.37E-10
1.25E+06	1.74E-11	1.40E-10	2.00E-10
1.50E+06	2.80E-11	1.96E-10	2.59E-10
2.00E+06	5.18E-11	3.00E-10	3.60E-10
3.00E+06	9.63E-11	4.67E-10	5.02E-10
4.00E+06	1.28E-10	5.87E-10	5.91E-10
5.00E+06	1.49E-10	6.72E-10	6.49E-10
6.00E+06	1.61E-10	7.34E-10	6.87E-10
7.00E+06	1.68E-10	7.80E-10	7.12E-10
8.00E+06	1.70E-10	8.13E-10	7.28E-10
1.00E+07	1.68E-10	8.57E-10	7.45E-10
1.50E+07	1.50E-10	8.93E-10	7.43E-10
2.00E+07	1.30E-10	8.87E-10	7.21E-10
3.00E+07	9.88E-11	8.45E-10	6.69E-10
4.00E+07	7.83E-11	7.97E-10	6.23E-10

Ar XIII + d			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
5.00E+05	2.04E-14	6.32E-13	3.05E-12
6.00E+05	6.77E-14	1.72E-12	6.64E-12
7.00E+05	1.70E-13	3.65E-12	1.19E-11
8.00E+05	3.53E-13	6.55E-12	1.87E-11
1.00E+06	1.05E-12	1.54E-11	3.64E-11
1.50E+06	5.25E-12	5.23E-11	9.33E-11
2.00E+06	1.26E-11	1.00E-10	1.54E-10
3.00E+06	3.17E-11	2.00E-10	2.57E-10
4.00E+06	5.01E-11	2.86E-10	3.32E-10
5.00E+06	6.50E-11	3.56E-10	3.86E-10
6.00E+06	7.62E-11	4.11E-10	4.25E-10
7.00E+06	8.40E-11	4.55E-10	4.54E-10
8.00E+06	8.93E-11	4.90E-10	4.74E-10
1.00E+07	9.46E-11	5.40E-10	5.00E-10
1.50E+07	9.29E-11	5.98E-10	5.19E-10
2.00E+07	8.47E-11	6.13E-10	5.13E-10
3.00E+07	6.81E-11	6.02E-10	4.85E-10
4.00E+07	5.55E-11	5.77E-10	4.56E-10
6.00E+07	3.95E-11	5.27E-10	4.07E-10
8.00E+07	3.01E-11	4.85E-10	3.71E-10

Ca XV + d			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
8.00E+05	2.54E-14	6.89E-13	3.27E-12
1.00E+06	1.03E-13	2.20E-12	7.92E-12
1.50E+06	8.25E-13	1.19E-11	2.84E-11
2.00E+06	2.64E-12	2.99E-11	5.66E-11
3.00E+06	9.23E-12	8.00E-11	1.17E-10
4.00E+06	1.77E-11	1.35E-10	1.70E-10
5.00E+06	2.61E-11	1.86E-10	2.13E-10
6.00E+06	3.34E-11	2.31E-10	2.47E-10
7.00E+06	3.95E-11	2.70E-10	2.74E-10
8.00E+06	4.44E-11	3.03E-10	2.94E-10
1.00E+07	5.09E-11	3.54E-10	3.23E-10
1.25E+07	5.49E-11	3.98E-10	3.43E-10
1.50E+07	5.62E-11	4.26E-10	3.54E-10
2.00E+07	5.46E-11	4.56E-10	3.59E-10
3.00E+07	4.70E-11	4.68E-10	3.49E-10
4.00E+07	3.97E-11	4.58E-10	3.32E-10
5.00E+07	3.39E-11	4.43E-10	3.15E-10
6.00E+07	2.94E-11	4.27E-10	3.00E-10
7.00E+07	2.58E-11	4.11E-10	2.86E-10
8.00E+07	2.28E-11	3.97E-10	2.75E-10

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

See page 5 for Explanation of Tables

Ti XVII + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.00E+06	7.92E-15	2.18E-13	1.56E-12
1.50E+06	1.06E-13	2.05E-12	7.92E-12
2.00E+06	4.61E-13	7.02E-12	1.93E-11
3.00E+06	2.30E-12	2.66E-11	5.04E-11
4.00E+06	5.44E-12	5.44E-11	8.35E-11
5.00E+06	9.21E-12	8.51E-11	1.14E-10
6.00E+06	1.31E-11	1.15E-10	1.40E-10
7.00E+06	1.67E-11	1.44E-10	1.61E-10
8.00E+06	1.99E-11	1.70E-10	1.79E-10
1.00E+07	2.49E-11	2.14E-10	2.07E-10
1.25E+07	2.90E-11	2.55E-10	2.29E-10
1.50E+07	3.13E-11	2.86E-10	2.42E-10
2.00E+07	3.28E-11	3.23E-10	2.54E-10
3.00E+07	3.06E-11	3.51E-10	2.55E-10
4.00E+07	2.70E-11	3.54E-10	2.46E-10
5.00E+07	2.37E-11	3.48E-10	2.36E-10
6.00E+07	2.09E-11	3.39E-10	2.26E-10
7.00E+07	1.86E-11	3.29E-10	2.17E-10
8.00E+07	1.67E-11	3.20E-10	2.08E-10
1.00E+08	1.37E-11	3.02E-10	1.94E-10

Cr XIX + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.50E+06	1.16E-14	2.87E-13	2.09E-12
2.00E+06	6.96E-14	1.38E-12	6.23E-12
3.00E+06	5.10E-13	7.74E-12	2.05E-11
4.00E+06	1.51E-12	1.97E-11	3.89E-11
5.00E+06	2.97E-12	3.55E-11	5.78E-11
6.00E+06	4.68E-12	5.32E-11	7.57E-11
7.00E+06	6.49E-12	7.15E-11	9.17E-11
8.00E+06	8.26E-12	8.96E-11	1.06E-10
1.00E+07	1.14E-11	1.23E-10	1.28E-10
1.50E+07	1.66E-11	1.86E-10	1.62E-10
2.00E+07	1.88E-11	2.25E-10	1.77E-10
3.00E+07	1.92E-11	2.62E-10	1.85E-10
4.00E+07	1.78E-11	2.74E-10	1.82E-10
5.00E+07	1.61E-11	2.76E-10	1.76E-10
6.00E+07	1.45E-11	2.73E-10	1.70E-10
7.00E+07	1.31E-11	2.68E-10	1.64E-10
8.00E+07	1.19E-11	2.62E-10	1.58E-10
1.00E+08	9.97E-12	2.50E-10	1.48E-10
1.50E+08	6.91E-12	2.24E-10	1.29E-10
2.00E+08	5.18E-12	2.03E-10	1.16E-10

Fe XXI + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.50E+06	1.08E-15	3.34E-14	5.61E-13
2.00E+06	9.20E-15	2.33E-13	2.01E-12
3.00E+06	1.02E-13	1.98E-12	8.24E-12
5.00E+06	8.79E-13	1.35E-11	2.88E-11
6.00E+06	1.56E-12	2.26E-11	4.02E-11
7.00E+06	2.36E-12	3.31E-11	5.11E-11
8.00E+06	3.22E-12	4.42E-11	6.12E-11
1.00E+07	4.95E-12	6.69E-11	7.86E-11
1.25E+07	6.87E-12	9.34E-11	9.53E-11
1.50E+07	8.40E-12	1.17E-10	1.08E-10
2.00E+07	1.04E-11	1.52E-10	1.23E-10
2.50E+07	1.13E-11	1.76E-10	1.30E-10
3.00E+07	1.16E-11	1.93E-10	1.34E-10
4.00E+07	1.14E-11	2.11E-10	1.35E-10
5.00E+07	1.07E-11	2.18E-10	1.32E-10
6.00E+07	9.85E-12	2.20E-10	1.28E-10
7.00E+07	9.06E-12	2.19E-10	1.24E-10
8.00E+07	8.34E-12	2.16E-10	1.21E-10
1.00E+08	7.13E-12	2.09E-10	1.13E-10
1.50E+08	5.08E-12	1.91E-10	9.93E-11

Ni XXIII + d			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
2.00E+06	1.03E-15	3.14E-14	6.39E-13
3.00E+06	1.78E-14	4.26E-13	3.24E-12
4.00E+06	8.62E-14	1.80E-12	7.96E-12
6.00E+06	4.75E-13	8.56E-12	2.09E-11
7.00E+06	7.91E-13	1.38E-11	2.79E-11
8.00E+06	1.16E-12	1.98E-11	3.48E-11
1.00E+07	2.00E-12	3.35E-11	4.74E-11
1.25E+07	3.07E-12	5.15E-11	6.04E-11
1.50E+07	4.02E-12	6.87E-11	7.07E-11
2.00E+07	5.47E-12	9.81E-11	8.45E-11
2.50E+07	6.35E-12	1.21E-10	9.25E-11
3.00E+07	6.83E-12	1.37E-10	9.70E-11
4.00E+07	7.09E-12	1.58E-10	1.00E-10
5.00E+07	6.90E-12	1.69E-10	9.99E-11
6.00E+07	6.55E-12	1.74E-10	9.81E-11
8.00E+07	5.75E-12	1.77E-10	9.32E-11
1.00E+08	5.03E-12	1.74E-10	8.82E-11
1.50E+08	3.71E-12	1.63E-10	7.79E-11
2.00E+08	2.88E-12	1.52E-10	7.04E-11
3.00E+08	1.94E-12	1.34E-10	6.02E-11

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

See page 5 for Explanation of Tables

N II + t			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
4.00E+03	1.64E-12	2.37E-11	8.94E-11
6.00E+03	1.50E-11	1.38E-10	3.90E-10
8.00E+03	5.12E-11	3.65E-10	8.61E-10
1.00E+04	1.13E-10	6.79E-10	1.42E-09
1.50E+04	3.46E-10	1.64E-09	2.83E-09
2.00E+04	6.28E-10	2.62E-09	4.06E-09
3.00E+04	1.18E-09	4.31E-09	5.90E-09
4.00E+04	1.63E-09	5.59E-09	7.16E-09
6.00E+04	2.29E-09	7.34E-09	8.71E-09
8.00E+04	2.72E-09	8.45E-09	9.63E-09
1.00E+05	3.02E-09	9.20E-09	1.02E-08
1.50E+05	3.47E-09	1.03E-08	1.11E-08
2.00E+05	3.71E-09	1.10E-08	1.16E-08
3.00E+05	3.96E-09	1.16E-08	1.21E-08
5.00E+05	4.17E-09	1.22E-08	1.24E-08
7.50E+05	4.29E-09	1.24E-08	1.26E-08
1.00E+06	4.34E-09	1.25E-08	1.27E-08
2.50E+06	4.25E-09	1.29E-08	1.28E-08
5.00E+06	3.72E-09	1.32E-08	1.28E-08
7.50E+06	3.22E-09	1.31E-08	1.25E-08

O III + t			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.50E+04	3.31E-12	5.66E-11	1.34E-10
2.00E+04	1.37E-11	1.69E-10	3.31E-10
3.00E+04	6.59E-11	5.48E-10	8.68E-10
4.00E+04	1.55E-10	1.03E-09	1.44E-09
5.00E+04	2.66E-10	1.53E-09	1.98E-09
6.00E+04	3.87E-10	2.01E-09	2.45E-09
8.00E+04	6.27E-10	2.85E-09	3.23E-09
1.00E+05	8.46E-10	3.55E-09	3.82E-09
1.50E+05	1.28E-09	4.80E-09	4.80E-09
2.00E+05	1.58E-09	5.61E-09	5.40E-09
3.00E+05	1.95E-09	6.59E-09	6.10E-09
4.00E+05	2.17E-09	7.14E-09	6.49E-09
6.00E+05	2.42E-09	7.74E-09	6.91E-09
8.00E+05	2.54E-09	8.06E-09	7.13E-09
1.00E+06	2.62E-09	8.25E-09	7.27E-09
1.50E+06	2.70E-09	8.52E-09	7.48E-09
2.00E+06	2.71E-09	8.68E-09	7.59E-09
4.00E+06	2.52E-09	9.00E-09	7.75E-09
7.00E+06	2.15E-09	9.05E-09	7.64E-09
1.00E+07	1.85E-09	8.91E-09	7.42E-09

Ne V + t			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
5.00E+04	6.91E-13	1.55E-11	4.02E-11
6.00E+04	1.92E-12	3.45E-11	7.76E-11
8.00E+04	7.67E-12	9.90E-11	1.85E-10
1.00E+05	1.89E-11	1.93E-10	3.21E-10
1.50E+05	6.96E-11	4.98E-10	6.92E-10
2.00E+05	1.40E-10	8.23E-10	1.03E-09
3.00E+05	2.94E-10	1.40E-09	1.57E-09
5.00E+05	5.52E-10	2.18E-09	2.22E-09
7.50E+05	7.65E-10	2.76E-09	2.66E-09
1.00E+06	8.99E-10	3.12E-09	2.91E-09
1.50E+06	1.04E-09	3.55E-09	3.21E-09
2.00E+06	1.11E-09	3.80E-09	3.38E-09
4.00E+06	1.12E-09	4.24E-09	3.65E-09
6.00E+06	1.04E-09	4.36E-09	3.69E-09
8.00E+06	9.48E-10	4.38E-09	3.65E-09
1.00E+07	8.64E-10	4.34E-09	3.59E-09
2.00E+07	5.83E-10	4.01E-09	3.22E-09
3.00E+07	4.33E-10	3.69E-09	2.91E-09
4.00E+07	3.42E-10	3.43E-09	2.65E-09
5.00E+07	2.81E-10	3.21E-09	2.45E-09

Mg VII + t			
T(K)	Rate Coefficient (cm^3 s^{-1})		
	0→1	0→2	1→2
1.00E+05	1.15E-13	2.96E-12	9.92E-12
1.50E+05	1.27E-12	2.05E-11	4.85E-11
2.00E+05	5.02E-12	5.90E-11	1.15E-10
2.50E+05	1.22E-11	1.15E-10	1.98E-10
3.00E+05	2.28E-11	1.83E-10	2.88E-10
4.00E+05	5.20E-11	3.36E-10	4.68E-10
5.00E+05	8.72E-11	4.92E-10	6.32E-10
6.00E+05	1.24E-10	6.39E-10	7.75E-10
8.00E+05	1.97E-10	8.96E-10	1.01E-09
1.00E+06	2.60E-10	1.11E-09	1.18E-09
1.50E+06	3.79E-10	1.49E-09	1.47E-09
2.00E+06	4.55E-10	1.73E-09	1.65E-09
3.00E+06	5.35E-10	2.03E-09	1.85E-09
4.00E+06	5.64E-10	2.20E-09	1.95E-09
6.00E+06	5.61E-10	2.37E-09	2.03E-09
8.00E+06	5.30E-10	2.43E-09	2.05E-09
1.00E+07	4.93E-10	2.45E-09	2.04E-09
1.50E+07	4.10E-10	2.40E-09	1.96E-09
2.00E+07	3.46E-10	2.33E-09	1.87E-09
3.00E+07	2.60E-10	2.16E-09	1.71E-09

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

See page 5 for Explanation of Tables

Si IX + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+05	8.26E-14	1.83E-12	6.82E-12
3.00E+05	9.11E-13	1.27E-11	3.33E-11
4.00E+05	3.56E-12	3.69E-11	7.86E-11
5.00E+05	8.60E-12	7.26E-11	1.35E-10
6.00E+05	1.60E-11	1.16E-10	1.96E-10
8.00E+05	3.61E-11	2.15E-10	3.18E-10
1.00E+06	6.03E-11	3.17E-10	4.28E-10
1.25E+06	9.22E-11	4.37E-10	5.46E-10
1.50E+06	1.23E-10	5.45E-10	6.45E-10
2.00E+06	1.78E-10	7.26E-10	7.96E-10
2.50E+06	2.22E-10	8.67E-10	9.04E-10
3.00E+06	2.55E-10	9.78E-10	9.85E-10
4.00E+06	2.99E-10	1.14E-09	1.09E-09
5.00E+06	3.21E-10	1.25E-09	1.16E-09
6.00E+06	3.31E-10	1.33E-09	1.20E-09
8.00E+06	3.30E-10	1.42E-09	1.24E-09
1.00E+07	3.17E-10	1.47E-09	1.26E-09
1.50E+07	2.74E-10	1.49E-09	1.24E-09
2.00E+07	2.35E-10	1.47E-09	1.20E-09
3.00E+07	1.80E-10	1.40E-09	1.11E-09

S XI + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+05	1.42E-13	2.24E-12	8.82E-12
5.00E+05	5.13E-13	6.48E-12	2.05E-11
6.00E+05	1.29E-12	1.37E-11	3.68E-11
7.00E+05	2.58E-12	2.38E-11	5.69E-11
8.00E+05	4.45E-12	3.65E-11	7.96E-11
1.00E+06	9.89E-12	6.80E-11	1.29E-10
1.25E+06	1.94E-11	1.14E-10	1.92E-10
1.50E+06	3.10E-11	1.64E-10	2.52E-10
2.00E+06	5.68E-11	2.62E-10	3.57E-10
3.00E+06	1.06E-10	4.30E-10	5.09E-10
4.00E+06	1.42E-10	5.58E-10	6.07E-10
5.00E+06	1.67E-10	6.53E-10	6.74E-10
6.00E+06	1.83E-10	7.26E-10	7.19E-10
7.00E+06	1.93E-10	7.82E-10	7.52E-10
8.00E+06	1.98E-10	8.26E-10	7.74E-10
1.00E+07	1.99E-10	8.86E-10	8.01E-10
1.50E+07	1.84E-10	9.53E-10	8.15E-10
2.00E+07	1.63E-10	9.65E-10	8.02E-10
3.00E+07	1.28E-10	9.41E-10	7.57E-10
4.00E+07	1.04E-10	9.00E-10	7.12E-10

Ar XIII + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
6.00E+05	7.12E-14	1.00E-12	5.21E-12
7.00E+05	1.83E-13	2.24E-12	9.73E-12
8.00E+05	3.88E-13	4.20E-12	1.58E-11
1.00E+06	1.18E-12	1.05E-11	3.20E-11
1.50E+06	5.94E-12	3.92E-11	8.68E-11
2.00E+06	1.43E-11	7.97E-11	1.47E-10
3.00E+06	3.63E-11	1.70E-10	2.53E-10
4.00E+06	5.81E-11	2.54E-10	3.33E-10
5.00E+06	7.63E-11	3.25E-10	3.93E-10
6.00E+06	9.04E-11	3.85E-10	4.37E-10
7.00E+06	1.01E-10	4.35E-10	4.71E-10
8.00E+06	1.08E-10	4.76E-10	4.96E-10
1.00E+07	1.17E-10	5.38E-10	5.30E-10
1.50E+07	1.18E-10	6.21E-10	5.64E-10
2.00E+07	1.10E-10	6.53E-10	5.66E-10
3.00E+07	9.11E-11	6.62E-10	5.46E-10
4.00E+07	7.58E-11	6.46E-10	5.19E-10
6.00E+07	5.53E-11	6.01E-10	4.71E-10
8.00E+07	4.28E-11	5.60E-10	4.32E-10
1.00E+08	3.46E-11	5.26E-10	4.02E-10

Ca XV + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
8.00E+05	2.53E-14	3.63E-13	2.49E-12
1.00E+06	1.07E-13	1.28E-12	6.44E-12
1.50E+06	9.11E-13	7.91E-12	2.52E-11
2.00E+06	2.98E-12	2.14E-11	5.23E-11
3.00E+06	1.07E-11	6.25E-11	1.13E-10
4.00E+06	2.08E-11	1.11E-10	1.68E-10
5.00E+06	3.11E-11	1.60E-10	2.14E-10
6.00E+06	4.04E-11	2.04E-10	2.51E-10
7.00E+06	4.83E-11	2.45E-10	2.80E-10
8.00E+06	5.48E-11	2.80E-10	3.04E-10
1.00E+07	6.40E-11	3.38E-10	3.39E-10
1.25E+07	7.02E-11	3.91E-10	3.65E-10
1.50E+07	7.27E-11	4.28E-10	3.81E-10
2.00E+07	7.22E-11	4.73E-10	3.93E-10
3.00E+07	6.39E-11	5.04E-10	3.90E-10
4.00E+07	5.51E-11	5.04E-10	3.76E-10
5.00E+07	4.76E-11	4.95E-10	3.60E-10
6.00E+07	4.17E-11	4.82E-10	3.45E-10
8.00E+07	3.29E-11	4.54E-10	3.19E-10
1.00E+08	2.69E-11	4.29E-10	2.98E-10

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

See page 5 for Explanation of Tables

Ti XVII + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	7.39E-15	1.07E-13	1.15E-12
1.50E+06	1.10E-13	1.18E-12	6.58E-12
2.00E+06	4.99E-13	4.46E-12	1.71E-11
3.00E+06	2.61E-12	1.89E-11	4.73E-11
4.00E+06	6.35E-12	4.14E-11	8.09E-11
5.00E+06	1.10E-11	6.80E-11	1.12E-10
6.00E+06	1.58E-11	9.57E-11	1.40E-10
7.00E+06	2.04E-11	1.23E-10	1.64E-10
8.00E+06	2.46E-11	1.49E-10	1.84E-10
1.00E+07	3.15E-11	1.94E-10	2.15E-10
1.25E+07	3.74E-11	2.41E-10	2.42E-10
1.50E+07	4.09E-11	2.76E-10	2.59E-10
2.00E+07	4.37E-11	3.25E-10	2.77E-10
3.00E+07	4.20E-11	3.69E-10	2.84E-10
4.00E+07	3.78E-11	3.82E-10	2.78E-10
5.00E+07	3.36E-11	3.83E-10	2.69E-10
6.00E+07	2.99E-11	3.78E-10	2.59E-10
7.00E+07	2.69E-11	3.71E-10	2.50E-10
8.00E+07	2.42E-11	3.63E-10	2.42E-10
1.00E+08	2.01E-11	3.46E-10	2.26E-10

Cr XIX + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+06	1.08E-14	1.75E-13	1.61E-12
2.00E+06	6.98E-14	8.27E-13	5.22E-12
3.00E+06	5.52E-13	5.03E-12	1.87E-11
4.00E+06	1.70E-12	1.38E-11	3.69E-11
5.00E+06	3.44E-12	2.63E-11	5.64E-11
6.00E+06	5.55E-12	4.12E-11	7.52E-11
7.00E+06	7.82E-12	5.74E-11	9.24E-11
8.00E+06	1.01E-11	7.39E-11	1.08E-10
1.00E+07	1.43E-11	1.06E-10	1.33E-10
1.50E+07	2.15E-11	1.73E-10	1.73E-10
2.00E+07	2.50E-11	2.19E-10	1.93E-10
3.00E+07	2.63E-11	2.69E-10	2.06E-10
4.00E+07	2.49E-11	2.90E-10	2.06E-10
5.00E+07	2.29E-11	2.98E-10	2.01E-10
6.00E+07	2.08E-11	3.00E-10	1.95E-10
7.00E+07	1.90E-11	2.98E-10	1.89E-10
8.00E+07	1.74E-11	2.94E-10	1.83E-10
1.00E+08	1.47E-11	2.84E-10	1.73E-10
1.50E+08	1.04E-11	2.59E-10	1.52E-10
2.00E+08	7.88E-12	2.38E-10	1.37E-10

Fe XXI + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+06	8.80E-16	1.47E-14	4.07E-13
2.00E+06	8.33E-15	1.15E-13	1.61E-12
3.00E+06	1.02E-13	1.14E-12	7.30E-12
5.00E+06	9.76E-13	9.15E-12	2.78E-11
6.00E+06	1.78E-12	1.62E-11	3.96E-11
7.00E+06	2.75E-12	2.47E-11	5.12E-11
8.00E+06	3.82E-12	3.41E-11	6.21E-11
1.00E+07	6.03E-12	5.44E-11	8.14E-11
1.25E+07	8.58E-12	7.98E-11	1.00E-10
1.50E+07	1.07E-11	1.03E-10	1.15E-10
2.00E+07	1.36E-11	1.42E-10	1.33E-10
2.50E+07	1.51E-11	1.71E-10	1.44E-10
3.00E+07	1.58E-11	1.91E-10	1.49E-10
4.00E+07	1.58E-11	2.17E-10	1.52E-10
5.00E+07	1.50E-11	2.30E-10	1.51E-10
6.00E+07	1.40E-11	2.36E-10	1.48E-10
8.00E+07	1.21E-11	2.38E-10	1.40E-10
1.00E+08	1.04E-11	2.34E-10	1.32E-10
1.50E+08	7.61E-12	2.18E-10	1.17E-10
2.00E+08	5.88E-12	2.02E-10	1.06E-10

Ni XXIII + t			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+06	8.16E-16	1.44E-14	4.83E-13
3.00E+06	1.62E-14	2.20E-13	2.77E-12
4.00E+06	8.50E-14	1.02E-12	7.26E-12
6.00E+06	5.10E-13	5.59E-12	2.04E-11
7.00E+06	8.72E-13	9.44E-12	2.78E-11
8.00E+06	1.31E-12	1.41E-11	3.51E-11
1.00E+07	2.33E-12	2.54E-11	4.89E-11
1.25E+07	3.68E-12	4.13E-11	6.36E-11
1.50E+07	4.94E-12	5.75E-11	7.54E-11
2.00E+07	6.94E-12	8.73E-11	9.20E-11
2.50E+07	8.25E-12	1.12E-10	1.02E-10
3.00E+07	9.02E-12	1.31E-10	1.08E-10
4.00E+07	9.61E-12	1.58E-10	1.13E-10
5.00E+07	9.52E-12	1.74E-10	1.14E-10
6.00E+07	9.16E-12	1.83E-10	1.13E-10
8.00E+07	8.21E-12	1.91E-10	1.08E-10
1.00E+08	7.28E-12	1.92E-10	1.03E-10
1.50E+08	5.50E-12	1.84E-10	9.20E-11
2.00E+08	4.33E-12	1.74E-10	8.35E-11
3.00E+08	2.97E-12	1.55E-10	7.18E-11

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

See page 5 for Explanation of Tables

N II + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
6.00E+03	2.22E-12	2.29E-11	1.15E-10
8.00E+03	1.22E-11	9.81E-11	3.74E-10
1.00E+04	3.70E-11	2.49E-10	7.95E-10
1.50E+04	1.84E-10	9.48E-10	2.30E-09
2.00E+04	4.39E-10	1.95E-09	4.05E-09
3.00E+04	1.11E-09	4.25E-09	7.31E-09
4.00E+04	1.81E-09	6.44E-09	9.93E-09
6.00E+04	3.02E-09	9.98E-09	1.36E-08
8.00E+04	3.93E-09	1.26E-08	1.60E-08
1.00E+05	4.61E-09	1.45E-08	1.76E-08
1.50E+05	5.72E-09	1.75E-08	2.01E-08
2.00E+05	6.37E-09	1.93E-08	2.14E-08
3.00E+05	7.07E-09	2.13E-08	2.29E-08
5.00E+05	7.68E-09	2.30E-08	2.41E-08
7.50E+05	8.00E-09	2.38E-08	2.46E-08
1.00E+06	8.17E-09	2.42E-08	2.49E-08
2.50E+06	8.47E-09	2.46E-08	2.52E-08
5.00E+06	8.36E-09	2.49E-08	2.52E-08
7.50E+06	8.02E-09	2.50E-08	2.51E-08
1.00E+07	7.60E-09	2.49E-08	2.49E-08

O III + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+04	2.45E-12	3.84E-11	1.19E-10
3.00E+04	2.15E-11	2.20E-10	5.05E-10
4.00E+04	7.19E-11	5.69E-10	1.10E-09
5.00E+04	1.56E-10	1.04E-09	1.79E-09
6.00E+04	2.67E-10	1.59E-09	2.50E-09
8.00E+04	5.41E-10	2.75E-09	3.84E-09
1.00E+05	8.41E-10	3.89E-09	5.01E-09
1.50E+05	1.55E-09	6.30E-09	7.21E-09
2.00E+05	2.14E-09	8.12E-09	8.68E-09
3.00E+05	2.97E-09	1.06E-08	1.05E-08
4.00E+05	3.50E-09	1.21E-08	1.15E-08
6.00E+05	4.13E-09	1.38E-08	1.27E-08
8.00E+05	4.48E-09	1.48E-08	1.33E-08
1.00E+06	4.69E-09	1.54E-08	1.37E-08
1.50E+06	4.99E-09	1.62E-08	1.43E-08
2.00E+06	5.14E-09	1.66E-08	1.45E-08
4.00E+06	5.31E-09	1.71E-08	1.49E-08
7.00E+06	5.19E-09	1.74E-08	1.50E-08
1.00E+07	4.94E-09	1.74E-08	1.50E-08
2.00E+07	4.00E-09	1.71E-08	1.42E-08

Ne V + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
8.00E+04	1.46E-12	2.37E-11	7.06E-11
1.00E+05	5.01E-12	6.43E-11	1.61E-10
1.50E+05	3.09E-11	2.69E-10	5.17E-10
2.00E+05	8.42E-11	5.83E-10	9.62E-10
3.00E+05	2.47E-10	1.33E-09	1.85E-09
5.00E+05	6.24E-10	2.72E-09	3.19E-09
7.50E+05	1.02E-09	3.97E-09	4.23E-09
1.00E+06	1.31E-09	4.84E-09	4.88E-09
1.50E+06	1.70E-09	5.92E-09	5.64E-09
2.00E+06	1.92E-09	6.57E-09	6.08E-09
4.00E+06	2.29E-09	7.69E-09	6.81E-09
6.00E+06	2.37E-09	8.10E-09	7.07E-09
8.00E+06	2.36E-09	8.30E-09	7.17E-09
1.00E+07	2.31E-09	8.39E-09	7.21E-09
2.00E+07	1.91E-09	8.33E-09	6.99E-09
3.00E+07	1.57E-09	8.03E-09	6.62E-09
4.00E+07	1.33E-09	7.70E-09	6.28E-09
5.00E+07	1.14E-09	7.39E-09	5.96E-09
7.50E+07	8.38E-10	6.74E-09	5.33E-09
1.00E+08	6.58E-10	6.22E-09	4.85E-09

Mg VII + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+05	1.48E-13	2.96E-12	1.21E-11
2.00E+05	9.47E-13	1.39E-11	4.35E-11
2.50E+05	3.22E-12	3.75E-11	9.85E-11
3.00E+05	7.71E-12	7.55E-11	1.74E-10
4.00E+05	2.47E-11	1.90E-10	3.67E-10
5.00E+05	5.22E-11	3.41E-10	5.84E-10
6.00E+05	8.77E-11	5.12E-10	8.04E-10
8.00E+05	1.73E-10	8.71E-10	1.21E-09
1.00E+06	2.64E-10	1.22E-09	1.56E-09
1.25E+06	3.74E-10	1.60E-09	1.91E-09
1.50E+06	4.74E-10	1.94E-09	2.20E-09
2.00E+06	6.40E-10	2.47E-09	2.62E-09
3.00E+06	8.61E-10	3.19E-09	3.14E-09
4.00E+06	9.93E-10	3.64E-09	3.44E-09
6.00E+06	1.13E-09	4.15E-09	3.76E-09
8.00E+06	1.17E-09	4.42E-09	3.91E-09
1.00E+07	1.18E-09	4.57E-09	3.98E-09
1.50E+07	1.12E-09	4.72E-09	4.02E-09
2.50E+07	9.47E-10	4.68E-09	3.89E-09
5.00E+07	6.40E-10	4.28E-09	3.45E-09

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

See page 5 for Explanation of Tables

Si IX + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+05	6.54E-13	8.27E-12	2.93E-11
5.00E+05	2.22E-12	2.26E-11	6.64E-11
6.00E+05	5.29E-12	4.59E-11	1.17E-10
8.00E+05	1.68E-11	1.17E-10	2.47E-10
1.00E+06	3.53E-11	2.12E-10	3.92E-10
1.25E+06	6.55E-11	3.50E-10	5.76E-10
1.50E+06	1.00E-10	4.96E-10	7.48E-10
2.00E+06	1.74E-10	7.80E-10	1.05E-09
2.50E+06	2.45E-10	1.04E-09	1.28E-09
3.00E+06	3.09E-10	1.26E-09	1.47E-09
4.00E+06	4.14E-10	1.62E-09	1.76E-09
5.00E+06	4.91E-10	1.89E-09	1.95E-09
6.00E+06	5.47E-10	2.10E-09	2.09E-09
8.00E+06	6.16E-10	2.39E-09	2.26E-09
1.00E+07	6.49E-10	2.58E-09	2.37E-09
1.50E+07	6.56E-10	2.81E-09	2.47E-09
2.00E+07	6.24E-10	2.90E-09	2.48E-09
3.00E+07	5.41E-10	2.91E-09	2.41E-09
4.00E+07	4.67E-10	2.84E-09	2.32E-09
5.00E+07	4.08E-10	2.76E-09	2.22E-09

S XI + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
6.00E+05	1.76E-13	2.13E-12	1.09E-11
8.00E+05	9.73E-13	9.23E-12	3.47E-11
1.00E+06	2.98E-12	2.36E-11	7.23E-11
1.25E+06	7.74E-12	5.23E-11	1.34E-10
1.50E+06	1.51E-11	9.10E-11	2.04E-10
2.00E+06	3.67E-11	1.89E-10	3.54E-10
2.50E+06	6.43E-11	2.99E-10	4.97E-10
3.00E+06	9.47E-11	4.12E-10	6.26E-10
4.00E+06	1.56E-10	6.25E-10	8.40E-10
5.00E+06	2.11E-10	8.12E-10	1.00E-09
6.00E+06	2.57E-10	9.71E-10	1.13E-09
7.00E+06	2.94E-10	1.11E-09	1.23E-09
8.00E+06	3.23E-10	1.22E-09	1.31E-09
1.00E+07	3.63E-10	1.40E-09	1.42E-09
1.50E+07	3.98E-10	1.67E-09	1.56E-09
2.00E+07	3.94E-10	1.80E-09	1.61E-09
3.00E+07	3.53E-10	1.88E-09	1.60E-09
4.00E+07	3.10E-10	1.88E-09	1.56E-09
5.00E+07	2.74E-10	1.85E-09	1.51E-09
6.00E+07	2.43E-10	1.81E-09	1.45E-09

Ar XIII + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.00E+06	1.67E-13	1.63E-12	9.95E-12
1.50E+06	1.62E-12	1.17E-11	4.51E-11
2.00E+06	5.76E-12	3.42E-11	1.02E-10
3.00E+06	2.30E-11	1.10E-10	2.39E-10
4.00E+06	4.85E-11	2.06E-10	3.75E-10
5.00E+06	7.68E-11	3.06E-10	4.94E-10
6.00E+06	1.05E-10	4.04E-10	5.95E-10
7.00E+06	1.30E-10	4.95E-10	6.79E-10
8.00E+06	1.52E-10	5.78E-10	7.50E-10
1.00E+07	1.88E-10	7.21E-10	8.60E-10
1.25E+07	2.16E-10	8.62E-10	9.53E-10
1.50E+07	2.33E-10	9.68E-10	1.02E-09
2.00E+07	2.45E-10	1.11E-09	1.08E-09
3.00E+07	2.35E-10	1.24E-09	1.12E-09
4.00E+07	2.13E-10	1.29E-09	1.11E-09
6.00E+07	1.72E-10	1.28E-09	1.05E-09
8.00E+07	1.42E-10	1.24E-09	9.94E-10
1.00E+08	1.20E-10	1.19E-09	9.40E-10
1.50E+08	8.50E-11	1.07E-09	8.33E-10
2.00E+08	6.49E-11	9.81E-10	7.53E-10

Ca XV + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
1.50E+06	1.30E-13	1.17E-12	8.01E-12
2.00E+06	6.97E-13	5.13E-12	2.42E-11
3.00E+06	4.50E-12	2.59E-11	7.91E-11
4.00E+06	1.25E-11	6.26E-11	1.48E-10
5.00E+06	2.39E-11	1.10E-10	2.19E-10
6.00E+06	3.71E-11	1.63E-10	2.86E-10
7.00E+06	5.10E-11	2.18E-10	3.46E-10
8.00E+06	6.47E-11	2.73E-10	4.00E-10
1.00E+07	8.95E-11	3.77E-10	4.90E-10
1.25E+07	1.14E-10	4.92E-10	5.74E-10
1.50E+07	1.32E-10	5.88E-10	6.34E-10
2.00E+07	1.52E-10	7.32E-10	7.10E-10
3.00E+07	1.60E-10	8.94E-10	7.70E-10
4.00E+07	1.52E-10	9.69E-10	7.81E-10
5.00E+07	1.41E-10	1.00E-09	7.73E-10
6.00E+07	1.30E-10	1.01E-09	7.59E-10
8.00E+07	1.10E-10	1.00E-09	7.24E-10
1.00E+08	9.48E-11	9.79E-10	6.90E-10
1.50E+08	6.89E-11	9.05E-10	6.15E-10
2.00E+08	5.34E-11	8.34E-10	5.54E-10

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

See page 5 for Explanation of Tables

Ti XVII + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+06	6.25E-14	5.39E-13	5.06E-12
3.00E+06	6.84E-13	4.63E-12	2.36E-11
4.00E+06	2.59E-12	1.51E-11	5.43E-11
5.00E+06	6.05E-12	3.24E-11	9.14E-11
6.00E+06	1.09E-11	5.52E-11	1.31E-10
7.00E+06	1.68E-11	8.20E-11	1.69E-10
8.00E+06	2.32E-11	1.11E-10	2.06E-10
1.00E+07	3.66E-11	1.74E-10	2.73E-10
1.25E+07	5.20E-11	2.51E-10	3.40E-10
1.50E+07	6.49E-11	3.23E-10	3.92E-10
2.00E+07	8.28E-11	4.44E-10	4.64E-10
3.00E+07	9.71E-11	6.01E-10	5.31E-10
4.00E+07	9.80E-11	6.88E-10	5.53E-10
5.00E+07	9.41E-11	7.36E-10	5.56E-10
6.00E+07	8.88E-11	7.61E-10	5.51E-10
8.00E+07	7.77E-11	7.78E-10	5.32E-10
1.00E+08	6.82E-11	7.74E-10	5.10E-10
1.50E+08	5.09E-11	7.35E-10	4.61E-10
2.00E+08	4.01E-11	6.92E-10	4.22E-10
3.00E+08	2.75E-11	6.17E-10	3.67E-10

Cr XIX + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
2.00E+06	4.39E-15	4.38E-14	9.93E-13
3.00E+06	8.48E-14	6.81E-13	6.61E-12
4.00E+06	4.47E-13	3.12E-12	1.86E-11
5.00E+06	1.31E-12	8.31E-12	3.60E-11
6.00E+06	2.76E-12	1.66E-11	5.67E-11
7.00E+06	4.80E-12	2.78E-11	7.91E-11
8.00E+06	7.33E-12	4.15E-11	1.02E-10
1.00E+07	1.33E-11	7.43E-11	1.46E-10
1.50E+07	2.93E-11	1.69E-10	2.37E-10
2.00E+07	4.20E-11	2.60E-10	2.98E-10
3.00E+07	5.58E-11	3.98E-10	3.63E-10
4.00E+07	6.03E-11	4.86E-10	3.89E-10
5.00E+07	6.04E-11	5.41E-10	3.99E-10
6.00E+07	5.87E-11	5.76E-10	4.00E-10
8.00E+07	5.34E-11	6.10E-10	3.91E-10
1.00E+08	4.80E-11	6.21E-10	3.78E-10
1.50E+08	3.71E-11	6.09E-10	3.45E-10
2.00E+08	2.98E-11	5.82E-10	3.17E-10
3.00E+08	2.09E-11	5.29E-10	2.77E-10
4.00E+08	1.59E-11	4.86E-10	2.49E-10

Fe XXI + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
3.00E+06	8.75E-15	8.43E-14	1.87E-12
5.00E+06	2.44E-13	1.87E-12	1.40E-11
6.00E+06	6.13E-13	4.43E-12	2.42E-11
7.00E+06	1.22E-12	8.45E-12	3.63E-11
8.00E+06	2.06E-12	1.40E-11	4.95E-11
1.00E+07	4.39E-12	2.92E-11	7.72E-11
1.25E+07	8.13E-12	5.42E-11	1.11E-10
1.50E+07	1.22E-11	8.32E-11	1.41E-10
2.00E+07	2.00E-11	1.45E-10	1.89E-10
2.50E+07	2.62E-11	2.03E-10	2.23E-10
3.00E+07	3.07E-11	2.55E-10	2.47E-10
4.00E+07	3.58E-11	3.36E-10	2.74E-10
5.00E+07	3.78E-11	3.92E-10	2.87E-10
6.00E+07	3.80E-11	4.32E-10	2.91E-10
8.00E+07	3.63E-11	4.78E-10	2.89E-10
1.00E+08	3.36E-11	4.99E-10	2.82E-10
1.50E+08	2.72E-11	5.09E-10	2.60E-10
2.00E+08	2.23E-11	4.97E-10	2.40E-10
3.00E+08	1.61E-11	4.62E-10	2.11E-10
4.00E+08	1.24E-11	4.29E-10	1.90E-10

Ni XXIII + α			
T(K)	Rate Coefficient ($cm^3\ s^{-1}$)		
	0→1	0→2	1→2
4.00E+06	8.28E-15	8.59E-14	2.13E-12
6.00E+06	1.21E-13	1.03E-12	1.01E-11
7.00E+06	2.76E-13	2.25E-12	1.63E-11
8.00E+06	5.25E-13	4.15E-12	2.36E-11
1.00E+07	1.33E-12	1.02E-11	4.01E-11
1.25E+07	2.85E-12	2.20E-11	6.21E-11
1.50E+07	4.76E-12	3.76E-11	8.35E-11
2.00E+07	8.96E-12	7.54E-11	1.20E-10
2.50E+07	1.29E-11	1.16E-10	1.49E-10
3.00E+07	1.61E-11	1.56E-10	1.70E-10
4.00E+07	2.05E-11	2.24E-10	1.96E-10
5.00E+07	2.29E-11	2.77E-10	2.10E-10
6.00E+07	2.39E-11	3.17E-10	2.16E-10
8.00E+07	2.40E-11	3.69E-10	2.19E-10
1.00E+08	2.30E-11	3.99E-10	2.16E-10
1.50E+08	1.95E-11	4.26E-10	2.01E-10
2.00E+08	1.64E-11	4.27E-10	1.87E-10
3.00E+08	1.22E-11	4.07E-10	1.65E-10
4.00E+08	9.59E-12	3.83E-10	1.49E-10
5.00E+08	7.82E-12	3.61E-10	1.37E-10