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Informal Report

Electron Excitation Collision Strengths For Positive Atomic Ions: A Collection of Theoretical Data

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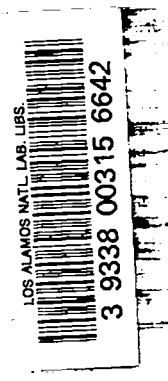

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Plot Symbol Table

1.	+	MANN	DWXCI
2.	*	MANN	DWCI
3.	□	ROBB	PWB
4.	○	MANN	DWX
5.	Δ	ROBB	CC
6.	∇	NAKAZAKI	CB
7.	⊕	MANN	DW
8.	∩	UCL	CC, DW
9.	≠	YOUNGER	DWXCI
10.	‖	PEEK	DWXCI
11.	$	BLAHA	DW
12.	U	PINDZOLA	DW
13.	θ	CALLAWAY	REL. CB
14.	I	QUB	CC
15.	8	SAMPSON	CBX
16.	H	OSTERBROCK	CC
17.	T	ORMONDE	CC
18.	W	CRANDALL	EXP.
19.	X	KIM	SCALED
20.	1	NUSSBAUMER	DW
21.	2	FLOWER	DW
22.	3	HENRY	CC

ELECTRON EXCITATION COLLISION STRENGTHS FOR POSITIVE ATOMIC IONS: A COLLECTION OF THEORETICAL DATA

by

A. L. Merts, J. B. Mann, W. D. Robb and N. H. Magee, Jr.

ABSTRACT

This report contains data on theoretical and experimental cross sections for electron impact excitation of positive atomic ions. It is an updated and corrected version of a preliminary manuscript which was used during an Atomic Data Workshop on Electron Excitation of Ions held at Los Alamos in November 1978. We attempt to show the current status of quantitative knowledge of collisional excitation collision strengths for highly stripped ions where configuration mixing, relativistic and resonance effects may be important. The results show a reasonably satisfactory state for first-row isoelectronic ions, and indicate that a considerable amount of work remains to be done for second-row and heavier ions.

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1. INTRODUCTION

The number of elements for which collisional excitation data are needed has expanded rapidly in the past few years. Elements of $Z \leq 30$ are important for both astrophysical applications and for many laboratory experiments. The use of higher-Z elements in the construction of power fusion reactors, with the resultant impurity ions causing radiative power losses, has forced the need for calculations to higher and higher Z. Even after the elimination of very high-Z elements, because of excessive power losses, one still must deal with a wide range of elements and ionization stages.

Although the need for these calculations is great, a literature search will quickly show that experimental data are largely nonexistent and there is a paucity of calculated results for many of the needed transitions. This led to

the choice of the ions and transitions presented at the meeting in Los Alamos and in this report. Two major considerations were paramount. First, ions and transitions were selected which were both of importance to the power fusion community and capable of being calculated by many different people and methods. This resulted in the largest possible duplication and comparison of collision strengths. Second, this selection was made to facilitate the development of isoelectronic scaling procedures, extending the work started by the authors in an earlier collisional excitation report.[42] Furthermore, it was hoped that the selection would allow reasonable interpolation of collision strengths as a function of N (number of bound electrons). Molybdenum is the heaviest element in the report, since it is at present the highest Z for which it is really practical to do calculations for complex ions. Table I on page 10 summarizes the elements and ions considered in this report.

The purpose of this work is to give a reasonably accurate impression of the data available from current practical computational methods. To achieve this, we have attempted to bring together a representative fraction of the existing data (published and unpublished). We have compared the data whenever possible to provide the reader with a basis for making his own judgements concerning the spread in calculated quantities. While we have chosen a few specific examples to discuss particular effects and to illustrate the importance of a process, we do not attempt to pass judgement on the various theoretical methods. The few known experimental values for collisional excitation cross-sections are also included.

Finally, the ultimate destiny of cross-sections is to produce rate coefficients. We have fitted many of the collision strengths in forms that are easily converted to rate coefficients for model calculations, etc. The fit coefficients and formulae needed to convert to rates have been included. In Appendix B we give some examples for scaling along isoelectronic sequences.

2. CALCULATIONAL METHODS

All of the theoretical collision strength data in this report comes from ab initio calculations. The approximations made in obtaining actual numbers are diverse and it is beyond the scope of this report to account for them in detail. We will instead provide references to relevant review articles and recent works of the authors whose numbers we have used, and where possible we reference publications on their computer codes and/or computational techniques.

The Close-coupling (CC) method[43] has been used, by the University College London (UCL) group and their associates through the program IMPACT,[44] by the Queen's University Belfast (QUB) group and their associates through the program RMATRX,[45] and by Henry and his associates using the NIEM[46] method. The CC calculations of Ormonde et al[47] are based on the computer program SEBAS. The Distorted-Wave (DW) method has many variants. The variational DW code developed by the UCL group has had wide usage as indicated on page iv. The other distorted wave methods including those of Peek,[48] Younger, and Mann are basically the DW method as described by Mott and Massey (Theory of Atomic Collisions). The method used here at Los Alamos by Mann uses Hartree-Fock (with relativistic mass-velocity and Darwin terms in the Hamiltonian)[49] wavefunctions for the target configurations. The potential for the continuum functions is the static potential of the target plus a local semiclassical exchange term.[50] The exchange terms arising from antisymmetric (N + 1) - electron functions are included, except "core-exchange" terms are ignored so that only the "active" bound electron wavefunctions need be used. Mixing coefficients are calculated simultaneously for both configuration interaction and intermediate coupling, using Cowan's RCG code.[51]

Several of the contributing authors also submitted more detailed statements on the methods they used. These statements have been collected in Appendix A.

3. DISCUSSION OF DATA

3.1. Configuration Interaction Effects

For ions in the Be, B, C, N, O, Mg, Al, Si, P and S iso-electronic sequences, there are significant correlation effects due to orbital degeneracy, in both the ground and lowest excited states. These correlation effects do not disappear even in the limit of infinite-Z, and it is well known from bound state calculations that they play a fundamental role in correctly predicting energy levels and radiative transition probabilities. It is not surprising therefore that they play an equally important role in the calculation of collision strengths.

Our point in this section is to demonstrate that the use of different target state wave functions by different authors can easily mask the differences produced by the various continuum approximations listed in Sec. 2. Further, correlation effects do not affect the collision strength simply through the change they produce in the optical oscillator strength, as might be inferred from the

semi-empirical formulae of Seaton and Van Regemorter. An illustration of the magnitude of correlation effects on the collision strength is shown in Fig. 1 for the $3s^2 3p\ ^2P^o$ - $3s\ 3p^2\ ^2D$ transition in S IV. The notation mxn denotes an m-term wave function for the initial state and an n-term wave function for the final state. The calculations (+) are due to Mann and the calculations (∩) are due to Bhatia, both of whom use distorted wave methods. Note that Mann's threshold collision strengths differ by a factor of 2.6 while the oscillator strength ratio is 5.3. The most important interaction in the (4 x 5) case is the 13.5% admixture of $3s^2 3d$ with the $3s3p^2\ ^2D$ term.

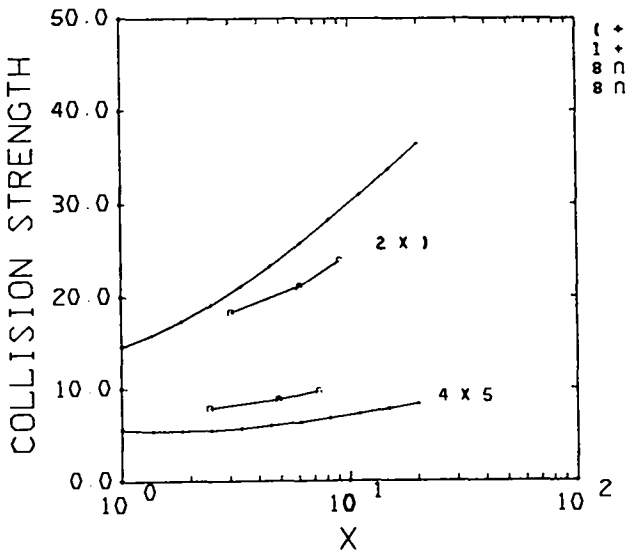

Fig. 1. Collision strengths of Bhatia and Mann, demonstrating the importance of configuration interaction for S IV ($3s^2 3p$ - $3s\ 3p^2\ ^2D$)

3.2. Relativistic Effects

As the nuclear charge of the target ion increases, the πLS coupling scheme for the representation of target states breaks down, and we are forced to go to an intermediate coupling scheme in which the target states are represented in a πLSJ coupling scheme. In addition, allowance for the relativistic velocity of the target electrons can significantly affect the threshold energies of transitions. Provided Z is not too large we can treat these relativistic effects as perturbations to the non-relativistic wave functions, proceed with our calculations in πLS coupling and recouple them to πLSJ coupling.

An example of intermediate coupling effects is shown in Fig. 2 for the $1s^2\ ^1S$ - $1s2p\ ^3P^o$ transition in Fe XXV. Here the spin-orbit term mixes the $1s2p\ ^3P_1$ and $1s2p\ ^1P_1$ configurations in the approximate ratio 0.95 to 0.3, and so at approximately X = 4 the component of the collision strength from the dipole-allowed transition $1s^2\ ^1S_o$ - $1s2p\ ^1P_1$ begins to dominate.

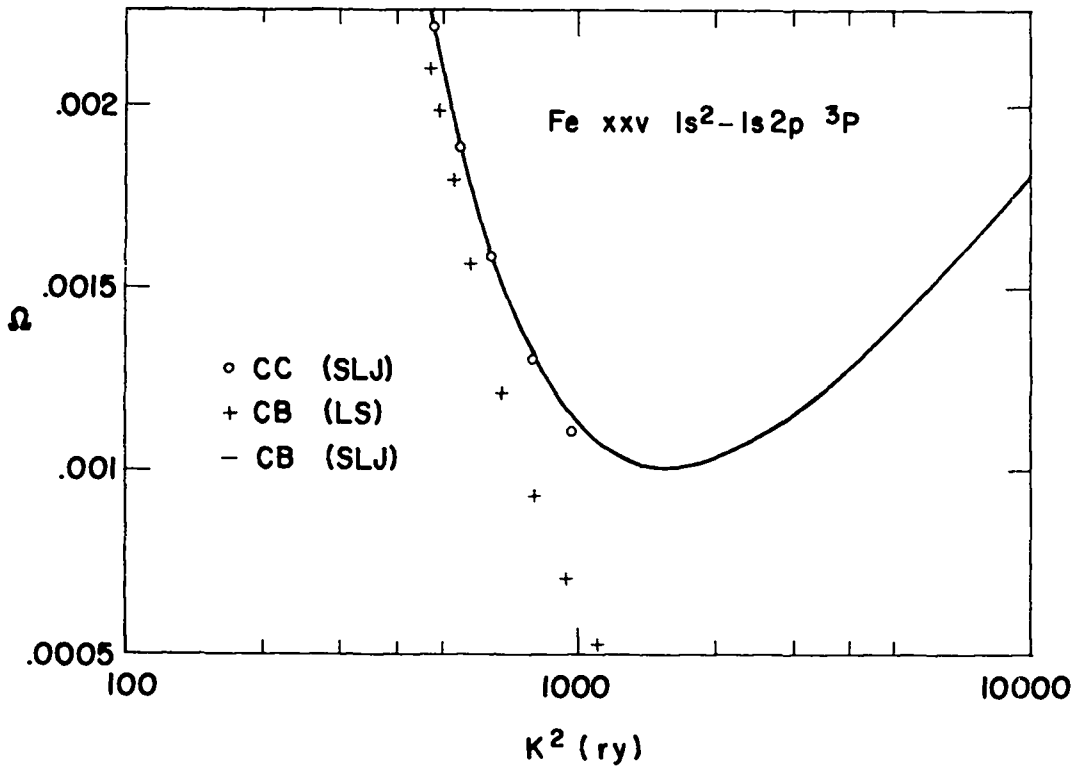

Fig. 2. Intermediate Coupling (LSJ) effects in the target state wave functions. The CB calculations are from Mann and the CC calculations are from Robb.

3.3. Resonant Excitation

The collision strengths included in this report do not include resonant excitation. In practice, resonances can greatly complicate the behaviour of the collision strength in the near threshold energy region. The CC method is the only procedure of those described in Sec. 2 which allows for resonant excitation, and the collision strength obtained for the $1s^22s^2\ ^1S$ - $1s^22s2p\ ^3P^o$ transition in O V calculated by Berrington et al[52] is shown in Fig. 3. It is clearly not tractable to tabulate, plot and compare resonant collision strengths under our present format. Instead we concentrate on comparisons of the non-resonant or background collision strength for the following reasons:

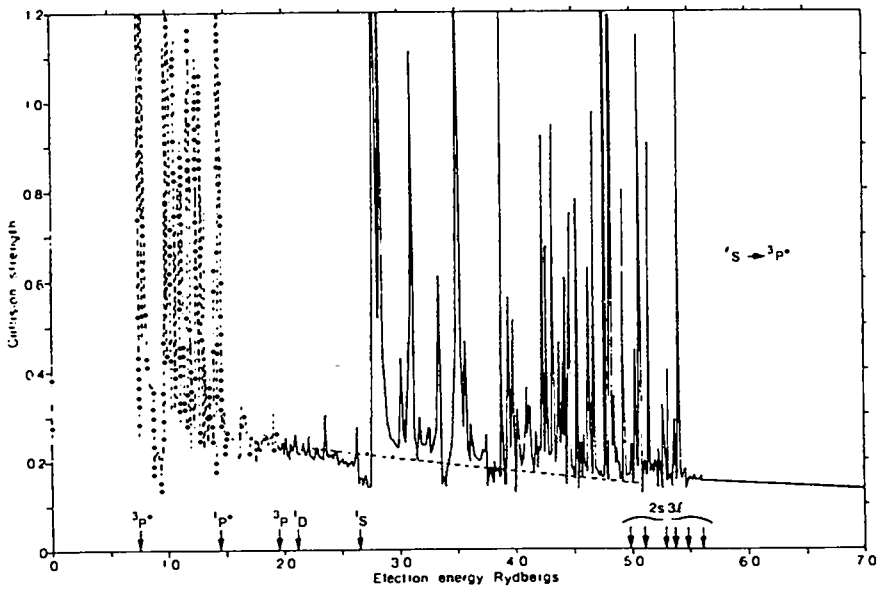

Fig. 3. Resonance structure in the O V ($2s^2\ ^1S$ - $2s\ 2p\ ^3P^o$) collision strength, from the calculations of Berrington et. al.

1. In general, resonant contributions to the rate coefficients for strong dipole allowed transitions are small (~10%).

2. For spin forbidden transitions, such as that of Fig. 3 where the resonant contribution to the rate coefficient is about 50%, the resonant contribution to the total 2s-2p excitation rate is only 12-15% and so for the purposes of power loss calculations (the primary object of this report) they are relatively unimportant.

3. Resonant collision strength data are almost non-existent and where they are available in the literature they are often incomplete and not easily transcribable.

4. It appears that, for ions more than a few times ionized, resonant excitation contributions can be calculated adequately using perturbative procedures[53] in conjunction with DW or CB scattering methods. We show one example of the contribution of the resonances to the rates. Figure 4 shows the excitation rate for O V ($2s^2$ - $2s2p\ ^3P$). Two of the curves (1, 2) show the difference between the rates without and with the inclusion of resonances. Curves (2, 3) compare the resonance rates calculated with the DW (perturbative procedure) and CC method.[52]

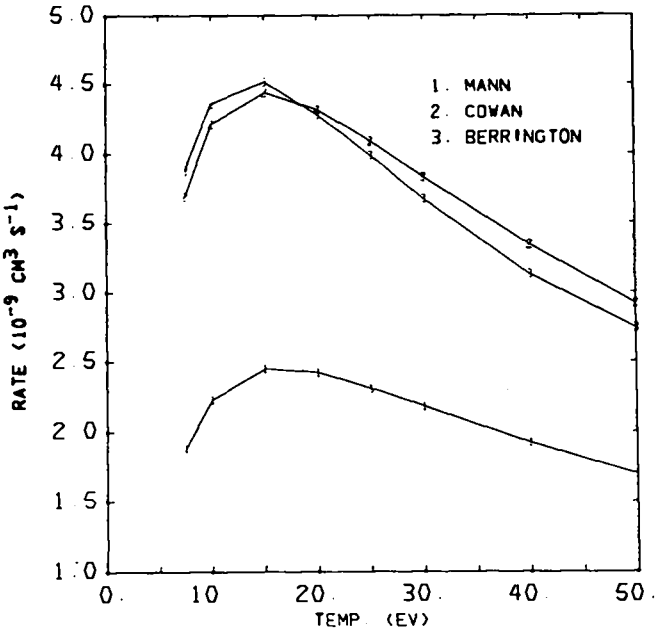

Fig. 4. O V ($2s^2$ - 2s 2p ^3P) excitation rates, without resonances (curve 1) and with resonances included (DW-curve 2, CC-curve 3).

4. DATA PRESENTATION AND FORMAT

All of the data presented in the report are listed in the tables at the end of Sec. 5, where each data set is individually referenced. Since there are over 500 sets, it was not practical to give each one a separate identification number for plotting and comparison. Therefore, we have grouped the data into three classifications. First, if there is a common author, all of the data will be listed under that author's last name as the principal identification (e.g., Gau-Henry, van Wyngaarden-Henry and Henry were given plot symbol No. 22 and all listed as Henry data). Second, if there is a particular school of calculation (such as the University College of London (UCL) code), all authors using that method will be listed under that identification (e.g., Mason, Bhatia, Seaton, etc., are all grouped under plot symbol No. 8 as UCL data). Finally, data not fitting into the above are listed under the principal author, the first author and/or the author sending us the data.

It was brought to our attention that the data of Osterbrock, Nussbaumer and Flower should be included with the UCL authors, but it was too late to change the identification for this report.

The data tables at the end of Sec. 5 are arranged in the same order as the "authors" are listed in the table on page iv, with Mann first and Henry last. Under each "author", such as UCL, the data are arranged by element, ionization

stage and transition, with a reference given for each data set. Thus, to identify a data set labeled UCL in one of the comparison plots, the reader should turn to the UCL data tables and find the appropriate element, ion and transition.

We have attempted to present in this report all of the unpublished data available to us which could reasonably be presented in the form of LS term-to-term transitions. Some of the data were given to us for individual LSJ-L'S'J' line transitions and we can provide them upon request. Data given to us for J-J' transitions calculated in a jj- coupling scheme are not included in this report. In addition, we have used all of the data we could find in the literature, for which there were at least two data sets per transition. Published data for which there were no comparisons have not (in general) been included in this report, but should be obtainable from the references.

5. DATA

TABLE I

DATA APPEARING IN OR REFERENCED IN REPORT

ELEMENT	ISOELECTRONIC SEQUENCE											
	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si
Be	1,5											
B	1	16										
C	1,5,11 13,18,19, 21,22	1,5,6,8, 10,11, 14,16,20	5,8									
N	1,18,19 21,22	6,16,17		17								
O	1,5,11,19	1,6,9,10, 11,14,16	1,5,11, 21	1,8,12, 17	17							
Ne	1,5,10,22	6,8,14, 16		8								
Na			21									
Mg				8	8				1			
Al						1,3,5	1,3	1	1	1	3	
Si	1,21	14,15	21	8		8			1,21	1		
S			21	8		8			21		1,8	
Ar	1,22	1,9,15	8	8		8			1	9		
Ca				8	8				11,21			
Fe	1,5,13, 19,22	1,5,8,9 14,15	1,5,8	1,5,8	1,5	1,5	1,5	1,21	1,11,19, 21	1,9,21	8,21	21
Mo	13,9	15	5						1,11,19	1,9		

Numbers are author identification numbers given on page vi.

5.2. Index to Comparison Plots

PAGE NO.	ELEMENT AND ION	... DATA SETS
34	O III 2S2 2P2(3P) - 2S2 2P2(1D)	BHATIA UCL O III 1S2 2S2 2P2(3P) -1S2 2S2 2P3(1D) PINOZOLA OW O III 2S2 2P2(3P) - 2S2 2P2(1D) MANN OWXCI II O III 2S2 2P2(3P) TO 2S2 2P2(1D) MIX(4 X 3)
35	O III 2S2 2P2(3P) - 2S2 2P2(1S)	BHATIA UCL O III 1S2 2S2 2P2(3P) -1S2 2S2 2P2(1S) MANN OWXCI II O III 2S2 2P2(3P) TO 2S2 2P2(1S) MIX(4 X 3)
36	O III 2S2 2P2(1D) - 2S2 2P2(1S)	BHATIA UCL O III 1S2 2S2 2P2(1D) -1S2 2S2 2P2(1S) MANN OWXCI II O III 2S2 2P2(1D) TO 2S2 2P2(1S) MIX(2 X 2)
37	O III 2S2 2P2(1D) - 2S 2P3(1P)	ORMONDE O III 2S2 2P2(1D) - 2S 2P3(1P) BHATIA UCL O III 1S2 2S2 2P2(1D) - 1S2 2S 2P3(1P)
38	O III 2S2 2P2(3P) - 2S 2P3(5S)	BHATIA UCL O III 1S2 2S2 2P2(3P) - 1S2 2S 2P3(5S) JACKSON UCL O III 2S2 2P2(3P) - 2S 2P3(5S) MANN OWXCI II O III 2S2 2P2(3P) TO 2S 2P3(5S) MIX(4 X 1)
39	O III 2S2 2P2(3P) - 2S 2P3(3D)	BHATIA UCL O III 1S2 2S2 2P2(3P) - 1S2 2S 2P3(3D) MANN OWXCI II O III 2S2 2P2(3P) TO 2S 2P3(3D) MIX (2 X 1)
40	O III 2S2 2P2(3P) - 2S 2P3(3P)	BHATIA UCL O III 1S2 2S2 2P2(3P) - 1S2 2S 2P3(3P) MANN OWXCI II O III 2S2 2P2(3P) TO 2S 2P3(3P) MIX (2 X 1)
41	O III 2S2 2P2(3P) - 2S 2P3(3S)	ORMONDE O III 2S2 2P2(3P) - 2S 2P3(3S) BHATIA UCL O III 1S2 2S2 2P2(3P) - 1S2 2S 2P3(3S) MANN OWXCI II O III 2S2 2P2(3P) TO 2S 2P3(3S) MIX (2 X 1)
42	O III 2S2 2P2(3P) - 2S 2P3(1D)	BHATIA UCL O III 1S2 2S2 2P2(3P) - 1S2 2S 2P3(1D) MANN OWXCI II O III 2S2 2P2(3P) TO 2S 2P3(1D) MIX (4 X 1)
43	O III 2S2 2P2(3P) - 2S 2P3(1P)	BHATIA UCL O III 1S2 2S2 2P2(3P) - 1S2 2S 2P3(1P) MANN OWXCI II O III 2S2 2P2(3P) TO 2S 2P3(1P) MIX (4 X 1)
44	O IV 2S2 2P - 2S 2P2(4P)	NUSSBAUMER-FLOWER O IV 2S2 2P - 2S 2P2(4P) ROBB O IV 5CCX 2S(2)2P-2S2P(2)(4P) CI MANN OWXCI II O IV 2S2 2P TO 2S 2P2(4P) MIX2 OWCI II
45	O IV 2S2 2P - 2S 2P2(2D)	NUSSBAUMER-FLOWER O IV 2S2 2P - 2S 2P2(2D) ROBB O IV 5CCX 2S(2)2P-2S2P(2)(2D) CI MANN DWXCI II O IV 2S2 2P TO 2S 2P2(2D) MIX2 DWCI II
46	O IV 2S2 2P - 2S 2P2(2S)	NUSSBAUMER-FLOWER O IV 2S2 2P - 2S 2P2(2S) ROBB O IV 5CCX 2S(2)2P-2S2P(2)(2S) CI MANN OWXCI II O IV 2S2 2P TO 2S 2P2(2S) MIX2 OWCI II
47	O IV 2S2 2P - 2S 2P2(2P)	DAVIS BLAHA UOWNX O IV 2S(2)2P(2P) - 2S2P(2)(2P) ROBB 5CCX O IV 2S(2)2P-2S2P(2)(2P) CI NUSSBAUMER-FLOWER O IV 2S2 2P - 2S 2P2(2P) MANN OWXCI II O IV 2S2 2P TO 2S 2P2(2P) MIX2 DWCI II
48	O IV 2S 2P2(4P) - 2S 2P2(2D)	NUSSBAUMER-FLOWER O IV 2S 2P2(4P) - 2S 2P2(2D) ROBB 5CCX O IV 2S2P(2)(4P)-2S2P(2)(2D) MANN OWX OXYGEN IV 2S 2P2(4P) TO 2S 2P2(2D) HFR

PAGE NO.	ELEMENT AND ION	... DATA SETS
49	O IV 2S 2P2(4P) - 2S 2P2(2P)	NUSSBAUMER-FLOWER O IV 2S 2P2(4P) - 2S 2P2(2P) ROBB 5CCX O IV 2S2P(2)(4P)-2S2P(2)(2P) CI MANN OWX OXYGEN IV 2S 2P2(4P) TO 2S 2P2(2P) HFR
50	O IV 2S 2P2(4P) - 2S 2P2(2S)	NUSSBAUMER-FLOWER O IV 2S 2P2(4P) - 2S 2P2(2S) ROBB 5CCX O IV 2S2P(2)(4P)-2S2P(2)(2S) CI MANN OWX O IV 2S 2P2(4P) TO 2S 2P2(2S) HFR OW
51	O IV 2S 2P2(2D) - 2S 2P2(2S)	ROBB 5CCX O IV 2S2P(2)(2D)-2S2P(2)(2S) CI MANN OWX O IV 2S 2P2(2D) TO 2S 2P2(2S) HFR OW
52	O IV 2S 2P2(2D) - 2S 2P2(2P)	ROBB 5CCX O IV 2S2P(2)(2D)-2S2P(2)(2P) CI MANN OWX OXYGEN IV 2S 2P2(2D) TO 2S 2P2(2P) HFR
53	O V 2S2 - 2S 2P(3P)	OSTERBROCK 3CCX O V 2S2 - 2S 2P(3P) QUB OW O V 1S2 2S2 - 1S2 2S 2P(3P) PEEK OWUCI O V 2S2 - 2S 2P(3P) MANN OWXCI II O V 2S2 TO 2S 2P(3P) HFR OWXCI II
54	O V 2S2 - 2S 2P(1P)	NAKAZAKI O V 2S2(1S) - 2S 2P(1P) QUB DW O V 1S2 2S2 - 1S2 2S 2P(1P) PEEK OWUCI O V 2S2 - 2S 2P(1P) YOUNGER OWXCI O V 2S2 - 2S 2P(1P) OSTERBROCK 3CCX O V 1S2 2S2 - 1S2 2S 2P(1P) DAVIS BLAHA UDWX O V 2S(2)(1S) - 2S2P(1P) MANN OWXCI II O V 2S2 TO 2S 2P(1P) HFR OWXCI II
56	O V 2S 2P(3P) - 2P2(3P)	QUB OW O V 12S 2P(3P) - 2P2(3P) MANN OWX II O V 2S 2P(3P) TO 2P2(3P) HFR DW II
57	O VI 1S2 2S - 1S2 2P	ROBB O VI 2CCX 2S - 2P DAVIS BLAHA UOWX O VI 2S - 2P KIM SCALED O VI 2S - 2P MANN OWX II O VI 2S TO 2P HFR DW II
58	NE VII 2S2 - 2S 2P(3P)	OSTERBROCK 3CCX NE VII 2S2 - 2S 2P(3P) HUMMER UCL NE VII 2S2 - 2S 2P(3P)
59	NE VII 2S2(1S) - 2S 2P(1P)	HUMMER UCL NE VII 2S2 - 2S 2P(1P) OSTERBROCK 3CCX NE VII 2S2 - 2S 2P(1P) NAKAZAKI NE VII 2S2(1S) - 2S 2P(1P)
60	NE VIII 2S - 2P	VAN WYNGAAROEN-HENRY 2CCX 5CCX NE VIII 2S - 2P ROBB 5CCX NE VIII 2S - 2P PEEK OWX NE VIII 1S2 2S TO 1S2 2P HF OW MANN OWX NE VIII 1S2 2S TO 1S2 2P HF DW
61	AL V 2S2 2P5(2P) - 2S1 2P6(2S)	ROBB PWB AL V 2S2 2P2(2P) - 2S1 2P6(2S) MANN OWX AL V 2S2 2P5(2P) TO 2S1 2P6(2S) HFR OW
62	AL VI 2S2 2P4(3P) - 2S1 2P5(3P)	ROBB CC AL VI 2S2 2P4(3P) TO 2S2P5(3P) ROBB PWB AL VI 2S2 2P4(3P) TO 2S2P5(3P) MANN OWX AL VI 2S2 2P4(3P) TO 2S1 2P5(3P) HFR DW

PAGE NO.	ELEMENT AND ION	... DATA SETS
63	SI IV 3S - 3P	NUSSBAUMER-FLOWER SI IV 3S - 3P MANN OWX II SI IV 3S TO 3P HFR OW II
64	SI XII 2S - 2P	FLOWER OWCI SI XII 2S - 2P MANN OWX II SI XII 2S TO 2P HFR OW II
65	S IV 3S2 3P - 3S 3P2(4P)	BHATIA UCL S IV 3S2 3P(2P) - 3S 3P2(4P) MANN OWXCI SULFUR IV 3S2 3P TO 3S 3P2(4P) MIX2 (4 X 6)
66	S IV 3S2 3P - 3S 3P2(2D)	BHATIA UCL S IV 3S2 3P(2P) - 3S 3P2(2D) MANN OWXCI SULFUR IV 3S2 3P TO 3S 3P2(2D) MIX2 (4 X 5)
67	S IV 3S2 3P - 3S 3P2(2S)	BHATIA UCL S IV 3S2 3P(2P) - 3S 3P2(2S) MANN OWXCI SULFUR IV 3S2 3P TO 3S 3P2(2S) MIX2 (4 X 3)
68	S IV 3S2 3P - 3S 3P2(2P)	BHATIA UCL S IV 3S2 3P(2P) - 3S 3P2(2P) MANN OWXCI SULFUR IV 3S2 3P TO 3S 3P2(2P) MIX2 (4 X 5)
69	AR XV 2S2 - 2S 2P(3P)	SAMPSON C8X AR XV 2S2 - 2S 2P(3P) MANN OWXCI ARGON XV 2S2 TO 2S 2P(3P) HFR OW MIX(3 X 2
70	AR XV 2S2 - 2S 2P(1P)	YOUNGER OWXCI AR XV 2S2 - 2S 2P(1P) SAMPSON C8X AR XV 2S2 - 2S 2P(1P) MANN OWXCI ARGON XV 2S2 TO 2S 2P(1P) HFR OW MIX(3 X 2
71	AR XVI 1S2 2S - 1S2 2P	GAU HENRY SCCX AR XVI 2S - 2P MANN OWX II A XVI 2S TO 2P HFR OW II
72	CA X 3S - 3P	NUSSBAUMER-FLOWER CA X 3S - 3P BLAHA OW CA X 3S - 3P
73	CA X 3S - 3D	NUSSBAUMER-FLOWER CA X 3S - 3D BLAHA OW CA X 3S - 3D
74	CA X 3P - 3D	NUSSBAUMER-FLOWER CA X 3P - 3D BLAHA OW CA X 3P - 3D
75	FE XV 3S2 - 3S 3P(1P)	FLOWER FE XV 3S2 - 3S 3P(1P) YOUNGER OWXCI FE XV 3S2 - 3S 3P(1P) MANN OWXCI FE XV 3S2 TO 3S 3P(1P) HFR OW MIX2
76	FE XVI 2P6 3S - 2P6 3P	NUSSBAUMER-FLOWER FE XVI 3S - 3P KIM SCALED FE XVI 3S - 3P BLAHA OW FE XVI 3S - 3P MANN OWX FE XVI 2P6 3S TO 2P6 3P HFR OW
77	FE XVI 2P6 3S - 2P6 3D	NUSSBAUMER-FLOWER FE XVI 3S - 3D BLAHA OW FE XVI 3S - 3D MANN OW FE XVI 2P6 3S TO 2P6 3D HFR OW MANN OWX FE XVI 2P6 3S TO 2P6 3D HFR OW

PAGE NO.	ELEMENT AND ION	... DATA SETS			
78	FE XVI 2P6 3S - 2P6 4S				
		BLAHA	OW	FE XVI	3S - 4S
		MANN	OW	FE XVI	2P6 3S TO 2P6 4S HFR OW
		MANN	OWX	FE XVI	2P6 3S TO 2P6 4S HFR OW
79	FE XVI 2P6 3S - 2P6 4P				
		BLAHA	OW	FE XVI	3S - 4P
		MANN	OWX	FE XVI	2P6 3S TO 2P6 4P HFR OW
80	FE XVI 3P - 3D				
		NUSSBAUMER-FLOWER		FE XVI	3P - 3D
		BLAHA	OW	FE XVI	3P - 3D
81	FE XVIII 2S2 2P5 - 2S 2P6				
		ROBB	2CCX	FE XVIII	2S2 2P5(2P) - 2S 2P6(2S)
		MANN	OWX	FE XVIII	2S2 2P5 TO 2S 2P6 HFR OW
82	FE XIX 2P4(3P) - 2P4(1D)				
		ROBB	5CCX	FE XIX	2S2 2P4(3P) - 2S2 2P4(1D)
		MANN	OWXCI	FE XIX	2P4(3P) TO 2P4(1D) HFR OW MIX
83	FE XIX 2P4(3P) - 2P4(1S)				
		ROBB	5CCX	FE XIX	2S2 2P4(3P) - 2S2 2P4(1S)
		MANN	OWXCI	FE XIX	2P4(3P) TO 2P4(1S) HFR OW MIX
84	FE XIX 2S2 2P4(3P) - 2S 2P5(3P)				
		ROBB	5CCX	FE XIX	2S2 2P4(3P) - 2S 2P5(3P)
		MANN	DWXCI	FE XIX	2S2 2P4(3P) TO 2S 2P5(3P) OWMIX
85	FE XIX 2S2 2P4(3P) - 2S 2P5(1P)				
		ROBB	5CCX	FE XIX	2S2 2P4(3P) - 2S 2P5(1P)
		MANN	OWXCI	FE XIX	2S2 2P4(3P) TO 2S 2P5(1P) OWMIX
86	FE XX 2S2 2P3(4S) - 2S 2P4(4P)				
		ROBB	7CCX	FE XX	2S2 2P3(4S) - 2S 2P4(4P)
		MANN	OWXCI	FE XX	2S2 2P3(4S) TO 2S 2P4(4P) OW CI8
87	FE XX 2S2 2P3(4S) - 2S 2P4(2S)				
		ROBB	7CCX	FE XX	2S2 2P3(4S) - 2S 2P4(2S)
		MANN	OWXCI	FE XX	2S2 2P3(4S) TO 2S 2P4(2S) DW CI7
88	FE XX 2S2 2P3(4S) - 2S 2P4(2P)				
		ROBB	7CCX	FE XX	2S2 2P3(4S) - 2S 2P4(2P)
		MANN	OWXCI	FE XX	2S2 2P3(4S) TO 2S 2P4(2P) OW CI 8
89	FE XX 2S2 2P3(4S) - 2S 2P4(2D)				
		ROBB	7CCX	FE XX	2S2 2P3(4S) - 2S 2P4(2D)
		MANN	OWXCI	FE XX	2S2 2P3(4S) TO 2S 2P4(2D) OW CI7
90	FE XXI 2S2 2P2(3P) - 2S2 2P2(1D)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) -1S2 2S2 2P2(1D)
		ROBB	6CCX	FE XXI	2S2 2P2(3P) - 2S2 2P2(1D)
91	FE XXI 2S2 2P2(3P) - 2S2 2P2(1S)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) -1S2 2S2 2P2(1S)
		ROBB	6CCX	FE XXI	2S2 2P2(3P) - 2S2 2P2(1S)
92	FE XXI 2S2 2P2(1D) - 2S2 2P2(1S)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(1D) -1S2 2S2 2P2(1S)
		ROBB	UNMIX	FE XXI	2S2 2P2(1D) - 2S2 2P2(1S)
		ROBB	6CCX	FE XXI	2S2 2P2(1D) - 2S2 2P2(1S)
93	FE XXI 2S2 2P2(3P) - 2S 2P3(5S)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) - 1S2 2S 2P3(5S)
		MANN	OWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(5S) DWCI10

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94	FE XXI 2S2 2P2(3P) - 2S 2P3(3D)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) - 1S2 2S 2P3(3D)
		R088	6CCX	FE XXI	2S2 2P2(3P) - 2S 2P3(3D)
		MANN	OWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(3D) OWCI12
95	FE XXI 2S2 2P2(3P) - 2S 2P3(3P)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) - 1S2 2S 2P3(3P)
		R088	6CCX	FE XXI	2S2 2P2(3P) - 2S 2P3(3P)
		MANN	OWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(3P) OWCI12
96	FE XXI 2S2 2P2(3P) - 2S 2P3(3S)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) - 1S2 2S 2P3(3S)
		R088	6CCX	FE XXI	2S2 2P2(3P) - 2S 2P3(3S)
		MANN	OWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(3S) OWCI10
97	FE XXI 2S2 2P2(3P) - 2S 2P3(1D)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) - 1S2 2S 2P3(1D)
		MANN	OWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(1D) OWCI10
98	FE XXI 2S2 2P2(3P) - 2S 2P3(1P)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(3P) - 1S2 2S 2P3(1P)
		MANN	OWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(1P) OWCI10
99	FE XXI 2S2 2P2(1D) - 2S 2P3(3D)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(1D) - 1S2 2S 2P3(3D)
		R088	UNMIX	FE XXI	2S2 2P2(1D) - 2S 2P3(3D)
		R088	6CCX	FE XXI	2S2 2P2(1D) - 2S 2P3(3D)
100	FE XXI 2S2 2P2(1D) - 2S 2P3(3P)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(1D) - 1S2 2S 2P3(3P)
		R088	UNMIX	FE XXI	2S2 2P2(1D) - 2S 2P3(3P)
		R088	6CCX	FE XXI	2S2 2P2(1D) - 2S 2P3(3P)
101	FE XXI 2S2 2P2(1D) - 2S 2P3(3S)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(1D) - 1S2 2S 2P3(3S)
		R088	UNMIX	FE XXI	2S2 2P2(1D) - 2S 2P3(3S)
		R088	6CCX	FE XXI	2S2 2P2(1D) - 2S 2P3(3S)
102	FE XXI 2S2 2P2(1S) - 2S 2P3(3D)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(1S) - 1S2 2S 2P3(3D)
		R088	UNMIX	FE XXI	2S2 2P2(1S) - 2S 2P3(3D)
		R088	6CCX	FE XXI	2S2 2P2(1S) - 2S 2P3(3D)
103	FE XXI 2S2 2P2(1S) - 2S 2P3(3P)				
		BHATIA	UCL	FE XXI	1S2 2S2 2P2(1S) - 1S2 2S 2P3(3P)
		R088	6CCX	FE XXI	2S2 2P2(1S) - 2S 2P3(3P)
104	FE XXII 2S2 2P - 2S 2P2(4P)				
		MASON	UCL	FE XXII	1S2 2S2 2P(2P) - 1S2 2S 2P2(4P)
		R088	5CCX	FE XXII	2S2 2P(2P) - 2S 2P2(4P)
		MANN	OWXCI	FE XXII	2S2 2P TO 2S 2P2(4P) HFROW MIX
105	FE XXII 2S2 2P - 2S 2P2(2D)				
		MASON	UCL	FE XXII	1S2 2S2 2P(2P) - 1S2 2S 2P2(2D)
		R088	5CCX	FE XXII	2S2 2P(2P) - 2S 2P2(2D)
		MANN	OWXCI	FE XXII	2S2 2P TO 2S 2P2(2D) HFROW MIX
106	FE XXII 2S2 2P - 2S 2P2(2S)				
		MASON	UCL	FE XXII	1S2 2S2 2P(2P) - 1S2 2S 2P2(2S)
		R088	5CCX	FE XXII	2S2 2P(2P) - 2S 2P2(2S)
		MANN	OWXCI	FE XXII	2S2 2P TO 2S 2P2(2S) HFROW MIX
107	FE XXII 2S2 2P - 2S 2P2(2P)				
		MASON	UCL	FE XXII	1S2 2S2 2P(2P) - 1S2 2S 2P2(2P)
		R088	5CCX	FE XXII	2S2 2P(2P) - 2S 2P2(2P)
		MANN	OWXCI	FE XXII	2S2 2P TO 2S 2P2(2P) HFROW MIX

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108	FE XXIII 2S2 - 2S 2P(3P)	HENRY UNMIXED FE XXIII 2S2 - 2S 2P(3P) BLAHA OW FE XXIII 2S2 - 2S 2P(3P) SAMPSON C8X FE XXIII 2S2 - 2S 2P(3P) MANN OWX FE XXIII 2S2 TO 2S 2P(3P) HFR OW . R088 6CCX FE XXIII 1S2 2S2 - 1S2 2S 2P(3P) MANN OWXCI FE XXIII 2S2 TO 2S 2P(3P) HFR OW MIX
110	FE XXIII 2S2 - 2S 2P(1P)	HENRY UC8 FE XXIII 2S2 - 2S 2P(1P) BLAHA OW FE XXIII 2S2 - 2S 2P(1P) SAMPSON C8X FE XXIII 2S2 - 2S 2P(1P) YOUNGER OWXCI FE XXIII 2S2 - 2S 2P(1P) R088 6CCX FE XXIII 1S2 2S2 - 1S2 2S 2P(1P) MANN OWXCI FE XXIII 2S2 TO 2S 2P(1P) HFR OW MIX
112	FE XXIII 2S 2P(3P) - 2P2(3P)	BLAHA OW FE XXIII 2S 2P(3P) - 2P2(3P) SAMPSON C8X FE XXXII 2S 2P(3P) - 2P2(3P) R088 6CCX FE XXIII 1S2 2S 2P(3P) - 1S2 2P2(3P) MANN OWXCI FE XXIII 2S 2P(3P) TO 2P2(3P) HFROW MIX
113	FE XXIII 2S 2P(1P) - 2P2(1D)	BLAHA OW FE XXIII 2S 2P(1P) - 2P2(1D) SAMPSON C8X FE XXIII 2S 2P(1P) - 2P2(1D) R088 6CCX FE XXIII 1S2 2S 2P(1P) - 1S2 2P2(1D)
114	FE XXIII 2S 2P(1P) - 2P2(1S)	BLAHA OW FE XXIII 2S 2P(1P) - 2P2(1S) SAMPSON C8X FE XXIII 2S 2P(1P) - 2P2(1S) R088 6CCX FE XXIII 1S2 2S 2P(1P) - 1S2 2P2(1S)
115	FE XXIII 2S 2P(3P) - 2P2(1D)	SAMPSON C8X FE XXIII 2S 2P(3P) - 2P2(1D) R088 6CCX FE XXIII 1S2 2S 2P(3P) - 1S2 2P2(1D)
116	FE XXIII 2S 2P(3P) - 2P2(1S)	SAMPSON C8X FE XXIII 2S 2P(3P) - 2P2(1S) R088 6CCX FE XXIII 1S2 2S 2P(3P) - 1S2 2P2(1S)
117	FE XXIII 2S 2P(1P) - 2P2(3P)	SAMPSON C8X FE XXIII 2S 2P(1P) - 2P2(3P) R088 6CCX FE XXIII 1S2 2S 2P(1P) - 1S2 2P2(3P)
118	FE XXIII 2S2 - 2P2(3P)	HENRY UNMIXED FE XXIII 2S2 - 2P2(3P) R088 6CCX FE XXIII 1S2 2S2 - 1S2 2P2(3P) MANN OWXCI FE XXIII 1S2 2S2(1S) TO 1S2 2P2(3P) 3X4
119	FE XXIII 2S2 - 2P2(1D)	HENRY UC8 FE XXIII 2S2 - 2P2(1D) HENRY UNMIXED FE XXIII 2S2 - 2P2(1D) R088 UNMIX FE XXIII 1S2 2S2 - 1S2 2P2(1D) R088 6CCX FE XXIII 1S2 2S2 - 1S2 2P2(1D)
120	FE XXIV 1S2 2S - 1S2 2P	KIM SCALED FE XXIV 2S - 2P CALLAWAY FE XXIV 2S(2S) - 2P(2P) R088 CCX FE XXIV 2S - 2P MANN OWX II FE XXIV 2S TO 2P HFROW II
122	MO XXXI 3S2 - 3S 3P(1P)	YOUNGER OWXCI MO XXXI 3S2 - 3S 3P(1P) MANN OWXCI MO XXXI 3S2 TO 3S 3P(1P) HFR OW MIX2
123	MO XXXII 2P6 3S - 2P6 3P	KIM SCALED MO XXXII 3S - 3P BLAHA OW MO XXXII 3S - 3P MANN OWX MO XXXII 2P6 3S TO 2P6 3P HFR OW

ELEMENT AND ION ... DATA SETS

124 MO XXXII
2P6 3S - 2P6 3D

BLAHA		OW	MO XXXII	3S - 3D			
MANN	OW		MO XXXII	2P6 3S TO 2P6 3D	HFR	OW	
MANN	OWX		MO XXXII	2P6 3S TO 2P6 3D	HFR	OW	

125 MO XXXII
2P6 3S - 2P6 4S

BLAHA		OW	MO XXXII	3S - 4S			
MANN	DW		MO XXXII	2P6 3S TO 2P6 4S	HFR	DW	
MANN	OWX		MO XXXII	2P6 3S TO 2P6 4S	HFR	OW	

126 MO XXXII
2P6 3S - 2P6 4P

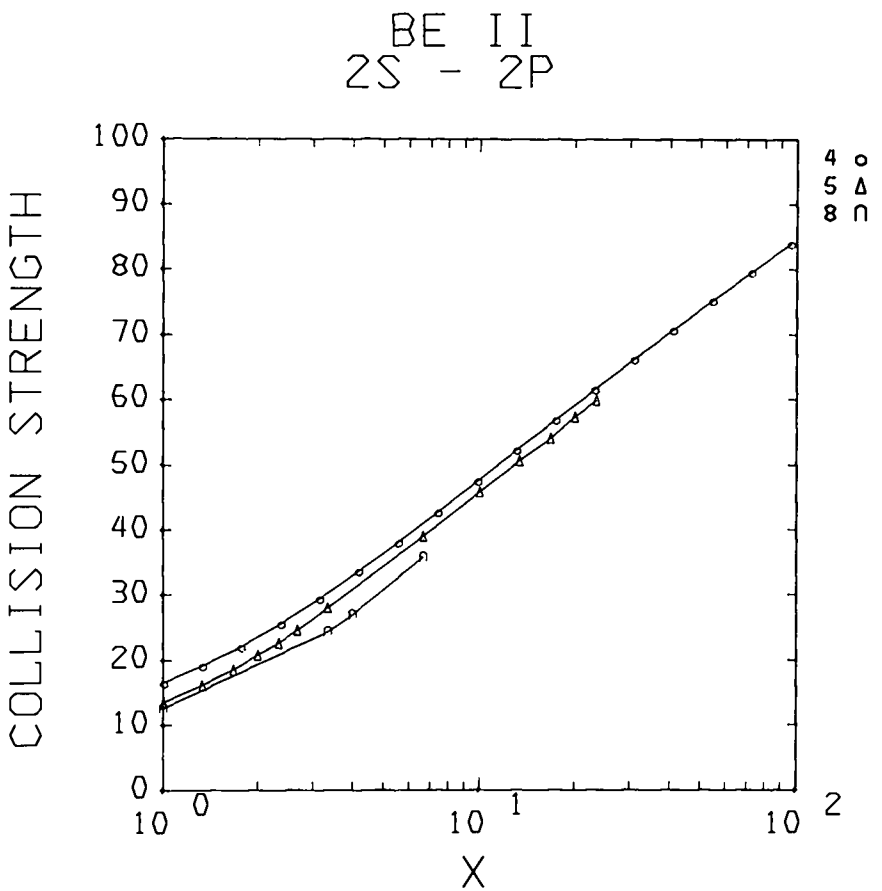
BLAHA		DW	MO XXXII	3S - 4P			
MANN	OWX		MO XXXII	2P6 3S TO 2P6 4P	HFR	DW	

127 MO XL
1S2 2S(2S) - 1S2 2P(2P)

KIM	SCALEO	MO XL	2S - 2P		
CALLAWAY		MO XL	2S(2S) - 2P(2P)		

BE II
2S - 2P

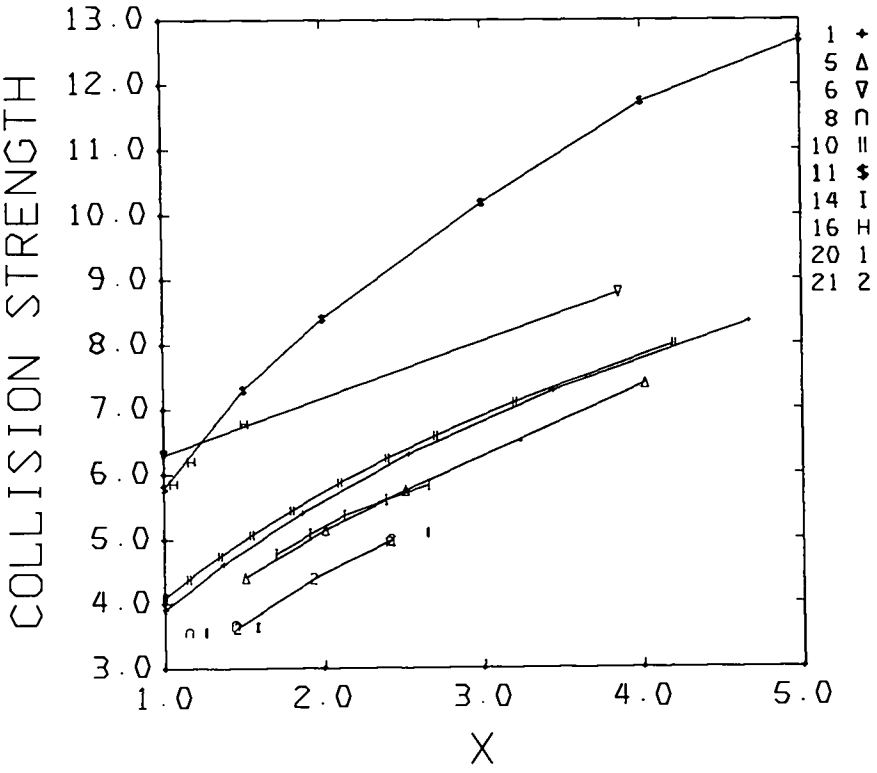
X	SYMBOL	4 MANN E= .291	5 ROBB E= .333	8 UCL E= .333
1.00		-	1.359E+01	1.260E+01
1.01		1.658E+01	-	-
1.33		-	1.619E+01	-
1.34		1.923E+01	-	-
1.67		-	1.859E+01	-
1.78		2.228E+01	-	-
2.00		-	2.085E+01	-
2.33		-	2.278E+01	-
2.37		2.573E+01	-	-
2.67		-	2.468E+01	-
3.15		2.960E+01	-	-
3.33		-	2.815E+01	2.441E+01
4.00		-	-	2.715E+01
4.19		3.383E+01	-	-
5.57		3.831E+01	-	-
6.67		-	3.919E+01	3.607E+01
7.41		4.295E+01	-	-
9.85		4.767E+01	-	-
10.00		-	4.592E+01	-
13.09		5.240E+01	-	-
13.33		-	5.067E+01	-
16.67		-	5.421E+01	-
17.41		5.712E+01	-	-
20.00		-	5.753E+01	-
23.14		6.173E+01	-	-
23.33		-	6.004E+01	-
30.76		6.638E+01	-	-
40.89		7.091E+01	-	-
54.36		7.537E+01	-	-
72.26		7.977E+01	-	-
96.06		8.410E+01	-	-
127.70		8.838E+01	-	-
169.76		9.261E+01	-	-
225.67		9.679E+01	-	-
300.00		1.009E+02	-	-

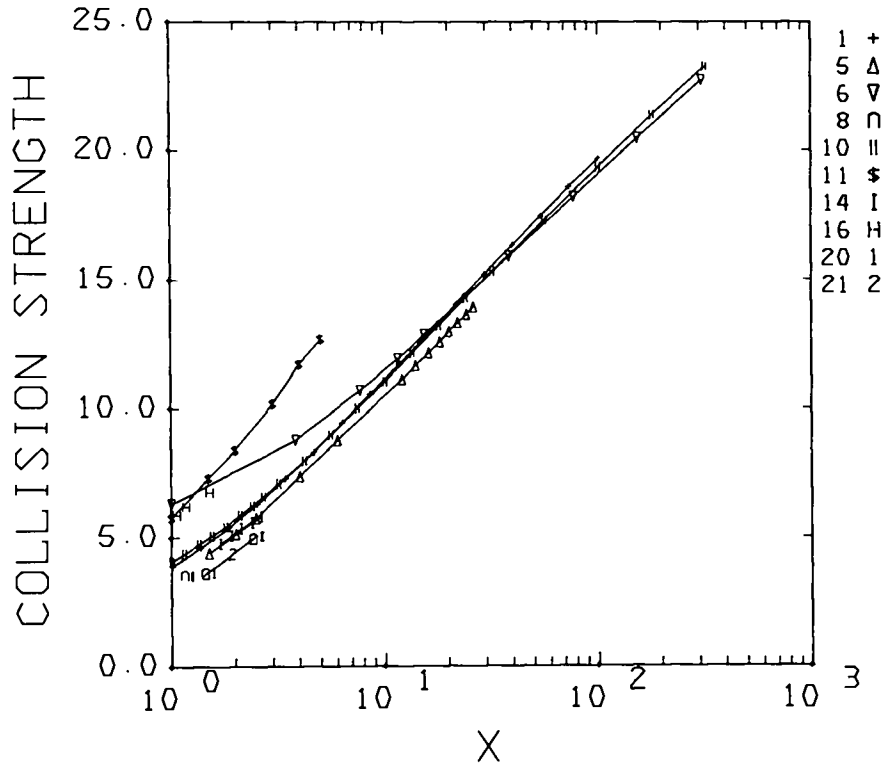


C III
1S2 2S2 – 1S2 2S 2P(1P)

X.SYMBOL	1 MANN E= .933	5 ROBB E= .995	6 NAKAZAKI E= .954	8 UCL E= 1.032	10 PEEK E= .933	11 BLAHA E= .933	14 DUB E= .941	16 OSTERBROCK E= .996	20 NUSSBAUMER E= .933	21 FLOWER E= 1.033
1.00	–	–	6.310E+00	–	4.102E+00	5.800E+00	–	–	–	–
1.01	3.920E+00	–	–	–	–	–	–	–	–	–
1.06	–	–	–	–	–	–	–	5.870E+00	–	–
1.13	–	–	–	3.567E+00	4.395E+00	–	–	–	–	–
1.17	–	–	–	–	–	–	–	6.220E+00	–	–
1.26	–	–	–	–	–	–	–	–	3.580E+00	–
1.35	–	–	–	–	4.752E+00	–	–	–	–	–
1.37	4.626E+00	–	–	–	–	–	–	–	–	–
1.44	–	–	–	3.669E+00	–	–	–	–	–	–
1.49	–	–	–	–	–	–	–	–	–	3.625E+00
1.51	–	4.410E+00	–	–	–	7.300E+00	–	6.780E+00	–	–
1.55	–	–	–	–	5.082E+00	–	–	–	–	–
1.56	–	–	–	–	–	–	–	–	3.660E+00	–
1.70	–	–	–	–	–	–	4.781E+00	–	–	–
1.80	–	–	–	–	5.460E+00	–	–	–	–	–
1.86	5.426E+00	–	–	–	–	–	–	–	–	–
1.91	–	–	–	–	–	–	5.090E+00	–	–	–
1.94	–	–	–	–	–	–	–	–	–	4.404E+00
2.01	–	5.150E+00	–	–	–	8.400E+00	–	–	–	–
2.10	–	–	–	–	5.878E+00	–	–	–	–	–
2.13	–	–	–	–	–	–	5.376E+00	–	–	–
2.40	–	–	–	–	6.254E+00	–	5.616E+00	–	–	–
2.41	–	–	–	4.974E+00	–	–	–	–	–	–
2.42	–	–	–	–	–	–	–	–	–	4.997E+00
2.51	–	5.770E+00	–	–	–	–	–	–	–	–
2.53	6.318E+00	–	–	–	–	–	–	–	–	–
2.66	–	–	–	–	–	–	5.849E+00	–	5.120E+00	–
2.70	–	–	–	–	6.602E+00	–	–	–	–	–
3.00	–	–	–	–	–	1.020E+01	–	–	–	–
3.20	–	–	–	–	7.122E+00	–	–	–	–	–
3.44	7.295E+00	–	–	–	–	–	–	–	–	–
3.85	–	–	8.800E+00	–	–	–	–	–	–	–
4.00	–	–	–	–	–	1.175E+01	–	–	–	–
4.02	–	7.490E+00	–	–	–	–	–	–	–	–
4.20	–	–	–	–	8.011E+00	–	–	–	–	–
4.67	8.348E+00	–	–	–	–	–	–	–	–	–
5.00	–	–	–	–	–	1.270E+01	–	–	–	–
5.60	–	–	–	–	8.990E+00	–	–	–	–	–
6.03	–	8.810E+00	–	–	–	–	–	–	–	–
6.35	9.453E+00	–	–	–	–	–	–	–	–	–
7.50	–	–	–	–	1.003E+01	–	–	–	–	–
7.70	–	–	1.071E+01	–	–	–	–	–	–	–
8.62	1.060E+01	–	–	–	–	–	–	–	–	–
10.00	–	–	–	–	1.107E+01	–	–	–	–	–
11.55	–	–	1.196E+01	–	–	–	–	–	–	–
11.71	1.176E+01	–	–	–	–	–	–	–	–	–
12.05	–	1.114E+01	–	–	–	–	–	–	–	–
13.50	–	–	–	–	1.218E+01	–	–	–	–	–
14.07	–	1.170E+01	–	–	–	–	–	–	–	–
15.40	–	–	1.288E+01	–	–	–	–	–	–	–
15.91	1.292E+01	–	–	–	–	–	–	–	–	–
16.07	–	1.218E+01	–	–	–	–	–	–	–	–
18.00	–	–	–	–	1.325E+01	–	–	–	–	–
18.03	–	1.262E+01	–	–	–	–	–	–	–	–
20.09	–	1.300E+01	–	–	–	–	–	–	–	–
21.62	1.408E+01	–	–	–	–	–	–	–	–	–
22.10	–	1.335E+01	–	–	–	–	–	–	–	–
24.00	–	–	–	–	1.430E+01	–	–	–	–	–
24.11	–	1.366E+01	–	–	–	–	–	–	–	–
25.12	–	1.396E+01	–	–	–	–	–	–	–	–
29.36	1.523E+01	–	–	–	–	–	–	–	–	–
32.00	–	–	–	–	1.535E+01	–	–	–	–	–
33.50	–	–	1.594E+01	–	–	–	–	–	–	–
39.89	1.637E+01	–	–	–	–	–	–	–	–	–
54.19	1.750E+01	–	–	–	–	–	–	–	–	–
56.00	–	–	–	–	1.734E+01	–	–	–	–	–
73.61	1.860E+01	–	–	–	–	–	–	–	–	–
77.00	–	–	1.823E+01	–	–	–	–	–	–	–
100.00	1.970E+01	–	–	–	1.939E+01	–	–	–	–	–
154.00	–	–	2.052E+01	–	–	–	–	–	–	–
180.00	–	–	–	–	2.139E+01	–	–	–	–	–
308.00	–	–	2.277E+01	–	–	–	–	–	–	–
323.00	–	–	–	–	2.330E+01	–	–	–	–	–

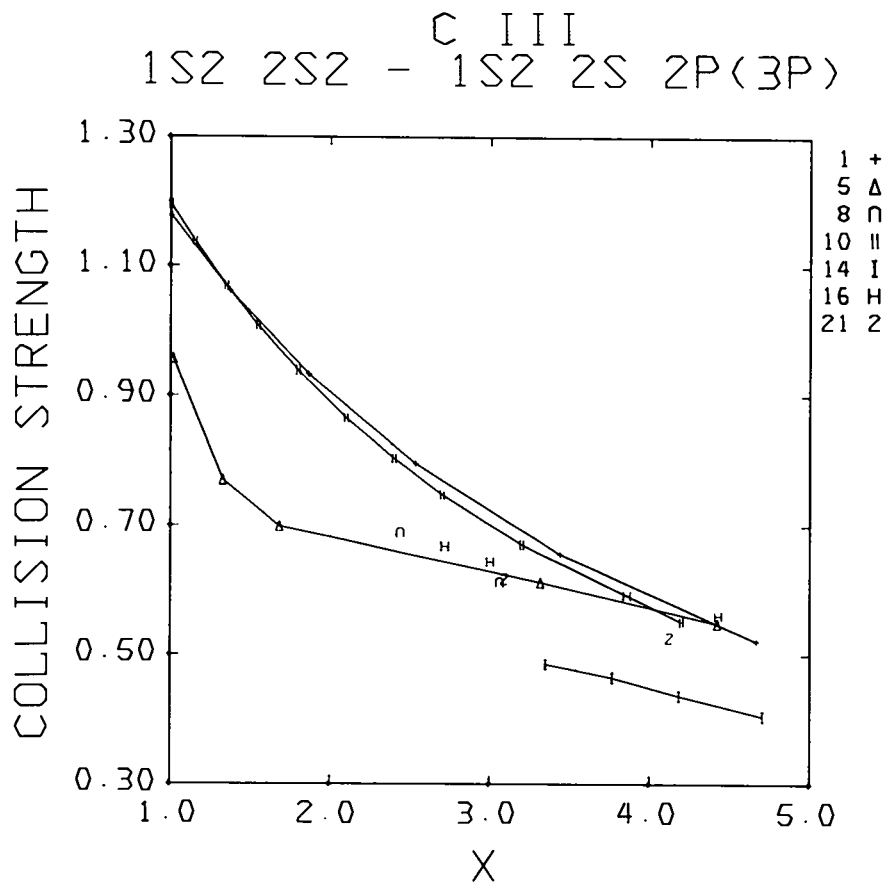
C III
1S2 2S2 - 1S2 2S 2P(1P)

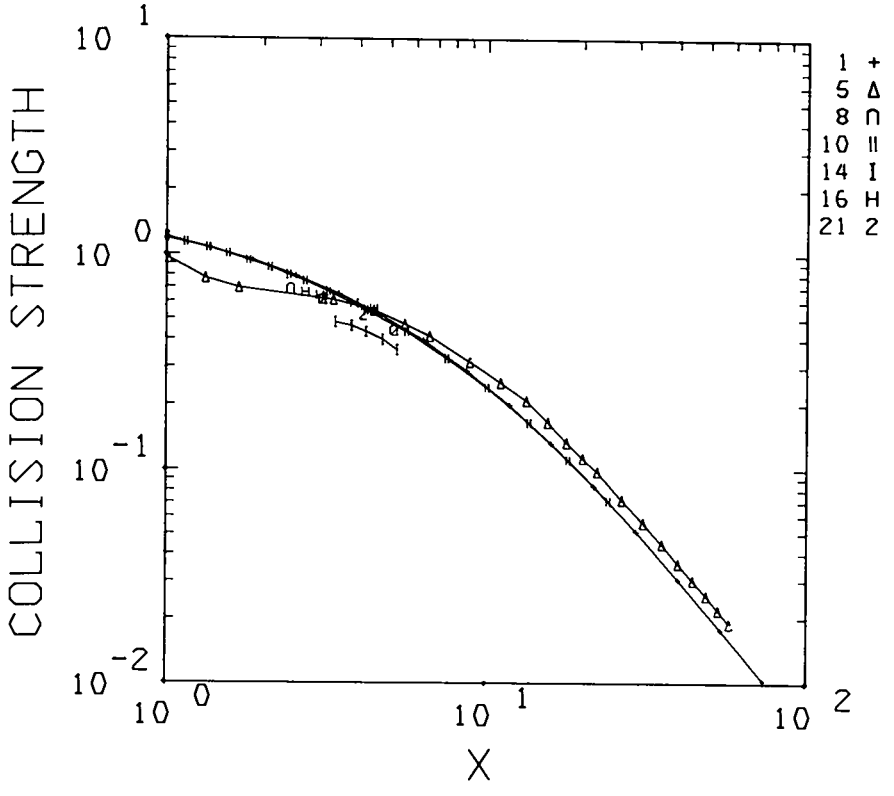




C III
1S2 2S2 - 1S2 2S 2P(3P)

X.SYMBOL	1 MANN E= .473	5 ROSS E= .452	8 UCL E= .486	10 PEEK E= .478	14 QUB E= .478	16 OSTERBROCK E= .350	21 FLOWER E= .485
1.00	-	-	-	1.197E+00	-	-	-
1.01	1.178E+00	9.590E-01	-	-	-	-	-
1.15	-	-	-	1.140E+00	-	-	-
1.33	-	7.720E-01	-	-	-	-	-
1.35	-	-	-	1.071E+00	-	-	-
1.37	1.064E+00	-	-	-	-	-	-
1.55	-	-	-	1.009E+00	-	-	-
1.68	-	7.000E-01	-	-	-	-	-
1.80	-	-	-	9.395E-01	-	-	-
1.86	9.349E-01	-	-	-	-	-	-
2.10	-	-	-	8.673E-01	-	-	-
2.40	-	-	-	8.045E-01	-	-	-
2.44	-	-	6.900E-01	-	-	-	-
2.53	7.972E-01	-	-	-	-	-	-
2.70	-	-	-	7.495E-01	-	-	-
2.71	-	-	-	-	-	6.690E-01	-
3.00	-	-	-	-	-	6.450E-01	-
3.06	-	-	6.140E-01	-	-	-	-
3.09	-	-	-	-	-	-	6.190E-01
3.20	-	-	-	6.715E-01	-	-	-
3.32	-	6.140E-01	-	-	-	-	-
3.35	-	-	-	-	4.864E-01	-	-
3.44	6.573E-01	-	-	-	-	-	-
3.77	-	-	-	-	4.657E-01	-	-
3.86	-	-	-	-	-	5.940E-01	-
4.12	-	-	-	-	-	-	5.270E-01
4.19	-	-	-	-	4.367E-01	-	-
4.20	-	-	-	5.522E-01	-	-	-
4.43	-	5.500E-01	-	-	-	5.620E-01	-
4.67	5.227E-01	-	-	-	-	-	-
4.71	-	-	-	-	4.049E-01	-	-
5.12	-	-	4.440E-01	-	-	-	-
5.15	-	-	-	-	-	-	4.470E-01
5.23	-	-	-	-	3.611E-01	-	-
5.53	-	4.740E-01	-	-	-	-	-
5.60	-	-	-	4.359E-01	-	-	-
5.35	3.989E-01	-	-	-	-	-	-
6.63	-	4.180E-01	-	-	-	-	-
7.50	-	-	-	3.306E-01	-	-	-
3.62	2.907E-01	-	-	-	-	-	-
8.84	-	3.180E-01	-	-	-	-	-
10.00	-	-	-	2.416E-01	-	-	-
11.06	-	2.560E-01	-	-	-	-	-
11.71	2.017E-01	-	-	-	-	-	-
13.27	-	2.100E-01	-	-	-	-	-
13.50	-	-	-	1.663E-01	-	-	-
15.48	-	1.670E-01	-	-	-	-	-
15.91	1.333E-01	-	-	-	-	-	-
17.69	-	1.340E-01	-	-	-	-	-
13.00	-	-	-	1.114E-01	-	-	-
19.90	-	1.140E-01	-	-	-	-	-
21.62	8.443E-02	-	-	-	-	-	-
22.11	-	9.300E-02	-	-	-	-	-
24.00	-	-	-	7.197E-02	-	-	-
25.53	-	7.300E-02	-	-	-	-	-
27.36	5.162E-02	-	-	-	-	-	-
30.96	-	5.670E-02	-	-	-	-	-
35.33	-	4.510E-02	-	-	-	-	-
39.80	-	3.672E-02	-	-	-	-	-
39.89	3.074E-02	-	-	-	-	-	-
44.22	-	3.056E-02	-	-	-	-	-
48.65	-	2.585E-02	-	-	-	-	-
53.07	-	2.203E-02	-	-	-	-	-
54.19	1.795E-02	-	-	-	-	-	-
57.49	-	1.901E-02	-	-	-	-	-
73.61	1.032E-02	-	-	-	-	-	-

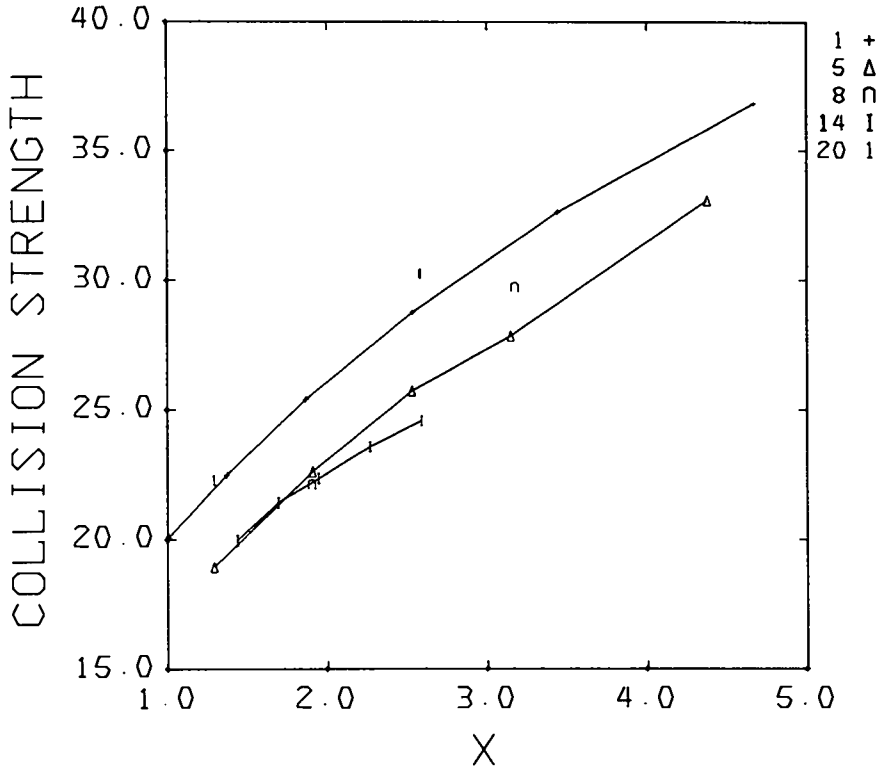

C III
1S2 2S2 - 1S2 2S 2P(3P)
COLLISION STRENGTH
1.30
1.10
0.90
0.70
0.50
0.30
1.0
2.0
3.0
4.0
5.0
X
1 +
5 Δ
8 Π
10 Σ
14 I
16 H
21 2

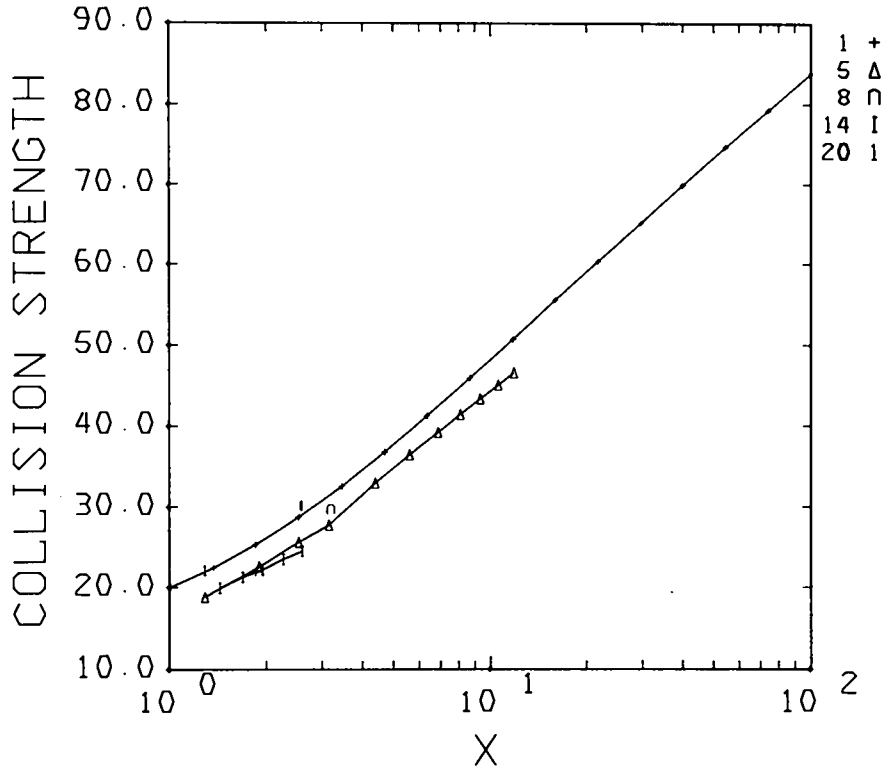

COLLISION STRENGTH
10^1
10^0
10^-1
10^-2
10^0
10^1
10^2
X
1 +
5 Δ
8 Π
10 Σ
14 I
16 H
21 2

C III
2S 2P(3P) - 2P2(3P)

X.SYMBOL	1 MANN E= .775	5 RUBB E= .810	8 UCL E= .784	14 QUB E= .782	20 NUSSBAUMER E= .775
1.01	2.010E+01	-	-	-	-
1.29	-	1.897E+01	-	-	2.230E+01
1.37	2.252E+01	-	-	-	-
1.44	-	-	-	1.998E+01	-
1.69	-	-	-	2.145E+01	-
1.86	2.543E+01	-	-	-	-
1.90	-	2.254E+01	2.213E+01	-	-
1.95	-	-	-	2.238E+01	-
2.27	-	-	-	2.359E+01	-
2.53	2.882E+01	2.577E+01	-	-	-
2.59	-	-	-	2.460E+01	3.030E+01
3.14	-	2.789E+01	-	-	-
3.17	-	-	2.975E+01	-	-
3.44	3.266E+01	-	-	-	-
4.38	-	3.312E+01	-	-	-
4.67	3.686E+01	-	-	-	-
5.61	-	3.656E+01	-	-	-
6.35	4.134E+01	-	-	-	-
6.85	-	3.930E+01	-	-	-
8.08	-	4.155E+01	-	-	-
8.62	4.602E+01	-	-	-	-
9.31	-	4.347E+01	-	-	-
10.55	-	4.516E+01	-	-	-
11.71	5.080E+01	-	-	-	-
11.78	-	4.566E+01	-	-	-
15.91	5.563E+01	-	-	-	-
21.62	6.046E+01	-	-	-	-
29.36	6.527E+01	-	-	-	-
39.89	7.003E+01	-	-	-	-
54.19	7.473E+01	-	-	-	-
73.61	7.936E+01	-	-	-	-
100.00	8.392E+01	-	-	-	-

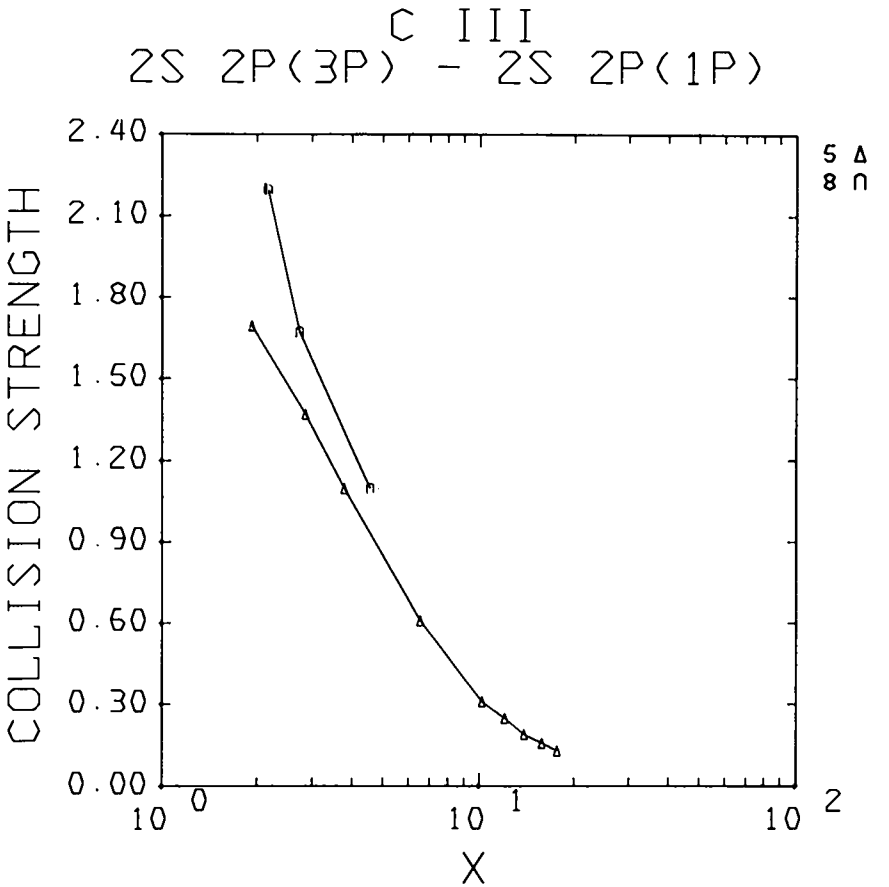
C III
2S 2P(3P) - 2P2(3P)





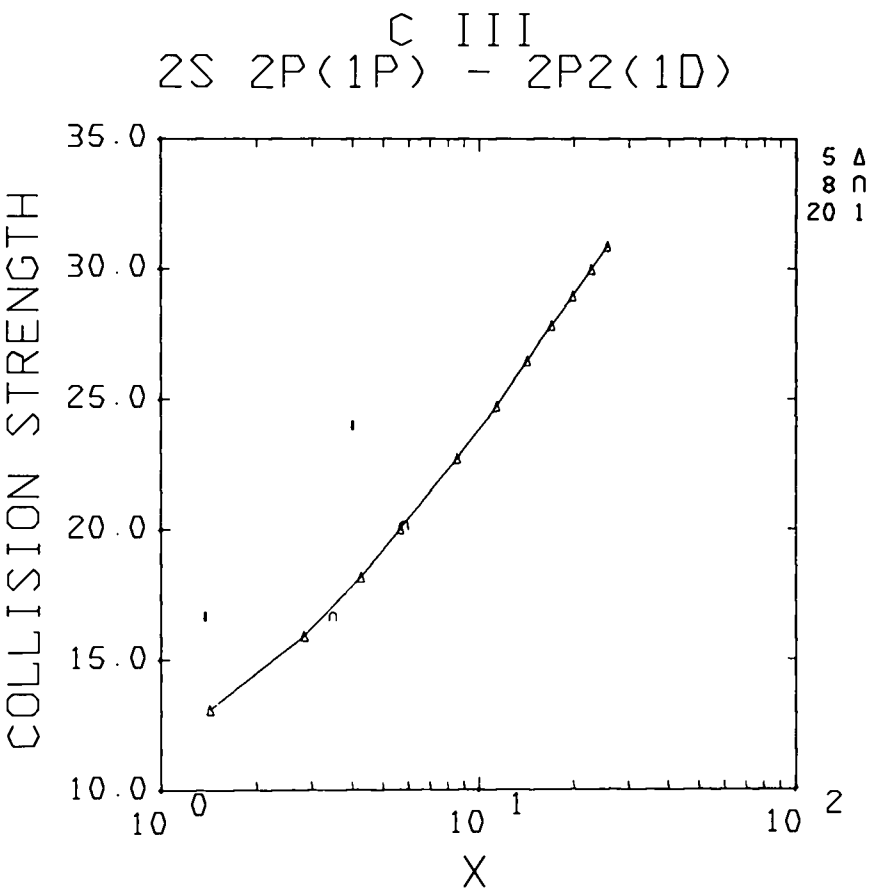
C III
2S 2P(3P) - 2S 2P(1P)

X.	SYMBOL	5 ROBB E= .543	8 UCL E= .546
1.93		1.699E+00	-
2.17		-	2.199E+00
2.72		-	1.676E+00
2.85		1.373E+00	-
3.77		1.101E+00	-
4.55		-	1.100E+00
6.53		6.118E-01	-
10.21		3.136E-01	-
12.06		2.524E-01	-
13.90		1.929E-01	-
15.74		1.601E-01	-
17.58		1.320E-01	-



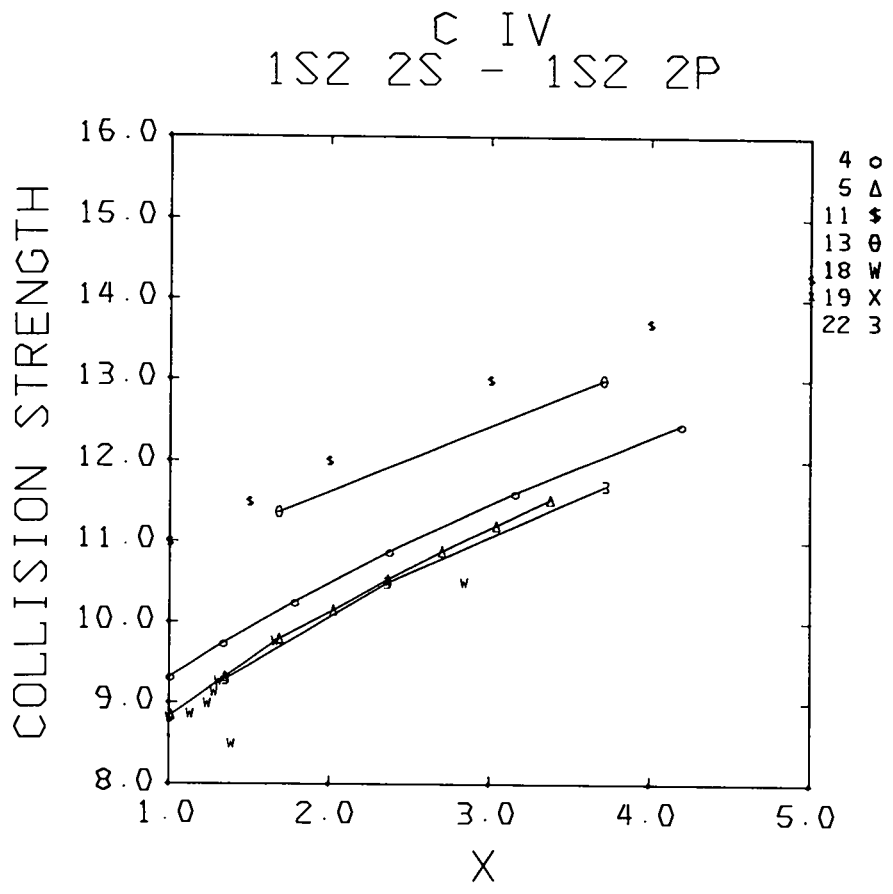
C III
2S 2P(1P) - 2P2(1D)

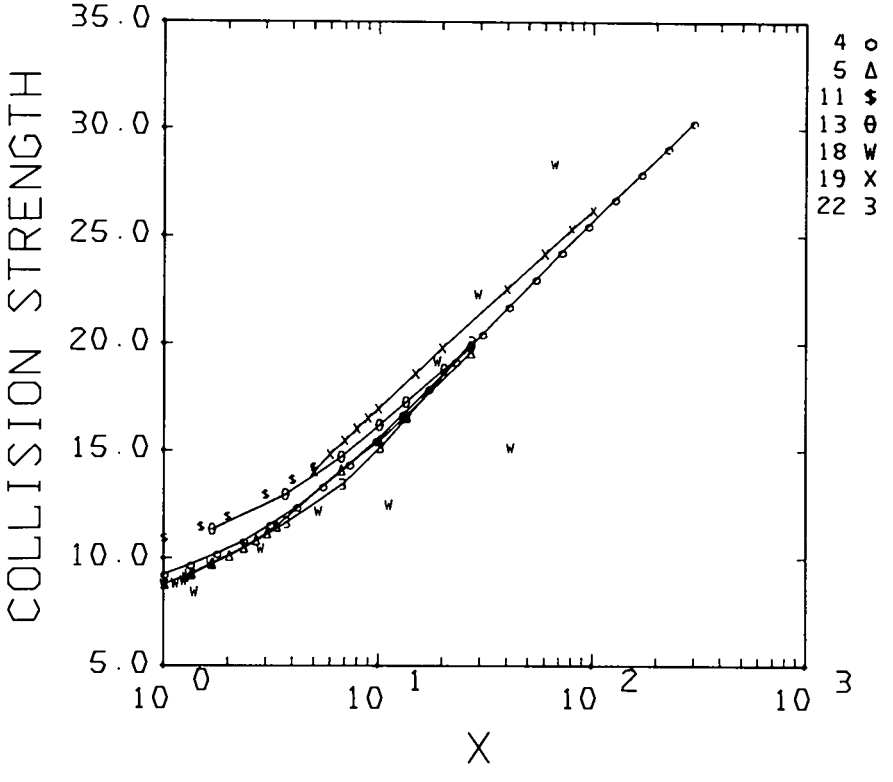
X. SYMBOL	5 ROBB E= .355	8 UCL E= .428	20 NUSSBAUMER E= .396
1.37	-	-	1.670E+01
1.42	1.310E+01	-	-
2.83	1.596E+01	-	-
3.47	-	1.664E+01	-
3.99	-	-	2.400E+01
4.24	1.820E+01	-	-
5.65	2.006E+01	-	-
5.81	-	2.016E+01	-
8.47	2.275E+01	-	-
11.29	2.474E+01	-	-
14.11	2.648E+01	-	-
16.93	2.784E+01	-	-
19.76	2.899E+01	-	-
22.58	3.001E+01	-	-
25.40	3.092E+01	-	-



C IV
1S2 2S - 1S2 2P

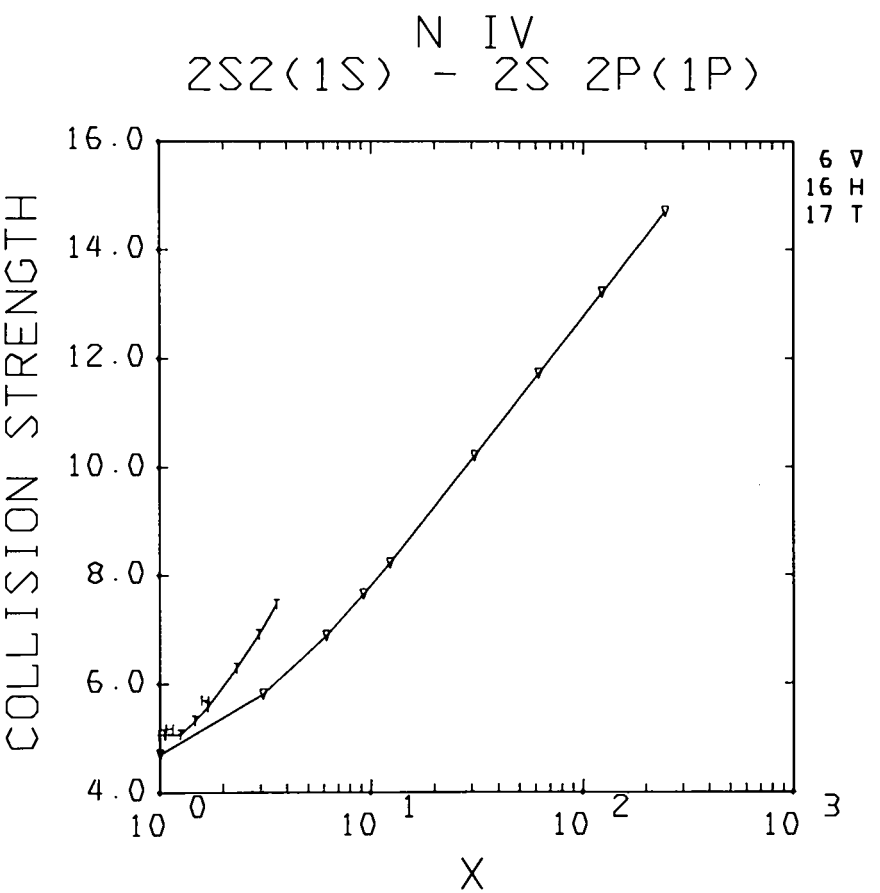
X.SYMBOL	4 MANN E= .588	5 ROSS E= .592	11 BLAHA E= .588	13 CALLAWAY E= .593	18 CRANDALL E= .588	19 KIM E= .594	22 HENRY E= .529
1.00	-	-	1.100E+01	-	8.820E+00	-	-
1.01	9.331E+00	8.850E+00	-	-	-	-	-
1.13	-	-	-	-	8.880E+00	-	-
1.24	-	-	-	-	9.000E+00	-	-
1.28	-	-	-	-	9.150E+00	-	-
1.31	-	-	-	-	9.280E+00	-	-
1.35	9.752E+00	9.330E+00	-	-	-	-	9.300E+00
1.39	-	-	-	-	8.500E+00	-	-
1.50	-	-	1.150E+01	-	-	-	-
1.66	-	-	-	-	9.780E+00	-	-
1.69	-	9.810E+00	-	1.137E+01	-	-	-
1.78	1.027E+01	-	-	-	-	-	-
2.00	-	-	1.200E+01	-	-	-	-
2.03	-	1.015E+01	-	-	-	-	-
2.36	1.089E+01	1.054E+01	-	-	-	-	1.050E+01
2.70	-	1.089E+01	-	-	-	-	-
2.84	-	-	-	-	1.051E+01	-	-
3.00	-	-	1.300E+01	-	-	-	-
3.04	-	1.121E+01	-	-	-	-	-
3.15	1.161E+01	-	-	-	-	-	-
3.38	-	1.153E+01	-	-	-	-	-
3.71	-	-	-	1.300E+01	-	-	-
3.72	-	-	-	-	-	-	1.170E+01
4.00	-	-	1.370E+01	-	-	-	-
4.19	1.245E+01	-	-	-	-	-	-
5.00	-	-	1.430E+01	-	-	1.409E+01	-
5.27	-	-	-	-	1.225E+01	-	-
5.57	1.340E+01	-	-	-	-	-	-
6.00	-	-	-	-	-	1.487E+01	-
6.74	-	-	-	1.476E+01	-	-	-
6.75	-	1.417E+01	-	-	-	-	-
6.81	-	-	-	-	-	-	1.350E+01
7.00	-	-	-	-	-	1.551E+01	-
7.41	1.444E+01	-	-	-	-	-	-
8.00	-	-	-	-	-	1.607E+01	-
9.00	-	-	-	-	-	1.656E+01	-
9.85	1.555E+01	-	-	-	-	-	-
10.00	-	-	-	-	-	1.699E+01	-
10.11	-	-	-	1.622E+01	-	-	-
10.13	-	1.554E+01	-	-	-	-	-
10.21	-	-	-	-	-	-	1.520E+01
11.20	-	-	-	-	1.258E+01	-	-
13.09	1.674E+01	-	-	-	-	-	-
13.48	-	-	-	1.733E+01	-	-	-
13.50	-	1.668E+01	-	-	-	-	-
13.61	-	-	-	-	-	-	1.660E+01
15.00	-	-	-	-	-	1.865E+01	-
17.41	1.797E+01	-	-	-	-	-	-
18.91	-	-	-	-	1.922E+01	-	-
20.00	-	-	-	-	-	1.980E+01	-
20.23	-	-	-	1.884E+01	-	-	-
23.14	1.922E+01	-	-	-	-	-	-
26.97	-	-	-	1.987E+01	-	-	-
27.01	-	1.962E+01	-	-	-	-	-
27.22	-	-	-	-	-	-	2.010E+01
29.14	-	-	-	-	2.232E+01	-	-
30.76	2.050E+01	-	-	-	-	-	-
40.00	-	-	-	-	-	2.258E+01	-
40.89	2.177E+01	-	-	-	-	-	-
41.23	-	-	-	-	1.521E+01	-	-
54.36	2.304E+01	-	-	-	-	-	-
60.00	-	-	-	-	-	2.419E+01	-
66.41	-	-	-	-	2.841E+01	-	-
72.26	2.430E+01	-	-	-	-	-	-
80.00	-	-	-	-	-	2.533E+01	-
96.06	2.555E+01	-	-	-	-	-	-
100.00	-	-	-	-	-	2.622E+01	-
127.70	2.678E+01	-	-	-	-	-	-
169.76	2.799E+01	-	-	-	-	-	-
225.67	2.919E+01	-	-	-	-	-	-
300.00	3.037E+01	-	-	-	-	-	-


C IV
1S2 2S - 1S2 2P
COLLISION STRENGTH
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
1.0
2.0
3.0
4.0
5.0
X
4 o
5 Δ
11 $
13 θ
18 W
19 X
22 3


COLLISION STRENGTH
35.0
30.0
25.0
20.0
15.0
10.0
5.0
10^0
10^1
10^2
10^3
X
4 o
5 Δ
11 $
13 θ
18 W
19 X
22 3

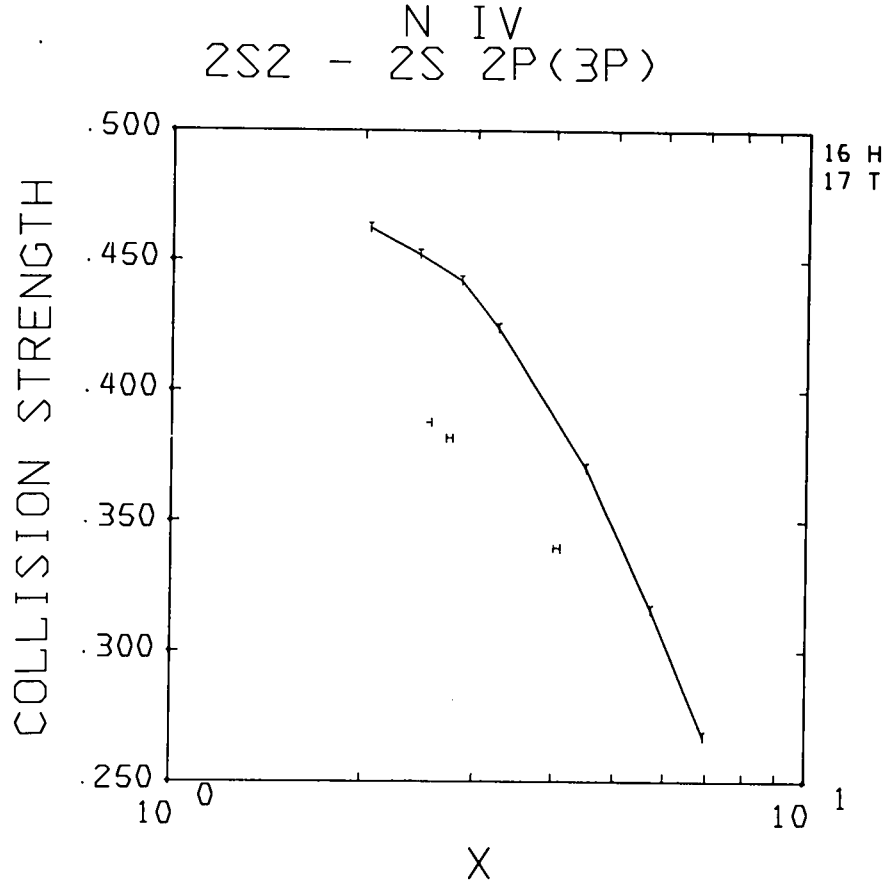
N IV
2S2(1S) - 2S 2P(1P)

X.	SYMBOL	6 NAKAZAKI E= 1.200	16 OSTERBROCK E= 1.133	17 ORMONDE E= 1.191
1.00		4.710E+00	-	-
1.02		-	5.080E+00	-
1.05		-	-	5.078E+00
1.11		-	5.180E+00	-
1.26		-	-	5.072E+00
1.47		-	-	5.321E+00
1.64		-	5.710E+00	-
1.68		-	-	5.581E+00
2.31		-	-	5.299E+00
2.94		-	-	5.916E+00
3.07		5.820E+00	-	-
3.57		-	-	7.472E+00
6.14		6.900E+00	-	-
9.22		7.670E+00	-	-
12.28		8.240E+00	-	-
30.70		1.022E+01	-	-
61.40		1.173E+01	-	-
122.80		1.323E+01	-	-
245.60		1.472E+01	-	-



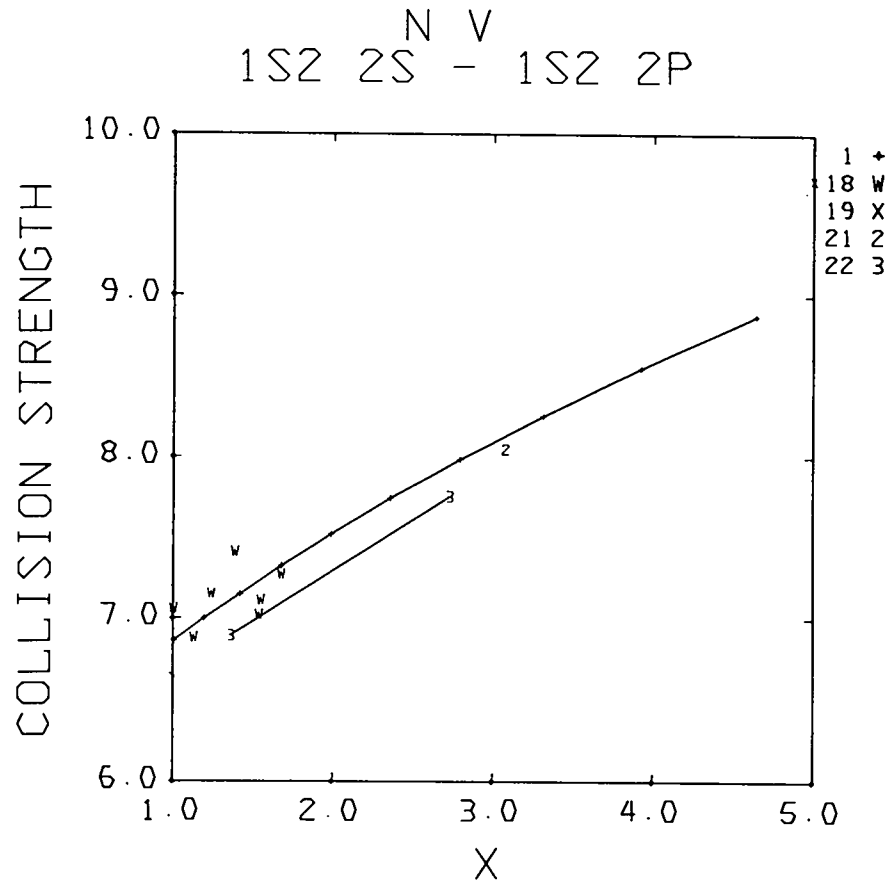
N IV
2S2 - 2S 2P(3P)

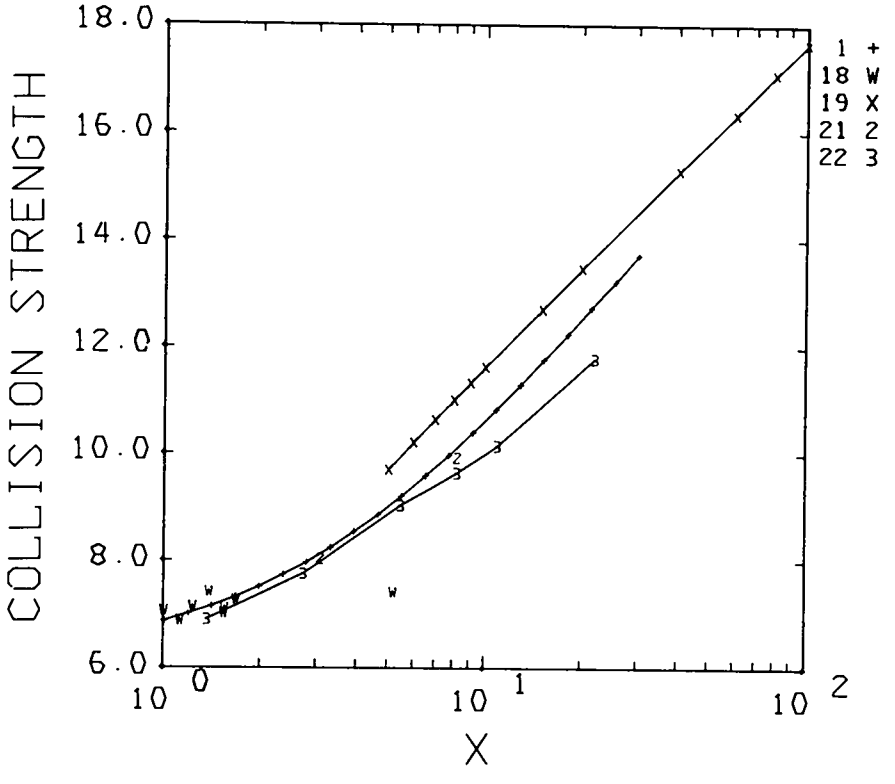
X.	SYMBOL	16 OSTERBROCK E= .459	17 JORMONDE E= .613
2.04		-	4.626E-01
2.45		-	4.523E-01
2.53		3.880E-01	-
2.74		3.820E-01	-
2.85		-	4.424E-01
3.26		-	4.241E-01
4.05		3.400E-01	-
4.49		-	3.706E-01
5.71		-	3.160E-01
6.93		-	2.673E-01



N V
1S2 2S - 1S2 2P

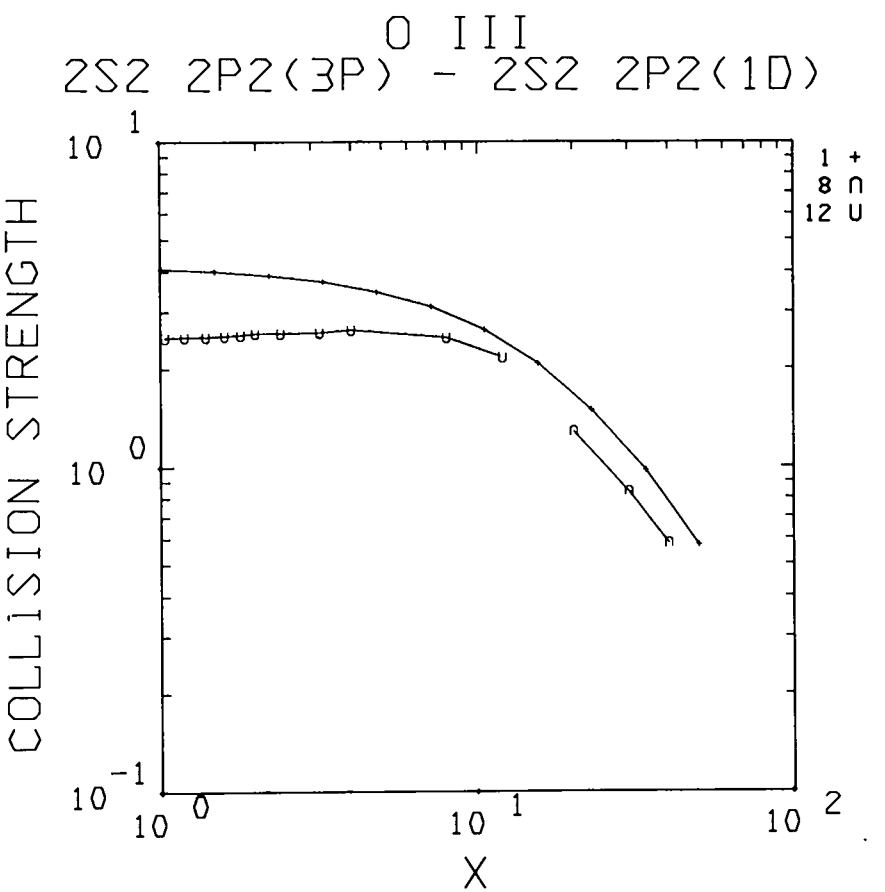
X.SYMBOL	1 MANN E= .735	18 CRANDALL E= .735	19 KIM E= .742	21 FLOWER E= .732	22 HENRY E= .733
1.00	-	7.070E+00	-	-	-
1.01	6.869E+00	-	-	-	-
1.13	-	6.890E+00	-	-	-
1.20	7.003E+00	-	-	-	-
1.24	-	7.160E+00	-	-	-
1.36	-	-	-	-	6.900E+00
1.39	-	7.420E+00	-	-	-
1.42	7.156E+00	-	-	-	-
1.54	-	7.030E+00	-	-	-
1.55	-	7.120E+00	-	-	-
1.68	7.330E+00	7.280E+00	-	-	-
1.99	7.526E+00	-	-	-	-
2.36	7.746E+00	-	-	-	-
2.73	-	-	-	-	7.760E+00
2.79	7.988E+00	-	-	-	-
3.07	-	-	-	8.050E+00	-
3.31	8.258E+00	-	-	-	-
3.92	8.554E+00	-	-	-	-
4.65	8.877E+00	-	-	-	-
5.00	-	-	9.724E+00	-	-
5.21	-	7.430E+00	-	-	-
5.45	-	-	-	-	9.040E+00
5.50	9.225E+00	-	-	-	-
6.00	-	-	1.023E+01	-	-
6.52	9.597E+00	-	-	-	-
7.00	-	-	1.066E+01	-	-
7.73	9.993E+00	-	-	-	-
8.00	-	-	1.102E+01	-	-
8.18	-	-	-	-	9.650E+00
8.20	-	-	-	9.940E+00	-
9.00	-	-	1.134E+01	-	-
9.15	1.041E+01	-	-	-	-
10.00	-	-	1.163E+01	-	-
10.85	1.085E+01	-	-	-	-
10.91	-	-	-	-	1.016E+01
12.85	1.130E+01	-	-	-	-
15.00	-	-	1.271E+01	-	-
15.23	1.177E+01	-	-	-	-
18.04	1.225E+01	-	-	-	-
20.00	-	-	1.347E+01	-	-
21.37	1.274E+01	-	-	-	-
21.82	-	-	-	-	1.178E+01
25.32	1.323E+01	-	-	-	-
30.00	1.373E+01	-	-	-	-
40.00	-	-	1.530E+01	-	-
60.00	-	-	1.635E+01	-	-
80.00	-	-	1.710E+01	-	-
100.00	-	-	1.767E+01	-	-


N V
1S2 2S - 1S2 2P
COLLISION STRENGTH
10.0
9.0
8.0
7.0
6.0
1.0
2.0
3.0
4.0
5.0
X
1 +
18 W
19 X
21 2
22 3


COLLISION STRENGTH
18.0
16.0
14.0
12.0
10.0
8.0
6.0
10 0
10 1
10 2
X
1 +
18 W
19 X
21 2
22 3

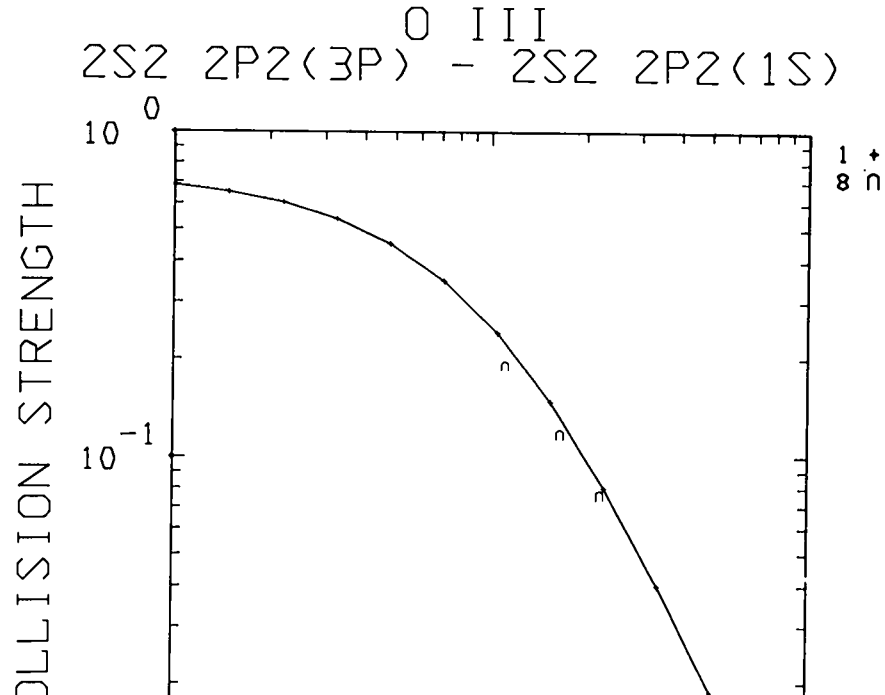
O III
2S2 2P2(3P) - 2S2 2P2(1D)

X.	SYMBOL	1 MANN E= .183	8 UCL E= .200	12 PINDOZOLA E= .185
1.01		4.083E+00	-	-
1.04		-	-	2.509E+00
1.19		-	-	2.520E+00
1.39		-	-	2.524E+00
1.49		4.005E+00	-	-
1.59		-	-	2.540E+00
1.79		-	-	2.560E+00
1.99		-	-	2.580E+00
2.20		3.891E+00	-	-
2.39		-	-	2.580E+00
3.18		-	-	2.593E+00
3.26		3.719E+00	-	-
3.98		-	-	2.646E+00
4.81		3.469E+00	-	-
7.11		3.117E+00	-	-
7.96		-	-	2.514E+00
10.50		2.651E+00	-	-
11.94		-	-	2.183E+00
15.51		2.091E+00	-	-
20.03		-	1.288E+00	-
22.91		1.504E+00	-	-
30.05		-	8.400E-01	-
33.85		9.765E-01	-	-
40.06		-	5.308E-01	-
50.00		5.749E-01	-	-



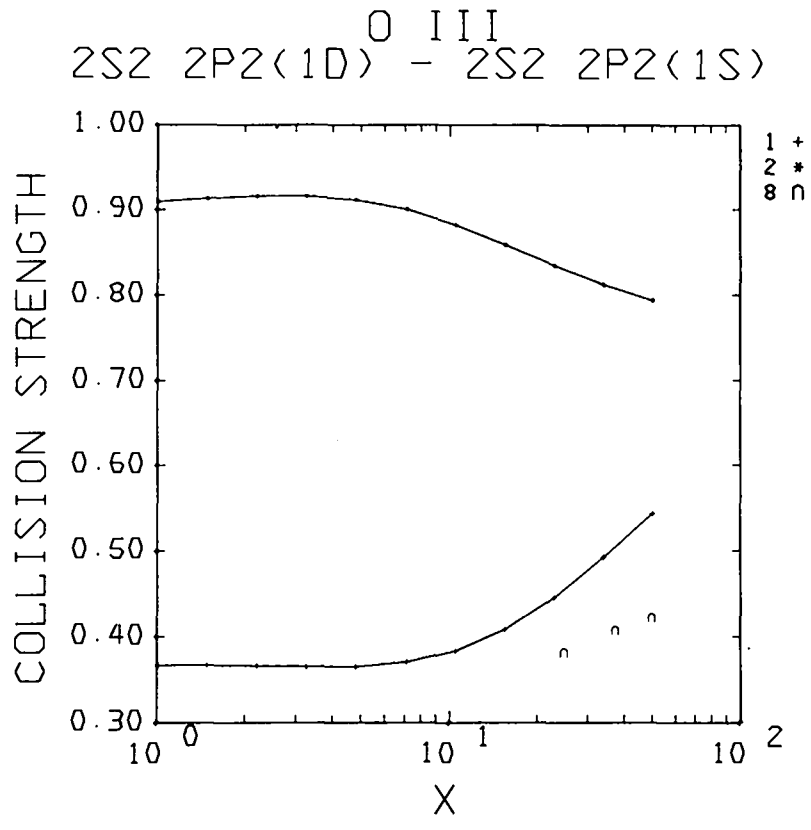
O III
2S2 2P2(3P) - 2S2 2P2(1S)

X.	SYMBOL	8 UCL E= .361	1 MANN E= .392
1.01		-	6.879E-01
1.49		-	6.545E-01
2.20		-	6.068E-01
3.26		-	5.407E-01
4.81		-	4.536E-01
7.11		-	3.496E-01
10.50		-	2.418E-01
11.07		1.910E-01	-
15.51		-	1.481E-01
16.61		1.173E-01	-
22.15		7.619E-02	-
22.91		-	8.075E-02
33.85		-	4.018E-02
50.00		-	1.896E-02



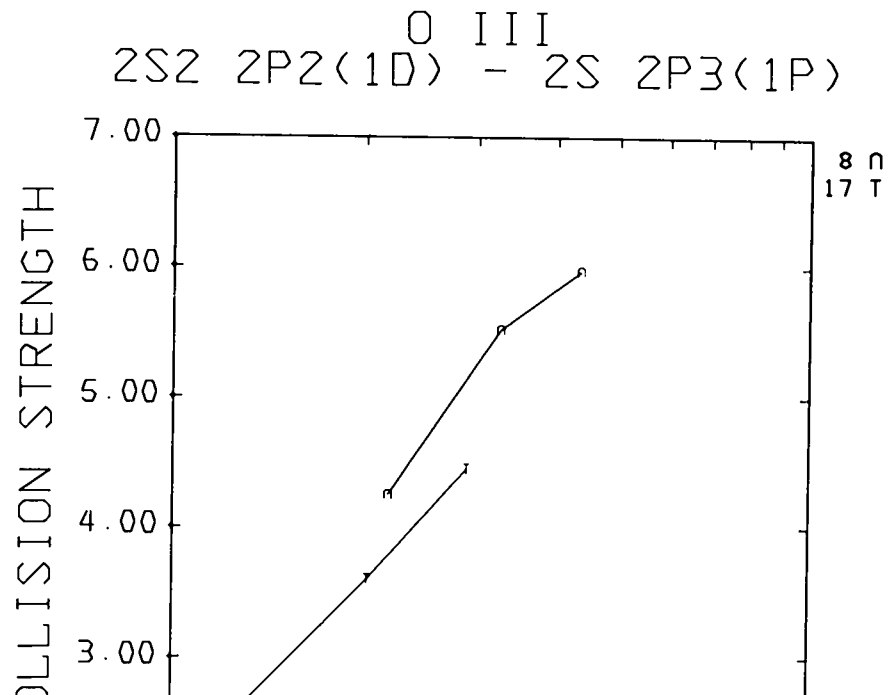
O III
2S2 2P2(1D) - 2S2 2P2(1S)

X	SYMBOL	8 UCL E= .162	1 MANN E= .209
1.01		-	3.673E-01
1.49		-	3.669E-01
2.20		-	3.661E-01
3.26		-	3.651E-01
4.81		-	3.657E-01
7.11		-	3.708E-01
10.50		-	3.841E-01
15.51		-	4.091E-01
22.91		-	4.466E-01
24.77		3.815E-01	-
33.85		-	4.936E-01
37.15		4.068E-01	-
49.53		4.221E-01	-
50.00		-	5.443E-01



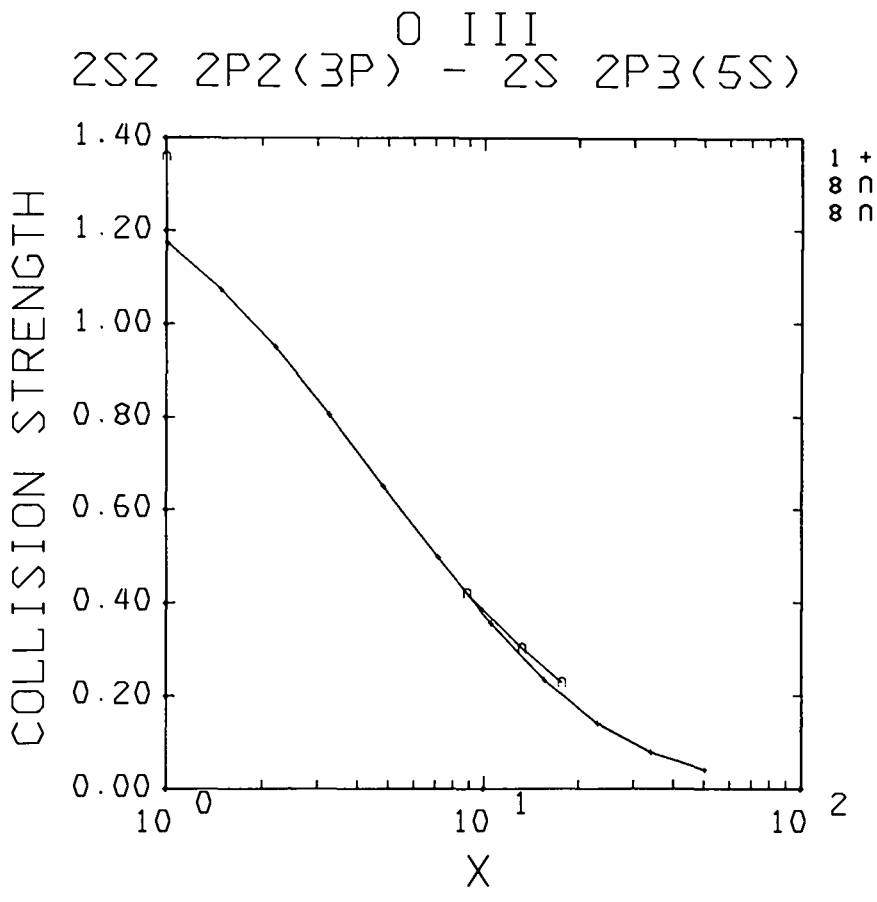
O III
2S2 2P2(1D) - 2S 2P3(1P)

X. SYMBOL	8	17
•	UCL	OR MONDE
	E= 1.838	E= 1.732
1.15	-	2.380E+00
2.02	-	3.610E+00
2.18	4.261E+00	-
2.89	-	4.460E+00
3.26	5.522E+00	-
4.35	5.977E+00	-



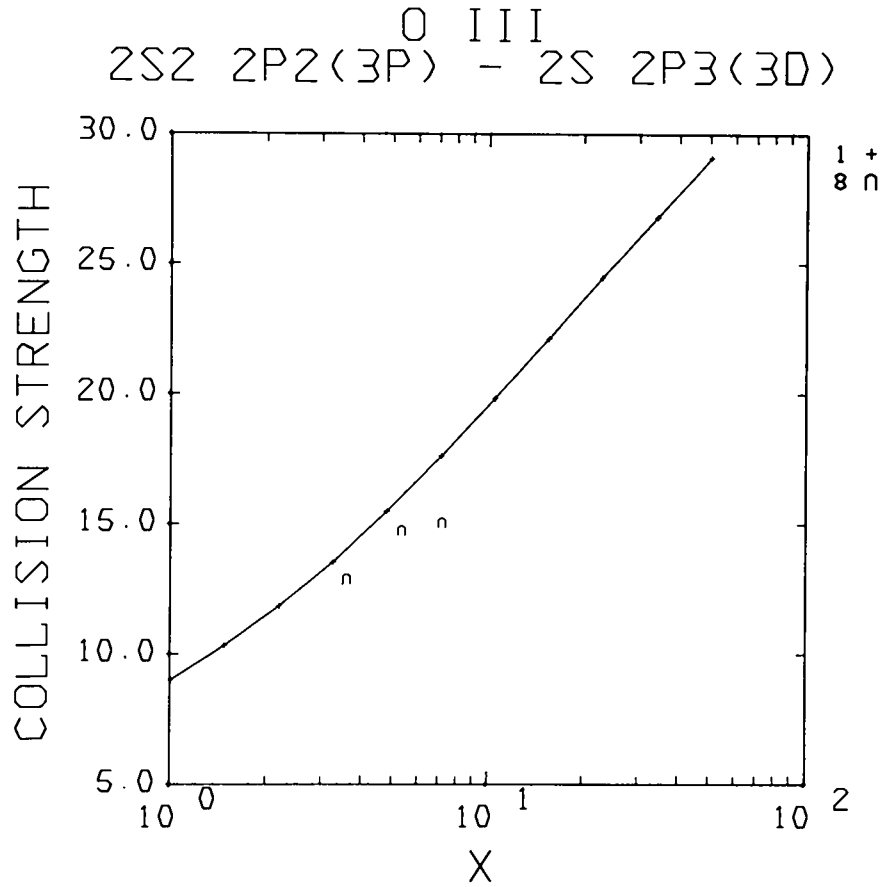
O III
2S2 2P2(3P) - 2S 2P3(5S)

X.	SYMBOL	8 UCL E= .454	8 UCL E= .548	1 MANN E= .548
1.00		-	1.360E+00	-
1.01		-	-	1.176E+00
1.49		-	-	1.076E+00
2.20		-	-	9.513E-01
3.26		-	-	8.071E-01
4.81		-	-	6.530E-01
7.11		-	-	5.002E-01
8.81		4.216E-01	-	-
10.50		-	-	3.578E-01
13.21		3.044E-01	-	-
15.51		-	-	2.353E-01
17.62		2.285E-01	-	-
22.91		-	-	1.415E-01
33.85		-	-	7.872E-02
50.00		-	-	4.136E-02



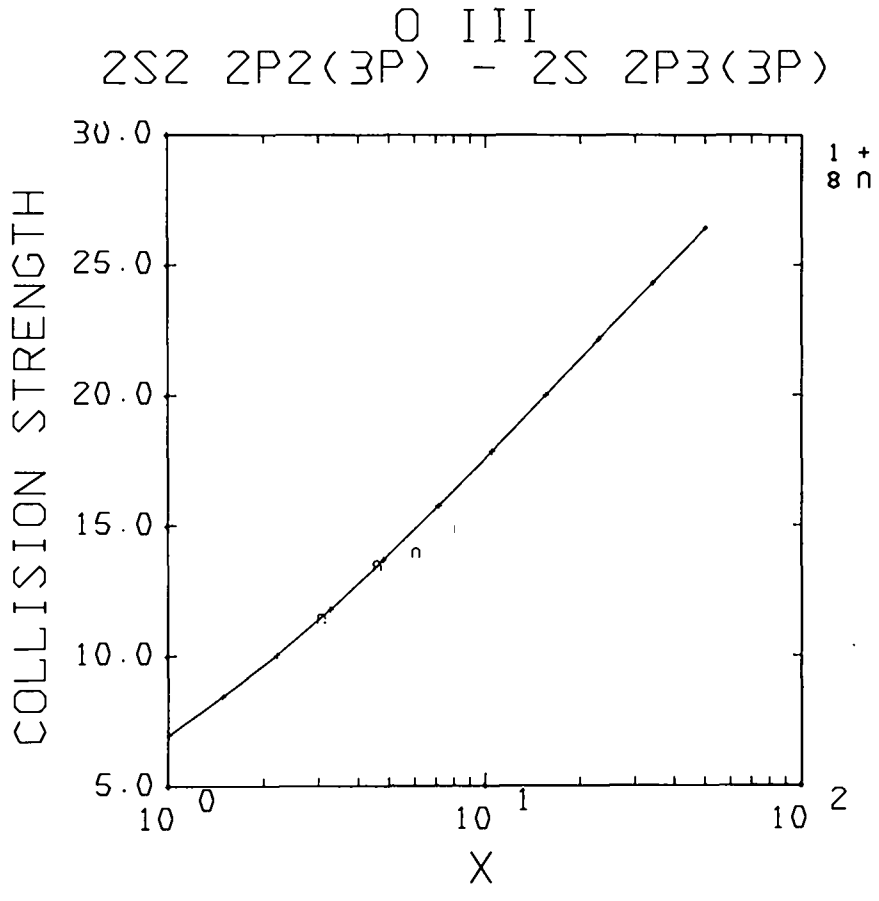
O III
2S2 2P2(3P) - 2S 2P3(3D)

X	SYMBOL	8	1
		UCL	MANN
		E= 1.115	E= 1.092
1.01		-	9.013E+00
1.49		-	1.036E+01
2.20		-	1.186E+01
3.26		-	1.359E+01
3.59		1.289E+01	-
4.81		-	1.552E+01
5.38		1.475E+01	-
7.11		-	1.763E+01
7.17		1.506E+01	-
10.50		-	1.987E+01
15.51		-	2.217E+01
22.91		-	2.450E+01
33.85		-	2.583E+01
50.00		-	2.913E+01



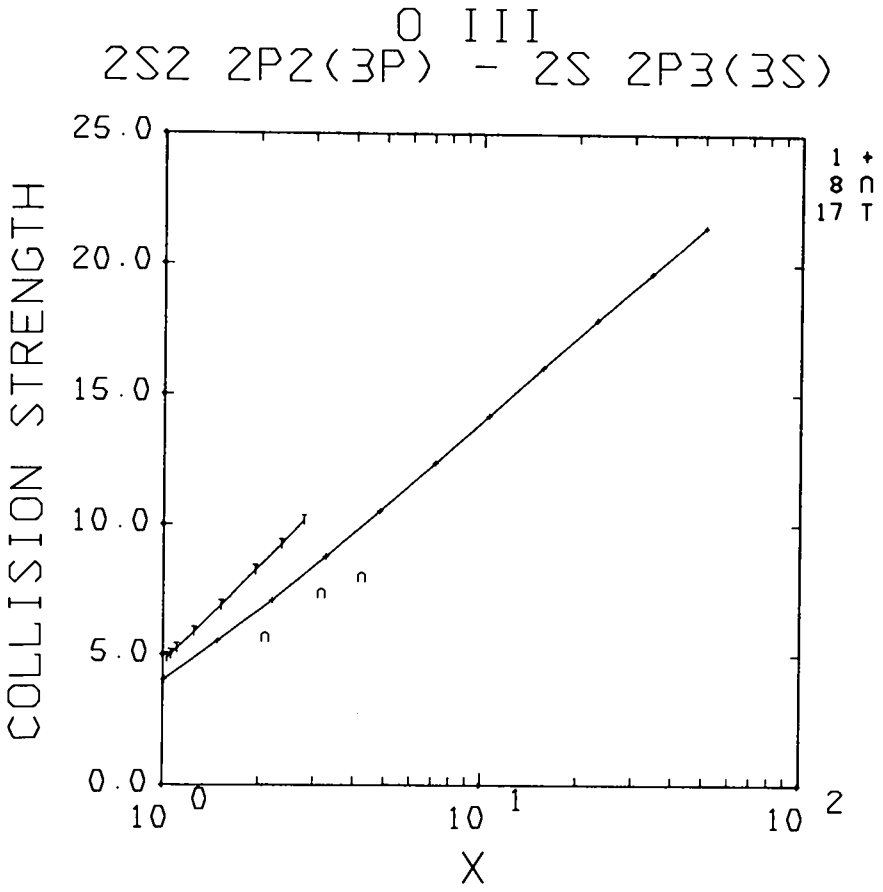
O III
2S2 2P2(3P) - 2S 2P3(3P)

X	SYMBOL	8 UCL E= 1.315	1 MANN E= 1.296
1.01		-	6.960E+00
1.49		-	8.451E+00
2.20		-	1.006E+01
3.04		1.146E+01	-
3.26		-	1.182E+01
4.56		1.352E+01	-
4.81		-	1.374E+01
6.08		1.396E+01	-
7.11		-	1.578E+01
10.50		-	1.790E+01
15.51		-	2.004E+01
22.91		-	2.220E+01
33.85		-	2.434E+01
50.00		-	2.646E+01



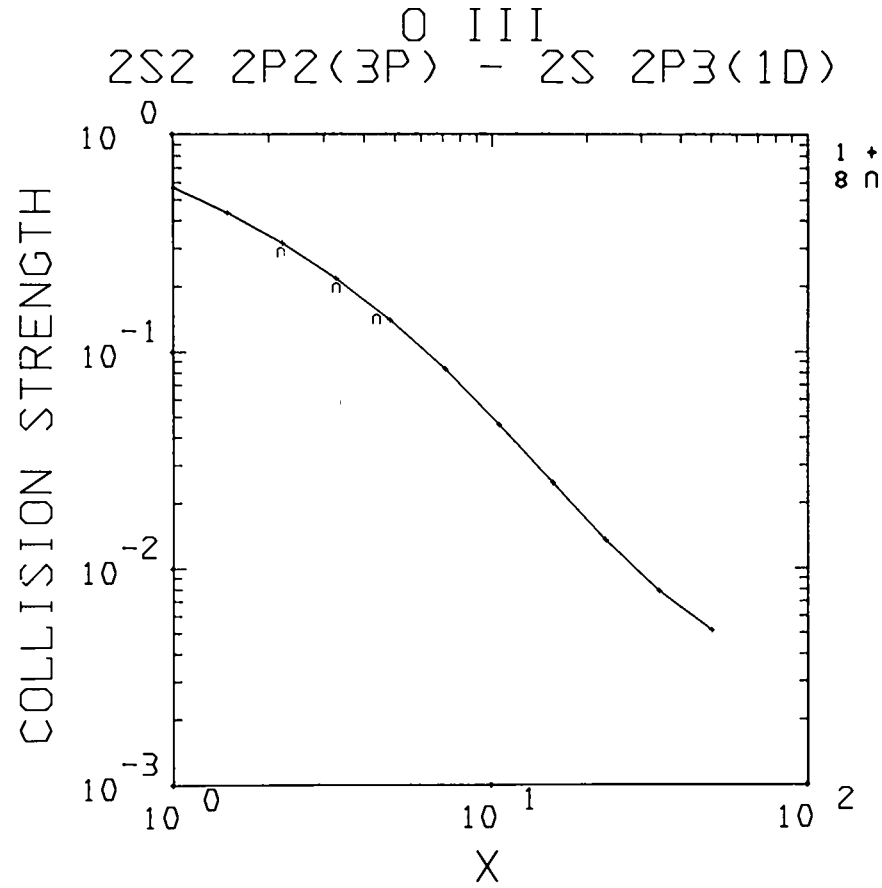
O III
2S2 2P2(3P) - 2S 2P3(3S)

X.	SYMBOL	1 MANN E= 1.794	8 UCL E= 1.900	17 ORMONDE E= 1.796
1.01		4.076E+00	-	-
1.03		-	-	4.890E+00
1.06		-	-	5.010E+00
1.11		-	-	5.270E+00
1.25		-	-	5.890E+00
1.49		5.560E+00	-	-
1.53		-	-	6.920E+00
1.95		-	-	9.260E+00
2.10		-	5.680E+00	-
2.20		7.127E+00	-	-
2.37		-	-	9.280E+00
2.78		-	-	1.020E+01
3.16		-	7.374E+00	-
3.26		8.801E+00	-	-
4.21		-	8.012E+00	-
4.81		1.056E+01	-	-
7.11		1.238E+01	-	-
10.50		1.422E+01	-	-
15.51		1.605E+01	-	-
22.91		1.788E+01	-	-
33.85		1.969E+01	-	-
50.00		2.148E+01	-	-



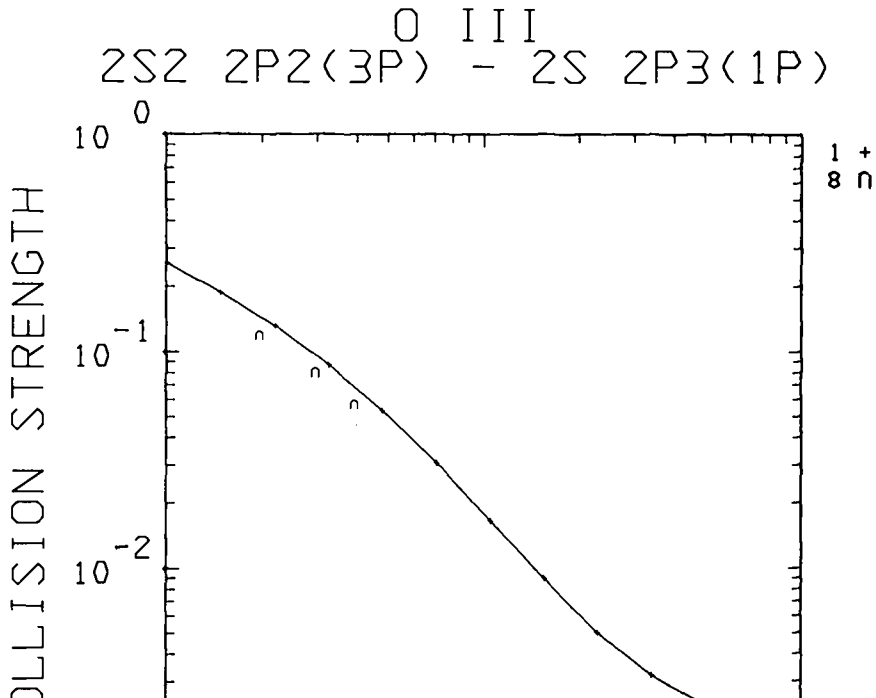
O III
2S2 2P2(3P) - 2S 2P3(1D)

X.	SYMBOL	8 UCL E= 1.838	1 MANN E= 1.703
1.01		-	5.701E-01
1.49		-	4.348E-01
2.18		2.854E-01	-
2.20		-	3.163E-01
3.26		1.970E-01	2.183E-01
4.35		1.413E-01	-
4.81		-	1.404E-01
7.11		-	8.343E-02
10.50		-	4.643E-02
15.51		-	2.500E-02
22.91		-	1.361E-02
33.85		-	7.897E-03
50.00		-	5.170E-03



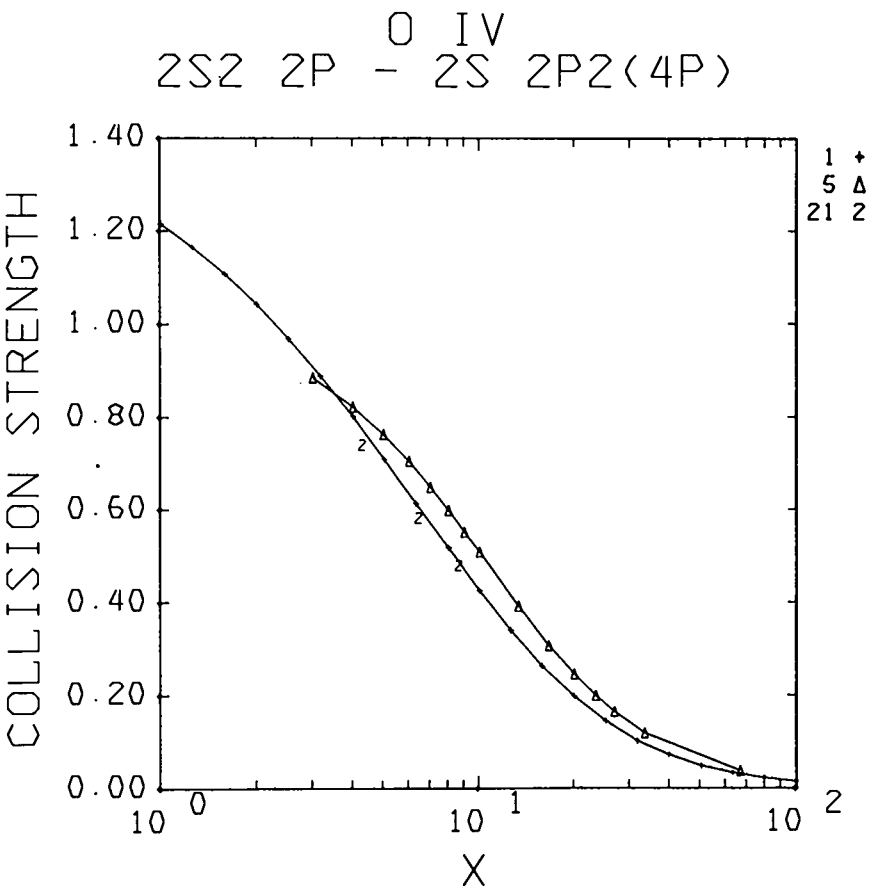
O III
2S2 2P2(3P) - 2S 2P3(1P)

X.	SYMBOL	8	1
		UCL	MANN
		E= 2.038	E= 1.916
1.01		-	2.562E-01
1.49		-	1.884E-01
1.96		1.179E-01	-
2.20		-	1.317E-01
2.94		7.927E-02	-
3.26		-	8.703E-02
3.93		5.647E-02	-
4.81		-	5.353E-02
7.11		-	3.059E-02
10.50		-	1.662E-02
15.51		-	8.953E-03
22.91		-	5.056E-03
33.85		-	3.185E-03
50.00		-	2.341E-03



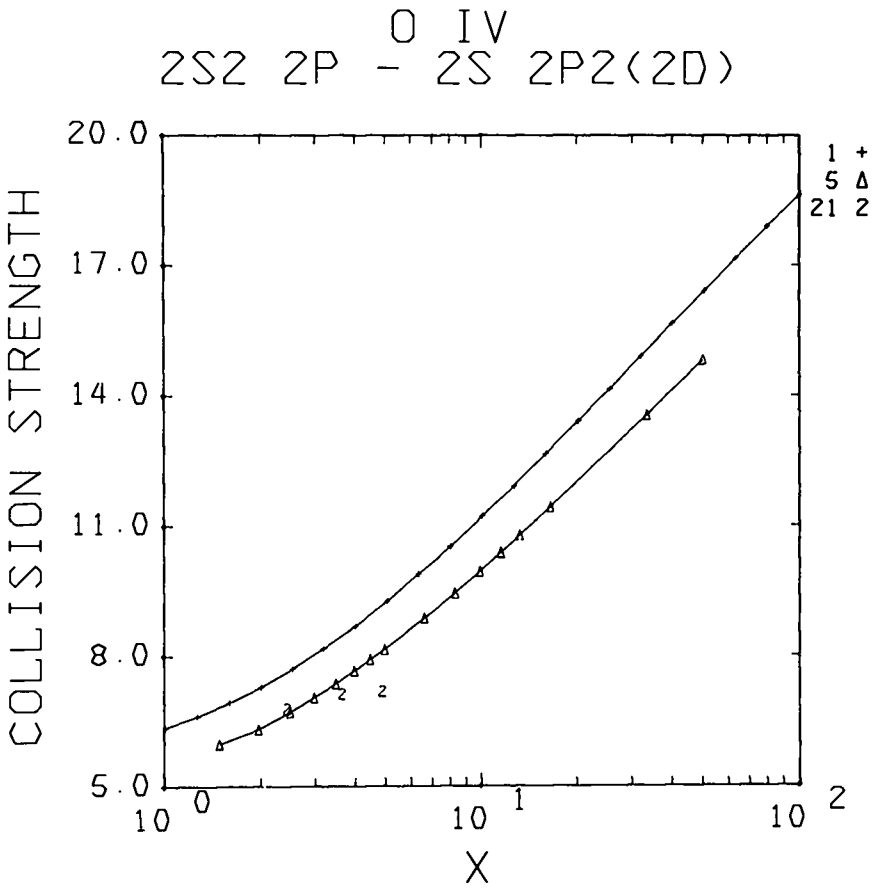
O IV
2S2 2P - 2S 2P2(4P)

X.SYMBOL	1 MANN E= .651	5 ROBB E= .598	21 FLOWER E= .650
1.01	1.217E+00	-	-
1.27	1.167E+00	-	-
1.60	1.110E+00	-	-
2.01	1.044E+00	-	-
2.53	9.707E-01	-	-
3.01	-	8.970E-01	-
3.19	8.898E-01	-	-
4.01	8.029E-01	8.240E-01	-
4.31	-	-	7.410E-01
5.02	-	7.640E-01	-
5.04	7.110E-01	-	-
6.02	-	7.060E-01	-
6.35	6.162E-01	-	-
6.46	-	-	5.940E-01
7.02	-	6.510E-01	-
7.99	5.208E-01	-	-
8.03	-	6.010E-01	-
8.62	-	-	4.810E-01
9.03	-	5.550E-01	-
10.03	-	5.110E-01	-
10.05	4.283E-01	-	-
12.65	3.418E-01	-	-
13.38	-	3.940E-01	-
15.91	2.645E-01	-	-
16.72	-	3.090E-01	-
20.02	1.988E-01	-	-
20.06	-	2.470E-01	-
23.41	-	2.010E-01	-
25.19	1.453E-01	-	-
26.75	-	1.660E-01	-
31.70	1.037E-01	-	-
33.44	-	1.190E-01	-
39.89	7.249E-02	-	-
50.19	4.984E-02	-	-
63.16	3.380E-02	-	-
66.88	-	3.766E-02	-
79.47	2.266E-02	-	-
100.00	1.505E-02	-	-
100.32	-	1.827E-02	-



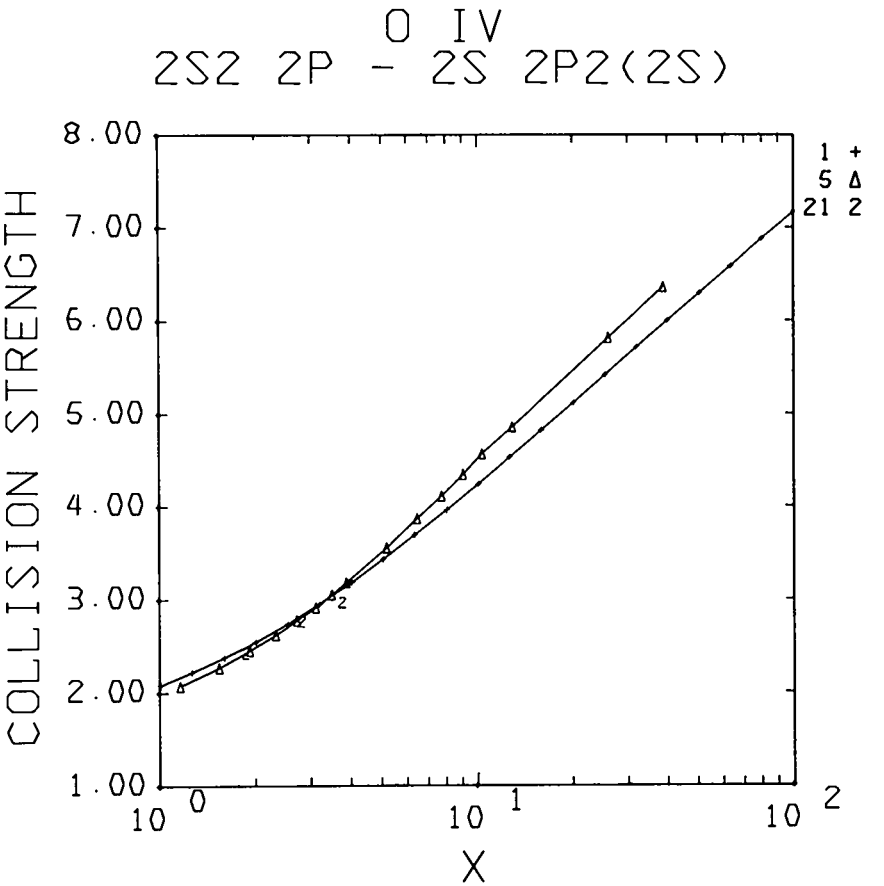
O IV
2S2 2P - 2S 2P2(2D)

X.SYMBOL	1 MANN E= 1.154	5 ROBB E= 1.211	21 FLOWER E= 1.154
1.01	6.363E+00	-	-
1.27	6.626E+00	-	-
1.49	-	5.987E+00	-
1.60	6.937E+00	-	-
1.98	-	6.313E+00	-
2.01	7.299E+00	-	-
2.43	-	-	5.800E+00
2.48	-	6.712E+00	-
2.53	7.716E+00	-	-
2.97	-	7.063E+00	-
3.19	8.187E+00	-	-
3.47	-	7.383E+00	-
3.64	-	-	7.142E+00
3.96	-	7.669E+00	-
4.01	8.709E+00	-	-
4.46	-	7.929E+00	-
4.85	-	-	7.201E+00
4.95	-	8.176E+00	-
5.04	9.280E+00	-	-
6.35	9.895E+00	-	-
6.60	-	8.880E+00	-
7.99	1.055E+01	-	-
8.26	-	9.463E+00	-
9.91	-	9.962E+00	-
10.05	1.123E+01	-	-
11.56	-	1.041E+01	-
12.65	1.194E+01	-	-
13.21	-	1.079E+01	-
15.91	1.267E+01	-	-
16.51	-	1.145E+01	-
20.02	1.342E+01	-	-
25.19	1.417E+01	-	-
31.70	1.492E+01	-	-
33.02	-	1.356E+01	-
39.89	1.568E+01	-	-
49.54	-	1.483E+01	-
50.19	1.643E+01	-	-
63.16	1.718E+01	-	-
79.47	1.792E+01	-	-
100.00	1.866E+01	-	-



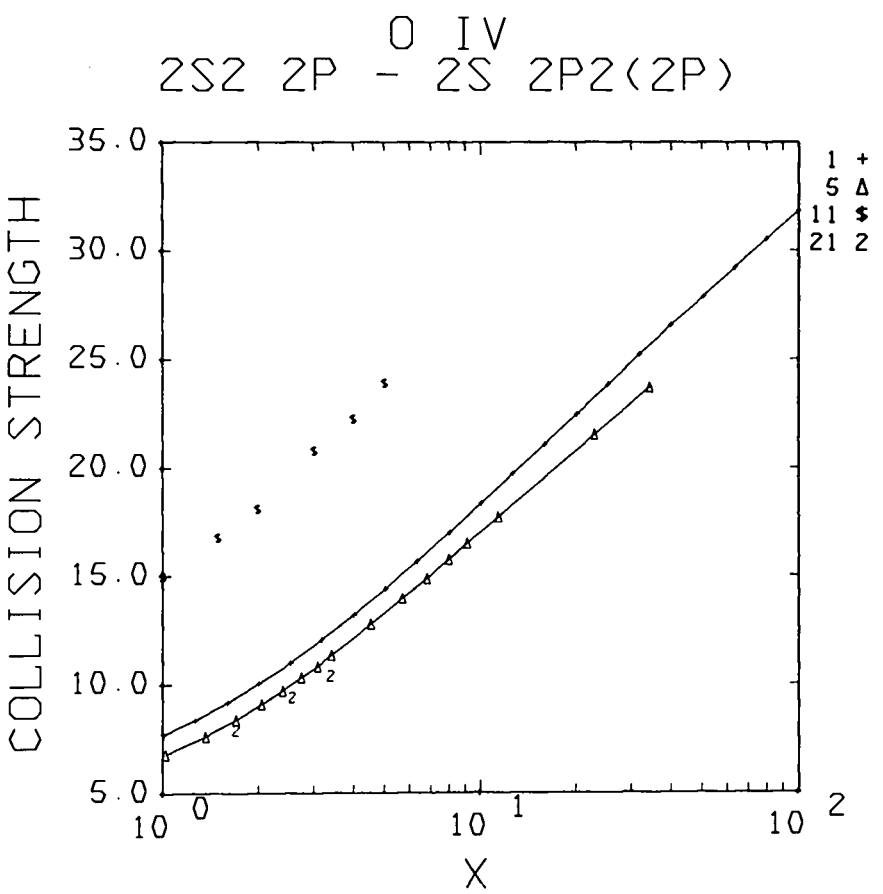
O IV
2S2 2P - 2S 2P2(2S)

X.	SYMBOL	1 MANN E= 1.496	5 R088 E= 1.552	21 FLOWER E= 1.495
1.01		2.094E+00	-	-
1.16		-	2.078E+00	-
1.27		2.229E+00	-	-
1.55		-	2.279E+00	-
1.60		2.383E+00	-	-
1.87		-	-	2.430E+00
1.93		-	2.460E+00	-
2.01		2.558E+00	-	-
2.32		-	2.628E+00	-
2.53		2.753E+00	-	-
2.71		-	2.784E+00	-
2.81		-	-	2.780E+00
3.09		-	2.930E+00	-
3.19		2.967E+00	-	-
3.48		-	3.066E+00	-
3.75		-	-	2.980E+00
3.87		-	3.193E+00	-
4.01		3.198E+00	-	-
5.04		3.445E+00	-	-
5.16		-	3.570E+00	-
6.35		3.705E+00	-	-
6.44		-	3.979E+00	-
7.73		-	4.122E+00	-
7.99		3.976E+00	-	-
9.02		-	4.360E+00	-
10.05		4.256E+00	-	-
10.31		-	4.576E+00	-
12.65		4.542E+00	-	-
12.89		-	4.867E+00	-
15.91		4.832E+00	-	-
20.02		5.126E+00	-	-
25.19		5.421E+00	-	-
25.78		-	5.821E+00	-
31.70		5.717E+00	-	-
38.66		-	6.367E+00	-
39.89		6.012E+00	-	-
50.19		6.305E+00	-	-
63.16		6.597E+00	-	-
79.47		6.896E+00	-	-
100.00		7.174E+00	-	-



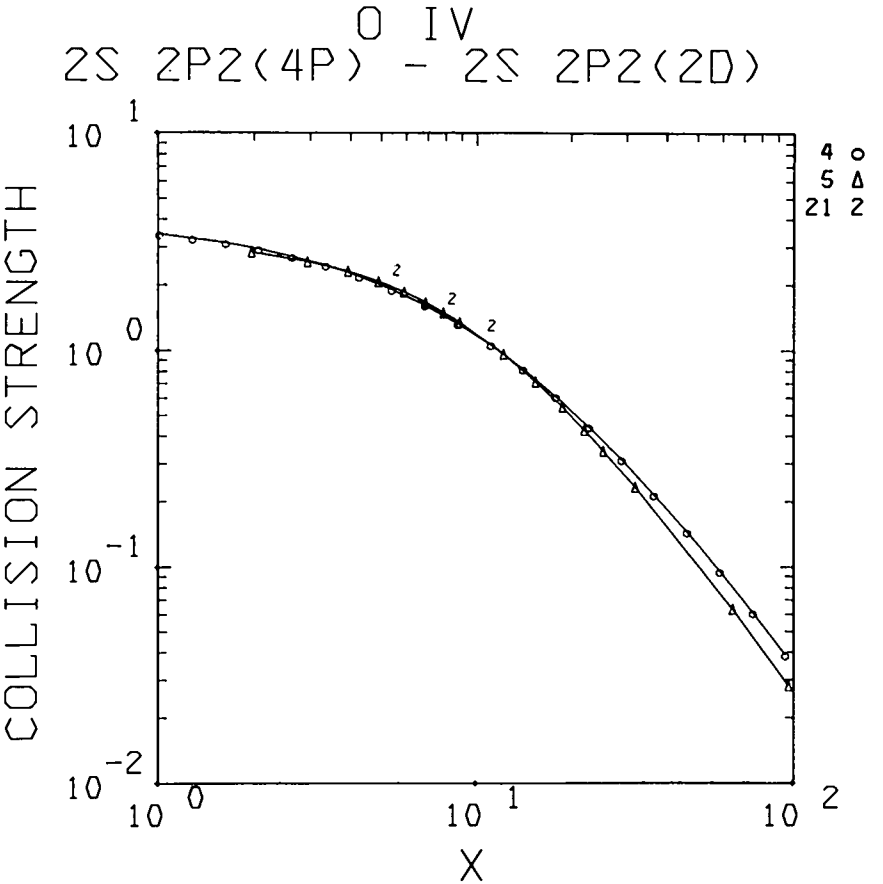
O IV
2S2 2P - 2S 2P2(2P)

X.SYMBOL	11 BLAHA E= 1.545	5 ROBB E= 1.756	21 FLOWER E= 1.644	1 MANN E= 1.644
1.00	1.500E+01	-	-	-
1.01	-	-	-	7.730E+00
1.02	-	6.804E+00	-	-
1.27	-	-	-	8.404E+00
1.37	-	7.652E+00	-	-
1.50	1.680E+01	-	-	-
1.60	-	-	-	9.179E+00
1.71	-	8.414E+00	7.910E+00	-
2.00	1.810E+01	-	-	-
2.01	-	-	-	1.006E+01
2.05	-	9.119E+00	-	-
2.39	-	9.760E+00	-	-
2.53	-	-	-	1.103E+01
2.56	-	-	9.430E+00	-
2.73	-	1.035E+01	-	-
3.00	2.080E+01	-	-	-
3.07	-	1.088E+01	-	-
3.19	-	-	-	1.209E+01
3.41	-	-	1.043E+01	-
3.42	-	1.137E+01	-	-
4.00	2.230E+01	-	-	1.324E+01
4.56	-	1.282E+01	-	-
5.00	2.390E+01	-	-	-
5.04	-	-	-	1.445E+01
5.69	-	1.399E+01	-	-
6.35	-	-	-	1.572E+01
6.83	-	1.494E+01	-	-
7.97	-	1.581E+01	-	-
7.99	-	-	-	1.703E+01
9.11	-	1.654E+01	-	-
10.05	-	-	-	1.837E+01
11.39	-	1.776E+01	-	-
12.65	-	-	-	1.973E+01
15.91	-	-	-	2.111E+01
20.02	-	-	-	2.248E+01
22.78	-	2.153E+01	-	-
25.19	-	-	-	2.385E+01
31.70	-	-	-	2.522E+01
34.16	-	2.371E+01	-	-
39.89	-	-	-	2.657E+01
50.19	-	-	-	2.792E+01
63.16	-	-	-	2.925E+01
79.47	-	-	-	3.057E+01
100.00	-	-	-	3.187E+01



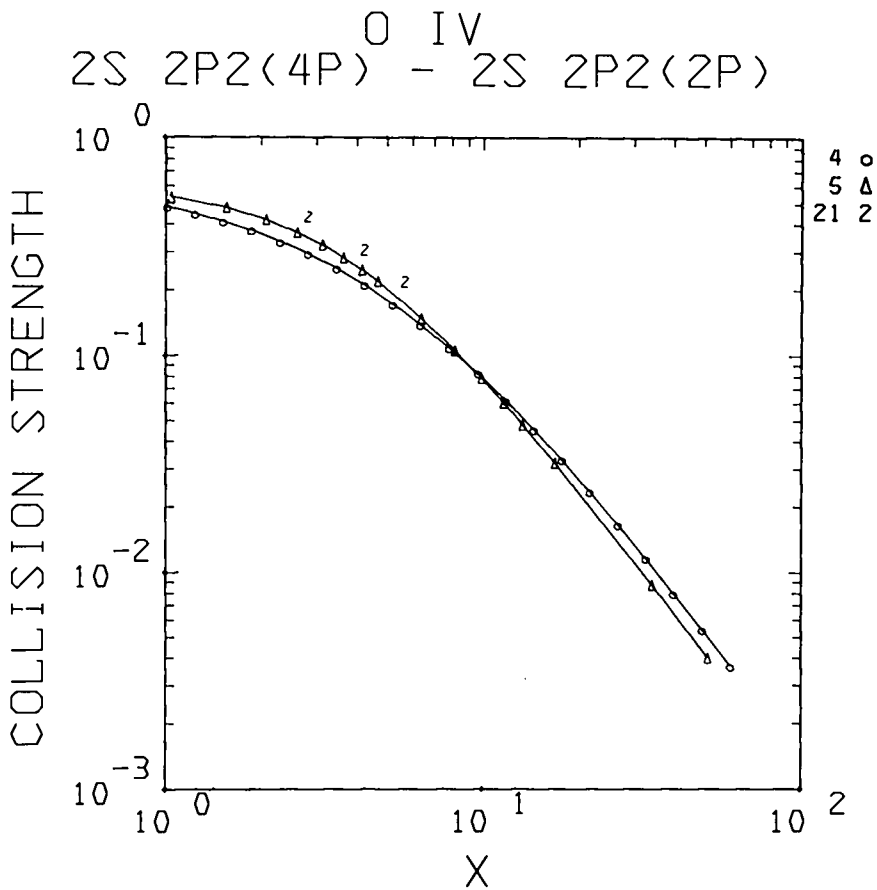
O IV
2S 2P2(4P) - 2S 2P2(2D)

X.SYMBOL	4 MANN E= .504	5 ROBB E= .613	21 FLOWER E= .504
1.01	3.427E+00	-	-
1.28	3.291E+00	-	-
1.63	3.128E+00	-	-
1.96	-	2.835E+00	-
2.07	2.937E+00	-	-
2.63	2.718E+00	-	-
2.94	-	2.572E+00	-
3.33	2.470E+00	-	-
3.92	-	2.314E+00	-
4.23	2.199E+00	-	-
4.90	-	2.075E+00	-
5.38	1.911E+00	-	-
5.56	-	-	2.344E+00
5.87	-	1.859E+00	-
6.83	1.618E+00	-	-
6.85	-	1.667E+00	-
7.83	-	1.497E+00	-
8.33	-	-	1.738E+00
8.67	1.331E+00	-	-
8.81	-	1.347E+00	-
11.01	1.061E+00	-	-
11.11	-	-	1.302E+00
12.07	-	9.668E-01	-
13.98	8.205E-01	-	-
15.33	-	7.168E-01	-
17.75	6.146E-01	-	-
18.60	-	5.486E-01	-
21.86	-	4.313E-01	-
22.54	4.467E-01	-	-
25.12	-	3.462E-01	-
28.62	3.155E-01	-	-
31.64	-	2.346E-01	-
36.35	2.170E-01	-	-
46.15	1.457E-01	-	-
58.61	9.581E-02	-	-
64.26	-	6.367E-02	-
74.42	6.186E-02	-	-
94.50	3.934E-02	-	-
96.88	-	2.941E-02	-
120.00	2.472E-02	-	-



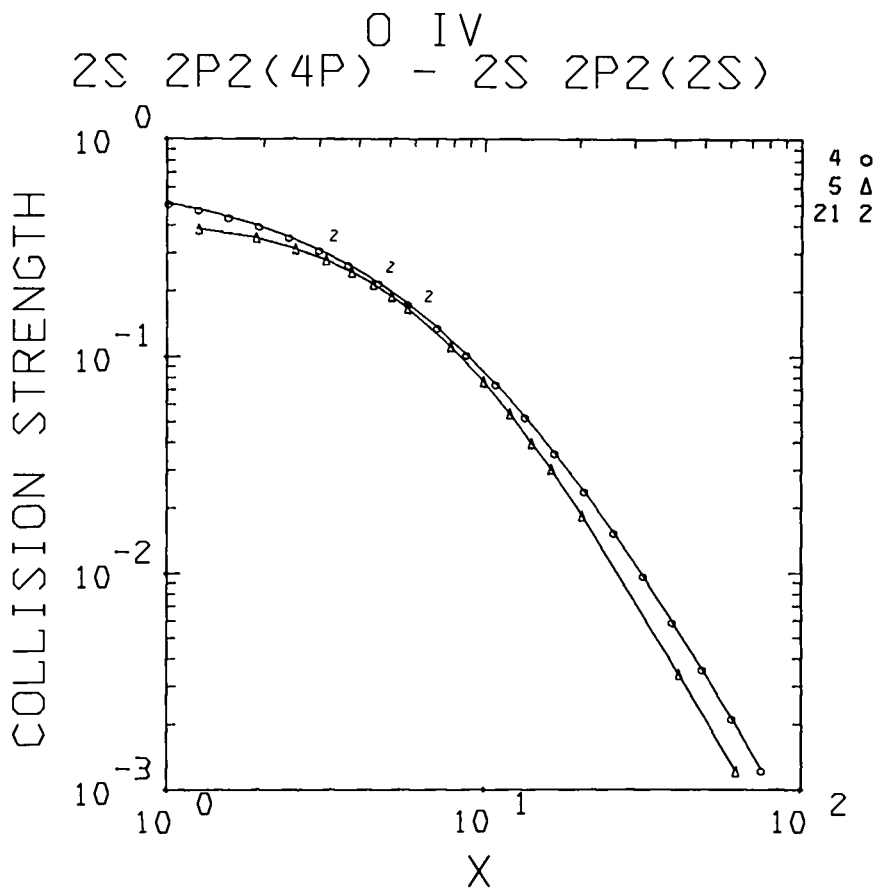
O IV
2S 2P2(4P) - 2S 2P2(2P)

X.	SYMBOL	4 MANN E= .993	5 R88 E= 1.158	21 FLOWER E= .994
1.01		4.820E-01	-	-
1.04		-	5.363E-01	-
1.24		4.500E-01	-	-
1.52		4.146E-01	-	-
1.56		-	4.774E-01	-
1.86		3.752E-01	-	-
2.07		-	4.202E-01	-
2.29		3.355E-01	-	-
2.59		-	3.679E-01	-
2.80		2.936E-01	-	-
2.82		-	-	4.330E-01
3.11		-	3.219E-01	-
3.44		2.516E-01	-	-
3.63		-	2.821E-01	-
4.15		-	2.480E-01	-
4.23		2.110E-01	-	3.050E-01
4.66		-	2.188E-01	-
5.17		1.729E-01	-	-
5.63		-	-	2.180E-01
6.35		1.384E-01	-	-
6.39		-	1.486E-01	-
7.78		1.084E-01	-	-
8.12		-	1.057E-01	-
9.55		8.305E-02	-	-
9.84		-	7.953E-02	-
11.57		-	6.061E-02	-
11.71		6.237E-02	-	-
13.30		-	4.812E-02	-
14.37		4.598E-02	-	-
16.75		-	3.213E-02	-
17.62		3.333E-02	-	-
21.61		2.380E-02	-	-
26.51		1.676E-02	-	-
32.51		1.166E-02	-	-
34.02		-	8.780E-03	-
39.88		8.030E-03	-	-
48.92		5.480E-03	-	-
51.29		-	4.030E-03	-
60.00		3.711E-03	-	-



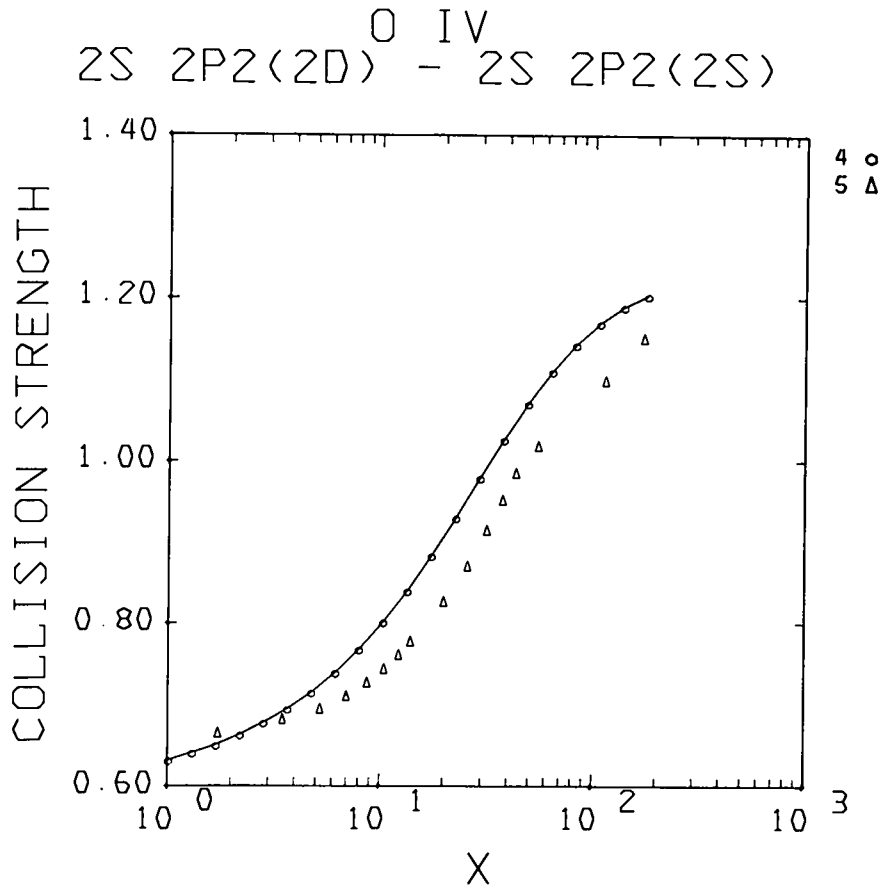
O IV
2S 2P2(4P) - 2S 2P2(2S)

X.SYMBOL	4 MANN E= .845	5 ROBB E= .954	21 FLOWER E= .845
1.01	5.091E-01	-	-
1.26	4.772E-01	3.879E-01	-
1.55	4.412E-01	-	-
1.89	-	3.529E-01	-
1.93	4.011E-01	-	-
2.39	3.575E-01	-	-
2.52	-	3.151E-01	-
2.96	3.117E-01	-	-
3.15	-	2.787E-01	-
3.31	-	-	3.590E-01
3.68	2.650E-01	-	-
3.78	-	2.454E-01	-
4.41	-	2.158E-01	-
4.56	2.192E-01	-	-
4.97	-	-	2.590E-01
5.03	-	1.898E-01	-
5.66	1.759E-01	1.672E-01	-
6.63	-	-	1.890E-01
7.02	1.368E-01	-	-
7.76	-	1.114E-01	-
8.70	1.030E-01	-	-
9.86	-	7.653E-02	-
10.80	7.500E-02	-	-
11.95	-	5.446E-02	-
13.39	5.292E-02	-	-
14.05	-	4.011E-02	-
16.15	-	3.039E-02	-
16.61	3.621E-02	-	-
20.34	-	1.848E-02	-
20.60	2.405E-02	-	-
25.55	1.554E-02	-	-
31.69	9.789E-03	-	-
39.31	6.021E-03	-	-
41.31	-	3.440E-03	-
48.75	3.625E-03	-	-
60.47	2.141E-03	-	-
62.28	-	1.220E-03	-
75.00	1.243E-03	-	-



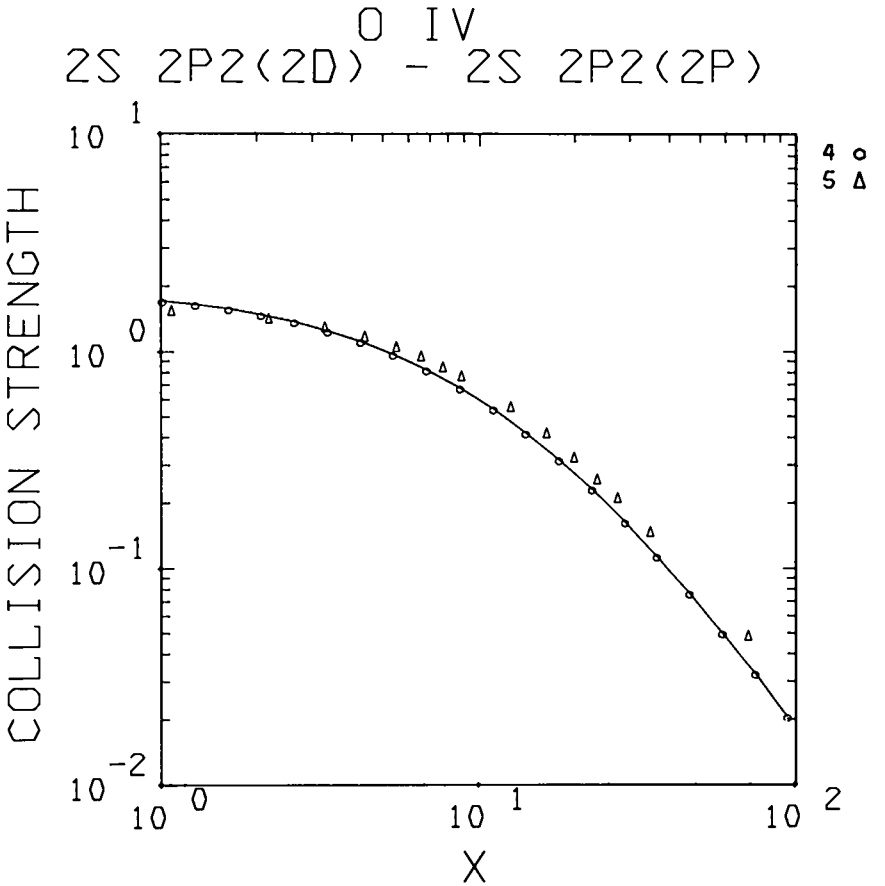
O IV
2S 2P2(2D) - 2S 2P2(2S)

X.SYMBOL	5 ROBB E= .341	4 MANN E= .341
1.01	-	6.327E-01
1.31	-	6.414E-01
1.70	-	6.516E-01
1.73	6.667E-01	-
2.20	-	6.640E-01
2.85	-	6.786E-01
3.49	6.834E-01	-
3.69	-	6.958E-01
4.78	-	7.163E-01
5.25	6.960E-01	-
6.20	-	7.404E-01
7.01	7.118E-01	-
8.03	-	7.693E-01
8.77	7.287E-01	-
10.41	-	8.030E-01
10.54	7.460E-01	-
12.30	7.633E-01	-
13.48	-	8.418E-01
14.06	7.798E-01	-
17.47	-	8.952E-01
19.93	8.283E-01	-
22.64	-	9.318E-01
25.80	8.720E-01	-
29.34	-	9.799E-01
31.67	9.169E-01	-
37.55	9.542E-01	-
38.02	-	1.027E+00
43.42	9.864E-01	-
49.26	-	1.071E+00
55.16	1.020E+00	-
63.84	-	1.111E+00
82.72	-	1.144E+00
107.20	-	1.170E+00
113.89	1.101E+00	-
138.91	-	1.190E+00
172.59	1.153E+00	-
180.00	-	1.205E+00



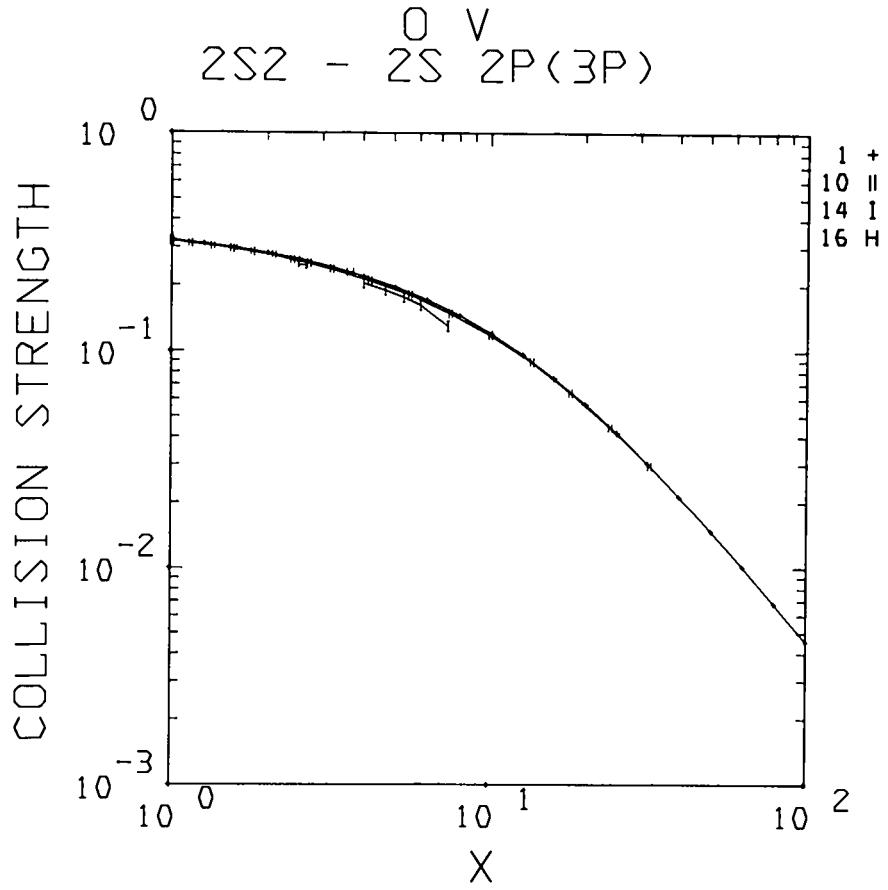
O IV
2S 2P2(2D) - 2S 2P2(2P)

X.	SYMBOL	5 ROBB E= .545	4 MANN E= .489
1.01		-	1.718E+00
1.08		1.553E+00	-
1.28		-	1.651E+00
1.63		-	1.572E+00
2.07		-	1.478E+00
2.18		1.432E+00	-
2.63		-	1.371E+00
3.28		1.302E+00	-
3.33		-	1.249E+00
4.23		-	1.115E+00
4.38		1.175E+00	-
5.38		-	9.721E-01
5.48		1.058E+00	-
6.58		9.523E-01	-
6.83		-	8.258E-01
7.69		8.581E-01	-
8.67		-	6.818E-01
8.79		7.748E-01	-
11.01		-	5.460E-01
12.46		5.617E-01	-
13.98		-	4.237E-01
16.13		4.209E-01	-
17.75		-	3.187E-01
19.80		3.261E-01	-
22.54		-	2.325E-01
23.46		2.602E-01	-
27.13		2.123E-01	-
28.62		-	1.648E-01
34.47		1.492E-01	-
36.35		-	1.137E-01
46.15		-	7.659E-02
58.61		-	5.048E-02
71.17		4.890E-02	-
74.42		-	3.266E-02
94.50		-	2.081E-02
107.86		2.560E-02	-
120.00		-	1.309E-02



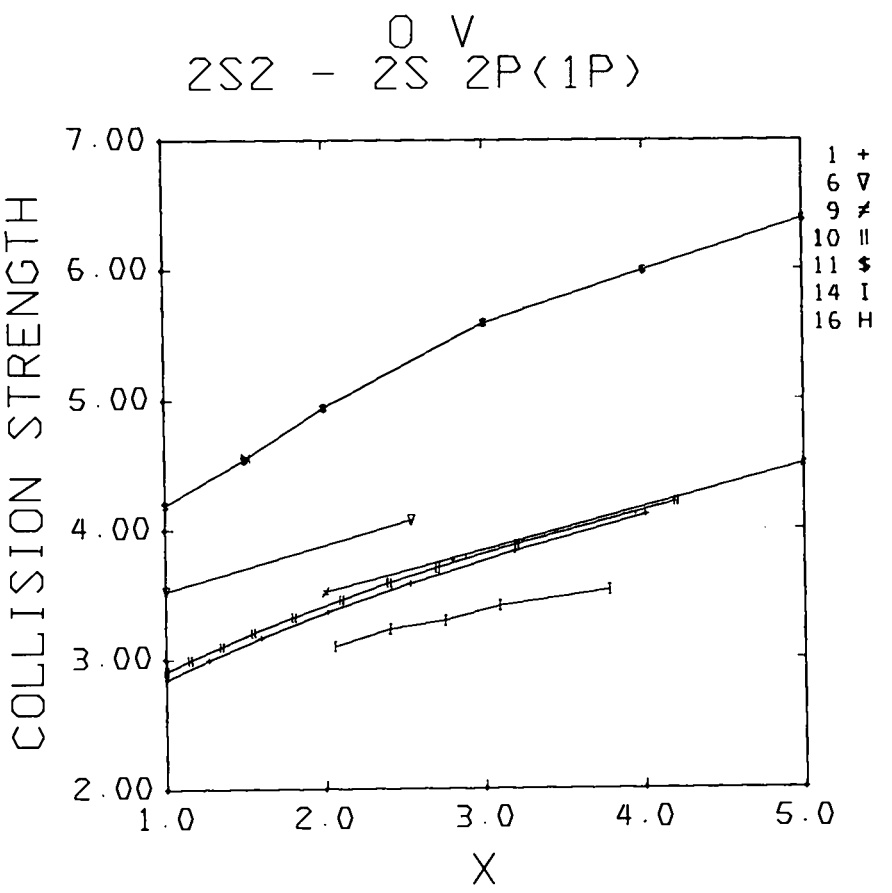
O V
2S2 - 2S 2P(3P)

X.SYMBOL	1 MANN E• .749	10 PEEK E• .749	14 QUB E• .747	16 OSTERBROCK E• .568
1.00	-	3.193E-01	-	-
1.01	3.219E-01	-	-	-
1.15	-	3.122E-01	-	-
1.27	3.103E-01	-	-	-
1.35	-	3.031E-01	-	-
1.55	-	2.945E-01	-	-
1.60	2.967E-01	-	-	-
1.80	-	2.844E-01	-	-
2.01	2.810E-01	-	-	-
2.10	-	2.730E-01	-	-
2.40	-	2.623E-01	-	-
2.53	2.629E-01	-	-	-
2.58	-	-	-	2.480E-01
2.70	-	2.524E-01	-	-
3.19	2.425E-01	-	-	-
3.20	-	2.371E-01	-	-
3.64	-	-	-	2.290E-01
4.02	2.202E-01	-	2.047E-01	-
4.20	-	2.105E-01	-	-
4.69	-	-	1.902E-01	-
5.04	1.960E-01	-	-	-
5.36	-	-	1.762E-01	-
5.60	-	1.304E-01	-	-
5.02	-	-	1.627E-01	-
6.35	1.707E-01	-	-	-
7.35	-	-	1.302E-01	-
7.50	-	1.437E-01	-	-
7.99	1.450E-01	-	-	-
10.00	-	1.180E-01	-	-
10.05	1.199E-01	-	-	-
12.65	9.625E-02	-	-	-
13.50	-	8.841E-02	-	-
15.91	7.507E-02	-	-	-
18.00	-	6.403E-02	-	-
20.02	5.691E-02	-	-	-
24.00	-	4.443E-02	-	-
25.19	4.203E-02	-	-	-
31.70	3.031E-02	-	-	-
32.00	-	2.966E-02	-	-
39.89	2.142E-02	-	-	-
50.19	1.487E-02	-	-	-
63.16	1.017E-02	-	-	-
79.47	6.873E-03	-	-	-
100.00	4.595E-03	-	-	-



J V
2S2 - 2S 2P(1P)

X.SYMBOL	1 MANN E= 1.447	6 NAKAZAKI E= 1.450	9 YOUNGER E= 1.447	10 PEEK E= 1.447	11 BLAHA E= 1.448	14 QUB E= 1.457	16 OSTERBROCK E= 1.366
1.00	-	3.530E+00	-	2.913E+00	4.200E+00	-	-
1.01	2.853E+00	-	-	-	-	-	-
1.15	-	-	-	2.998E+00	-	-	-
1.27	3.000E+00	-	-	-	-	-	-
1.35	-	-	-	3.106E+00	-	-	-
1.50	-	-	-	-	4.550E+00	-	-
1.51	-	-	-	-	-	-	4.560E+00
1.55	-	-	-	3.208E+00	-	-	-
1.60	3.171E+00	-	-	-	-	-	-
1.80	-	-	-	3.329E+00	-	-	-
2.00	-	-	3.520E+00	-	4.950E+00	-	-
2.01	3.368E+00	-	-	-	-	-	-
2.06	-	-	-	-	-	3.107E+00	-
2.10	-	-	-	3.464E+00	-	-	-
2.40	-	-	-	3.592E+00	-	3.234E+00	-
2.54	3.591E+00	4.090E+00	-	-	-	-	-
2.70	-	-	-	3.711E+00	-	-	-
2.75	-	-	-	-	-	3.306E+00	-
3.00	-	-	-	-	5.600E+00	-	-
3.09	-	-	-	-	-	3.415E+00	-
3.19	3.341E+00	-	-	-	-	-	-
3.20	-	-	-	3.896E+00	-	-	-
3.78	-	-	-	-	-	3.536E+00	-
4.00	4.117E+00	-	-	-	6.000E+00	-	-
4.20	-	-	-	4.220E+00	-	-	-
5.00	-	-	4.510E+00	-	6.400E+00	-	-
5.04	4.416E+00	-	-	-	-	-	-
5.08	-	4.740E+00	-	-	-	-	-
5.60	-	-	-	4.597E+00	-	-	-
6.35	4.736E+00	-	-	-	-	-	-
7.50	-	-	-	5.015E+00	-	-	-
7.61	-	5.230E+00	-	-	-	-	-
7.99	5.074E+00	-	-	-	-	-	-
8.00	-	-	5.210E+00	-	-	-	-
10.00	-	-	5.510E+00	5.449E+00	-	-	-
10.05	5.426E+00	-	-	-	-	-	-
10.16	-	5.500E+00	-	-	-	-	-
12.65	5.789E+00	-	-	-	-	-	-
13.50	-	-	-	5.920E+00	-	-	-
15.91	6.159E+00	-	-	-	-	-	-
16.00	-	-	6.160E+00	-	-	-	-
18.00	-	-	-	6.381E+00	-	-	-
20.00	-	-	6.500E+00	-	-	-	-
20.02	6.534E+00	-	-	-	-	-	-
24.00	-	-	-	6.850E+00	-	-	-
25.19	6.912E+00	-	-	-	-	-	-
25.40	-	6.950E+00	-	-	-	-	-
31.70	7.290E+00	-	-	-	-	-	-
32.00	-	-	-	7.322E+00	-	-	-
39.89	7.667E+00	-	-	-	-	-	-
50.19	8.042E+00	-	-	-	-	-	-
50.80	-	7.990E+00	-	-	-	-	-
56.00	-	-	-	8.227E+00	-	-	-
63.16	8.414E+00	-	-	-	-	-	-
79.47	8.792E+00	-	-	-	-	-	-
100.00	9.147E+00	-	-	9.145E+00	-	-	-
101.60	-	9.050E+00	-	-	-	-	-
180.00	-	-	-	1.004E+01	-	-	-
203.20	-	1.008E+01	-	-	-	-	-
320.00	-	-	-	1.093E+01	-	-	-


O V
2S2 - 2S 2P(1P)
COLLISION STRENGTH
7.00
6.00
5.00
4.00
3.00
2.00
1.0
2.0
3.0
4.0
5.0
X
1 +
6 ∇
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11 $
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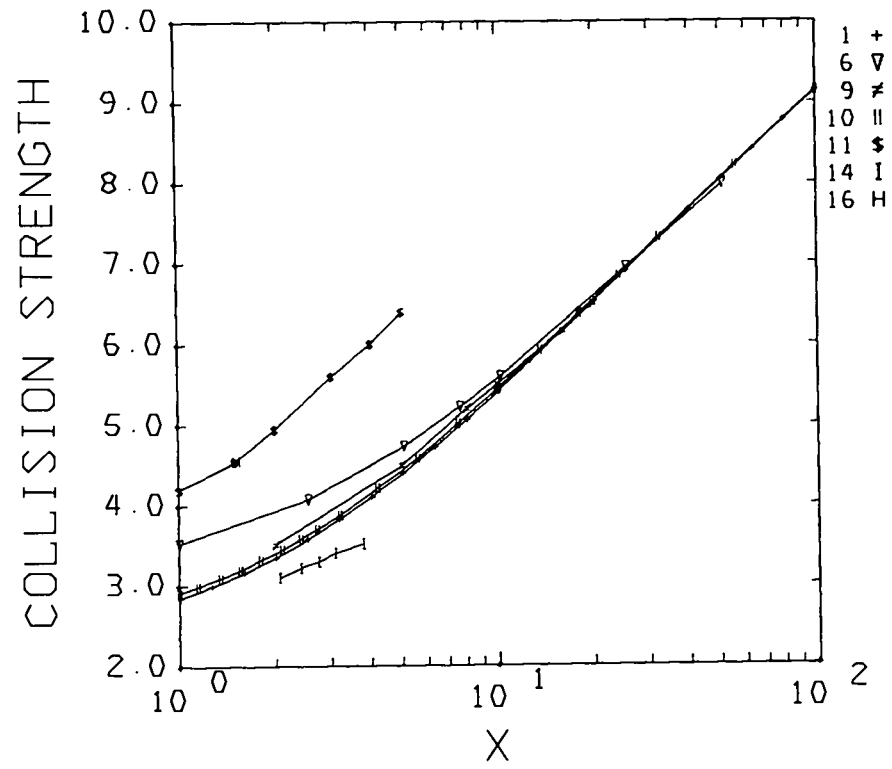
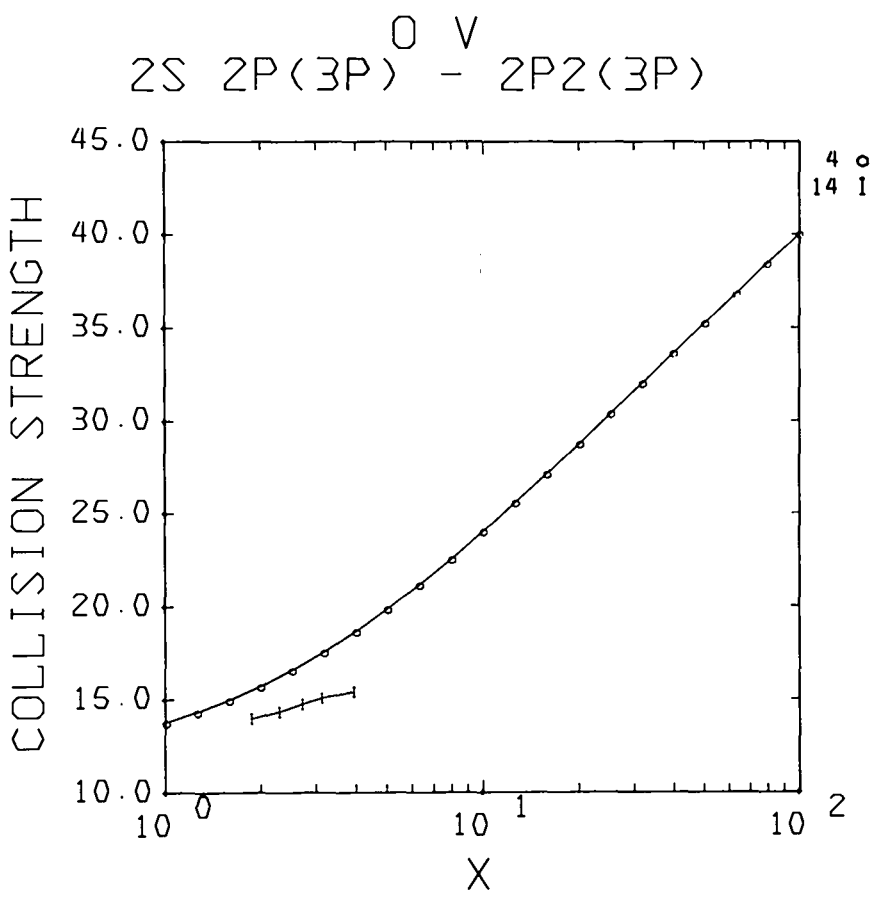
16 H


COLLISION STRENGTH
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
10 0
10 1
10 2
X
1 +
6 ∇
9 ≠
10 ||
11 $
14 I
16 H

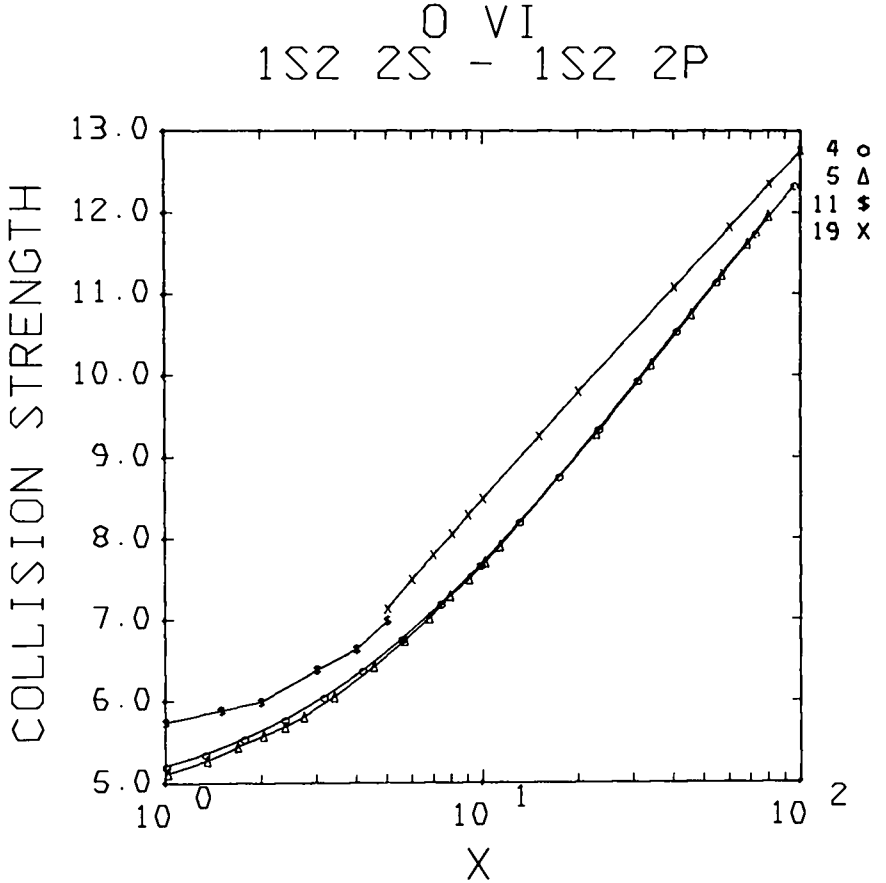
O V
2S 2P(3P) - 2P2(3P)

X.	SYMBOL	4 MANN E= 1.199	14 QUB E= 1.203
1.01		1.381E+01	-
1.27		1.437E+01	-
1.60		1.502E+01	-
1.87		-	1.401E+01
2.01		1.578E+01	-
2.29		-	1.440E+01
2.53		1.666E+01	-
2.70		-	1.480E+01
3.12		-	1.513E+01
3.19		1.765E+01	-
3.95		-	1.544E+01
4.01		1.875E+01	-
5.04		1.996E+01	-
6.35		2.126E+01	-
7.99		2.266E+01	-
10.05		2.412E+01	-
12.65		2.555E+01	-
15.91		2.721E+01	-
20.02		2.881E+01	-
25.19		3.043E+01	-
31.70		3.206E+01	-
39.89		3.369E+01	-
50.19		3.531E+01	-
63.16		3.691E+01	-
79.47		3.851E+01	-
100.00		4.009E+01	-



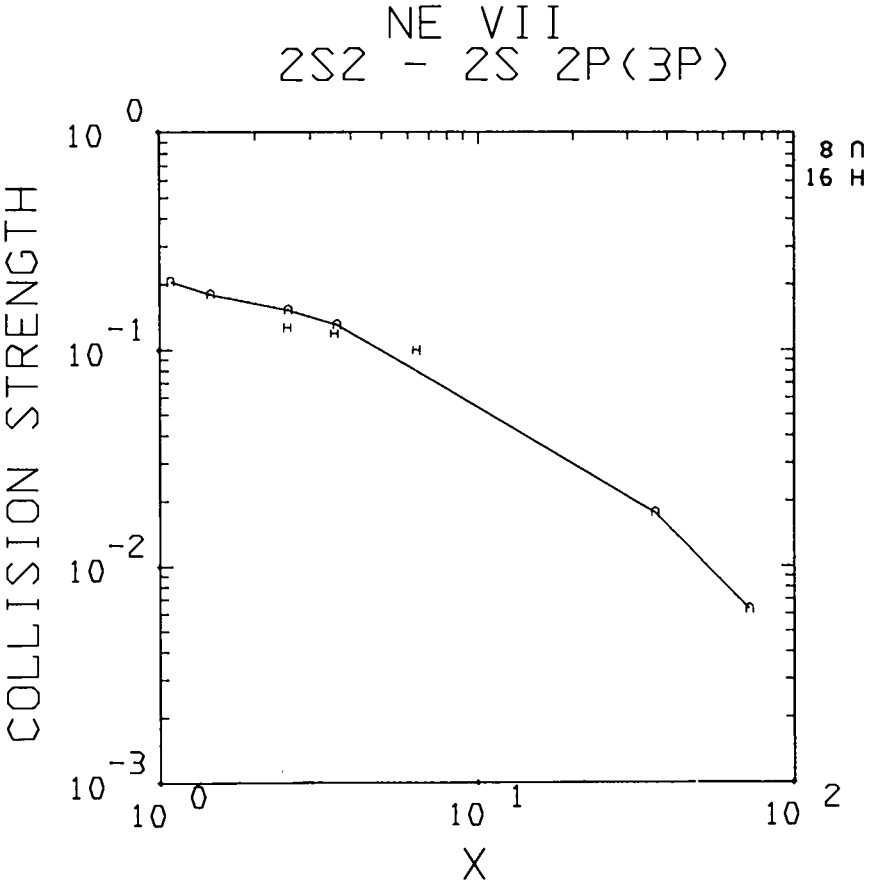
O VI
1S2 2S - 1S2 2P

X.SYMBOL	4 MANN E= .882	5 ROBB E= .883	11 BLAHA E= .882	19 KIM E= .889
1.00	-	-	5.750E+00	-
1.02	5.222E+00	5.124E+00	-	-
1.34	5.371E+00	-	-	-
1.36	-	5.284E+00	-	-
1.50	-	-	5.900E+00	-
1.70	-	5.446E+00	-	-
1.78	5.558E+00	-	-	-
2.00	-	-	5.000E+00	-
2.04	-	5.586E+00	-	-
2.38	5.786E+00	5.698E+00	-	-
2.72	-	5.819E+00	-	-
3.00	-	-	5.400E+00	-
3.15	6.064E+00	-	-	-
3.40	-	6.070E+00	-	-
4.00	-	-	6.650E+00	-
4.19	6.393E+00	-	-	-
4.53	-	6.433E+00	-	-
5.00	-	-	7.000E+00	7.146E+00
5.57	6.777E+00	-	-	-
5.66	-	6.751E+00	-	-
6.00	-	-	-	7.506E+00
6.79	-	7.030E+00	-	-
7.00	-	-	-	7.806E+00
7.41	7.211E+00	-	-	-
7.93	-	7.308E+00	-	-
8.00	-	-	-	8.064E+00
9.00	-	-	-	8.290E+00
9.06	-	7.511E+00	-	-
9.85	7.694E+00	-	-	-
10.00	-	-	-	8.491E+00
10.19	-	7.720E+00	-	-
11.32	-	7.917E+00	-	-
13.09	8.217E+00	-	-	-
15.00	-	-	-	9.258E+00
17.41	8.774E+00	-	-	-
20.00	-	-	-	9.796E+00
22.65	-	9.291E+00	-	-
23.14	9.354E+00	-	-	-
30.76	9.949E+00	-	-	-
33.97	-	1.014E+01	-	-
40.00	-	-	-	1.108E+01
40.89	1.055E+01	-	-	-
45.29	-	1.076E+01	-	-
54.36	1.116E+01	-	-	-
56.62	-	1.124E+01	-	-
60.00	-	-	-	1.183E+01
67.94	-	1.163E+01	-	-
72.26	1.176E+01	-	-	-
79.26	-	1.197E+01	-	-
80.00	-	-	-	1.235E+01
96.06	1.235E+01	-	-	-
100.00	-	-	-	1.276E+01
127.70	1.294E+01	-	-	-
169.76	1.351E+01	-	-	-
225.67	1.408E+01	-	-	-
300.00	1.464E+01	-	-	-



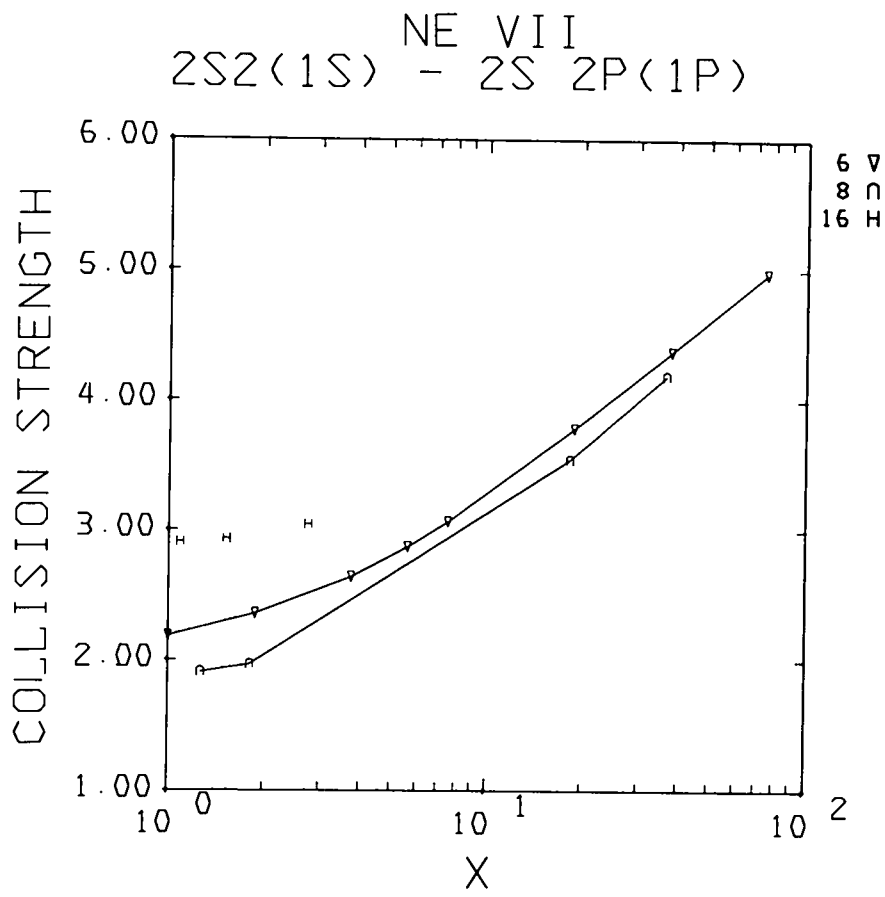
NE VII
2S2 - 2S 2P(3P)

X.	SYMBOL	8 UCL E= 1.014	16 OSTERBROCK E= .783
1.09		2.050E-01	-
1.45		1.800E-01	-
2.53		-	1.270E-01
2.54		1.520E-01	-
3.55		-	1.190E-01
3.62		1.300E-01	-
6.39		-	1.000E-01
36.24		1.760E-02	-
72.49		6.340E-03	-



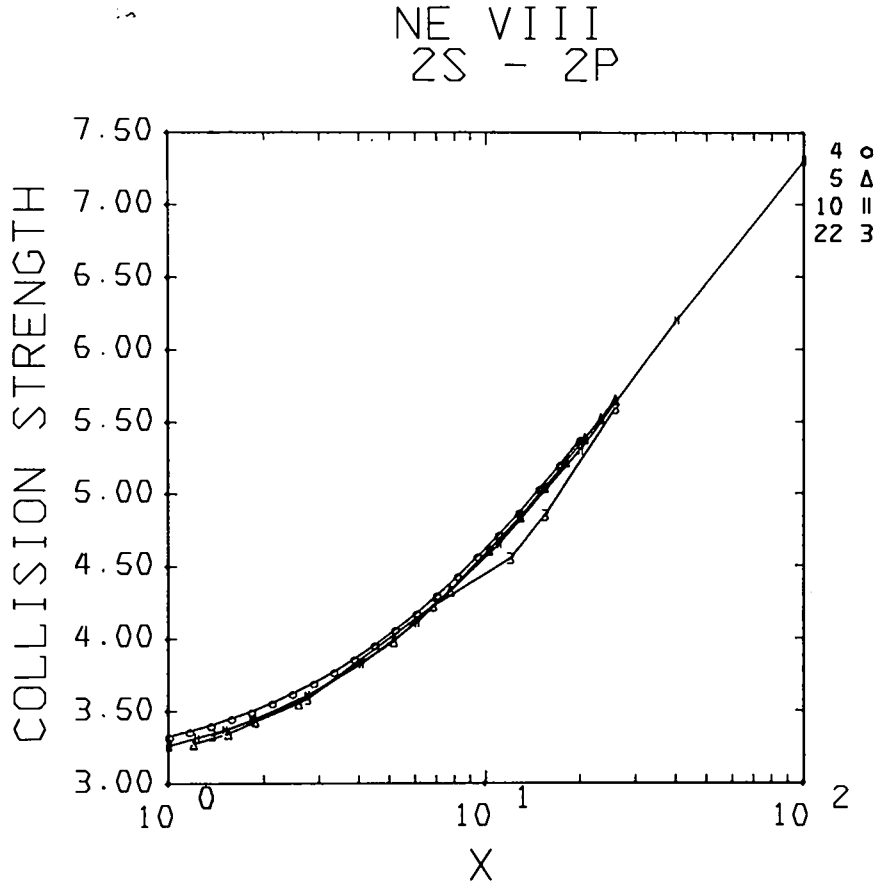
NE VII
2S2(1S) - 2S 2P(1P)

X.SYMBOL	6 NAKAZAKI E= 1.950	8 UCL E= 2.027	16 OSTERBROCK E= 1.825
1.00	2.190E+00	-	-
1.09	-	-	2.910E+00
1.27	-	1.910E+00	-
1.53	-	-	2.940E+00
1.81	-	1.970E+00	-
1.88	2.360E+00	-	-
2.74	-	-	3.050E+00
3.76	2.650E+00	-	-
5.65	2.880E+00	-	-
7.52	3.070E+00	-	-
18.13	-	3.550E+00	-
18.80	3.790E+00	-	-
36.25	-	4.190E+00	-
37.60	4.380E+00	-	-
75.20	4.980E+00	-	-
150.40	5.570E+00	-	-



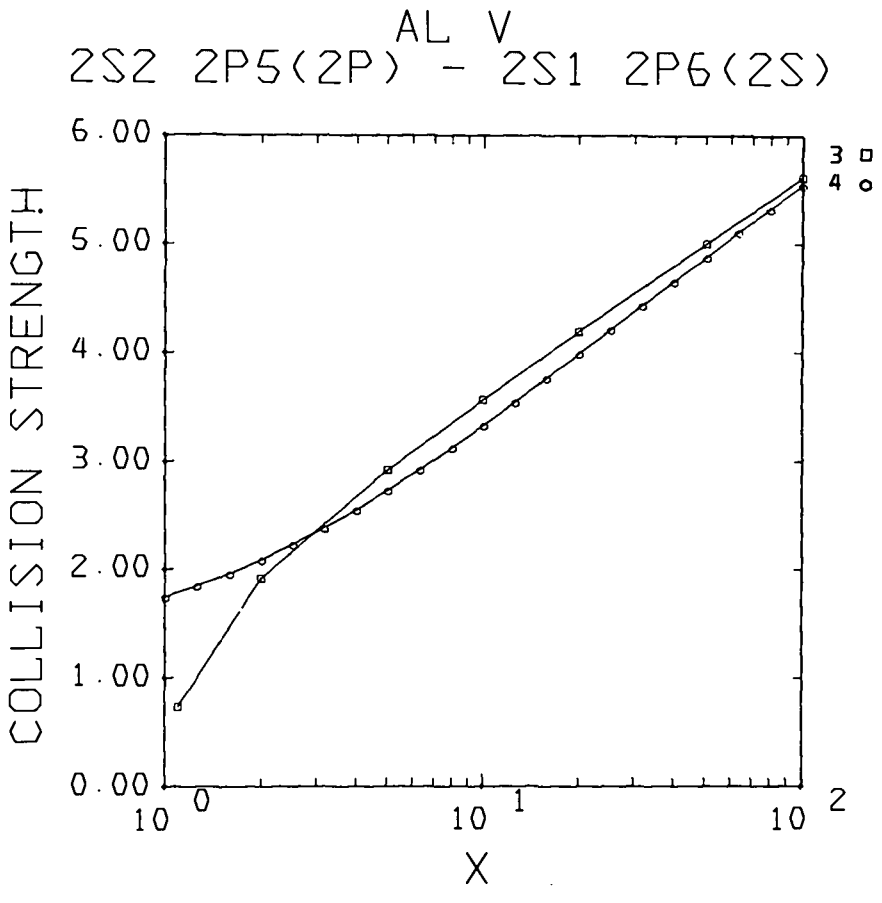
NE VIII
2S - 2P

X.SYMBOL	4 MANN E= 1.189	5 ROBB E= 1.168	10 PEEK E= 1.189	22 HENRY E= 1.170
1.00	-	-	3.265E+00	-
1.01	3.333E+00	-	3.267E+00	-
1.17	3.369E+00	-	-	-
1.20	-	3.280E+00	-	-
1.23	-	-	3.317E+00	-
1.37	3.409E+00	-	-	3.340E+00
1.50	-	-	3.374E+00	-
1.54	-	3.350E+00	-	-
1.58	3.455E+00	-	-	-
1.84	3.507E+00	-	3.440E+00	-
1.88	-	3.430E+00	-	-
2.13	3.563E+00	-	-	-
2.47	3.628E+00	-	-	-
2.57	-	3.560E+00	-	-
2.74	-	-	3.610E+00	3.590E+00
2.87	3.701E+00	-	-	-
3.33	3.781E+00	-	-	-
3.87	3.870E+00	-	-	-
4.07	-	-	3.835E+00	-
4.49	3.967E+00	-	-	-
5.14	-	3.990E+00	-	-
5.22	4.073E+00	-	-	-
6.06	4.187E+00	-	4.120E+00	-
6.84	-	-	-	4.230E+00
7.03	4.310E+00	-	-	-
7.71	-	4.340E+00	-	-
8.17	4.442E+00	-	-	-
9.48	4.582E+00	-	-	-
10.28	-	4.620E+00	-	-
11.01	4.729E+00	-	4.661E+00	-
11.97	-	-	-	4.560E+00
12.78	4.884E+00	-	-	-
12.85	-	4.850E+00	-	-
14.84	5.045E+00	-	-	-
15.38	-	-	-	4.860E+00
15.42	-	5.050E+00	-	-
17.23	5.211E+00	-	-	-
17.99	-	5.230E+00	-	-
20.00	5.383E+00	-	5.312E+00	-
20.56	-	5.390E+00	-	-
23.13	-	5.530E+00	-	-
25.64	-	-	-	5.600E+00
25.70	-	5.660E+00	-	-
40.00	-	-	5.208E+00	-
100.00	-	-	7.310E+00	-



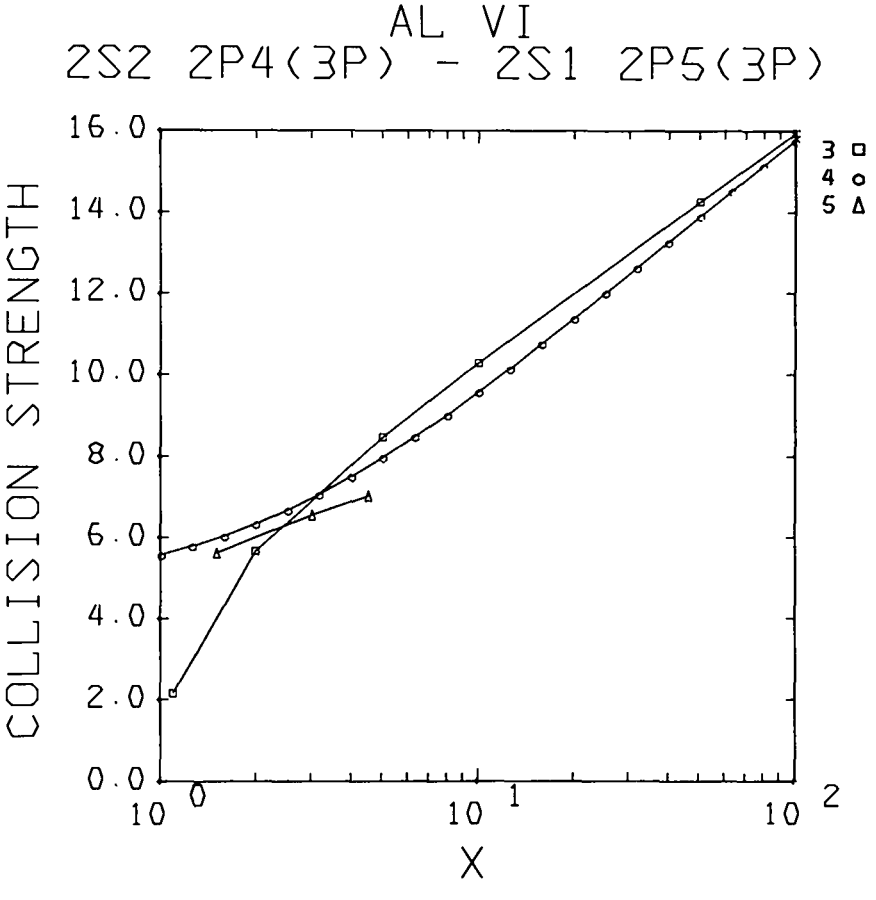
AL V
2S2 2P5(2P) - 2S1 2P6(2S)

X.	SYMBOL	3 ROBB E= 3.259	4 MANN E= 3.259
1.01		-	1.758E+00
1.10		7.350E-01	-
1.27		-	1.859E+00
1.60		-	1.970E+00
2.00		1.919E+00	-
2.01		-	2.096E+00
2.53		-	2.236E+00
3.19		-	2.390E+00
4.01		-	2.558E+00
5.00		2.921E+00	-
5.04		-	2.738E+00
6.35		-	2.929E+00
7.99		-	3.130E+00
10.00		3.569E+00	-
10.05		-	3.338E+00
12.65		-	3.553E+00
15.91		-	3.773E+00
20.00		4.196E+00	-
20.02		-	3.995E+00
25.19		-	4.220E+00
31.70		-	4.445E+00
39.89		-	4.670E+00
50.00		5.011E+00	-
50.19		-	4.894E+00
63.16		-	5.117E+00
79.47		-	5.338E+00
100.00		5.622E+00	5.557E+00



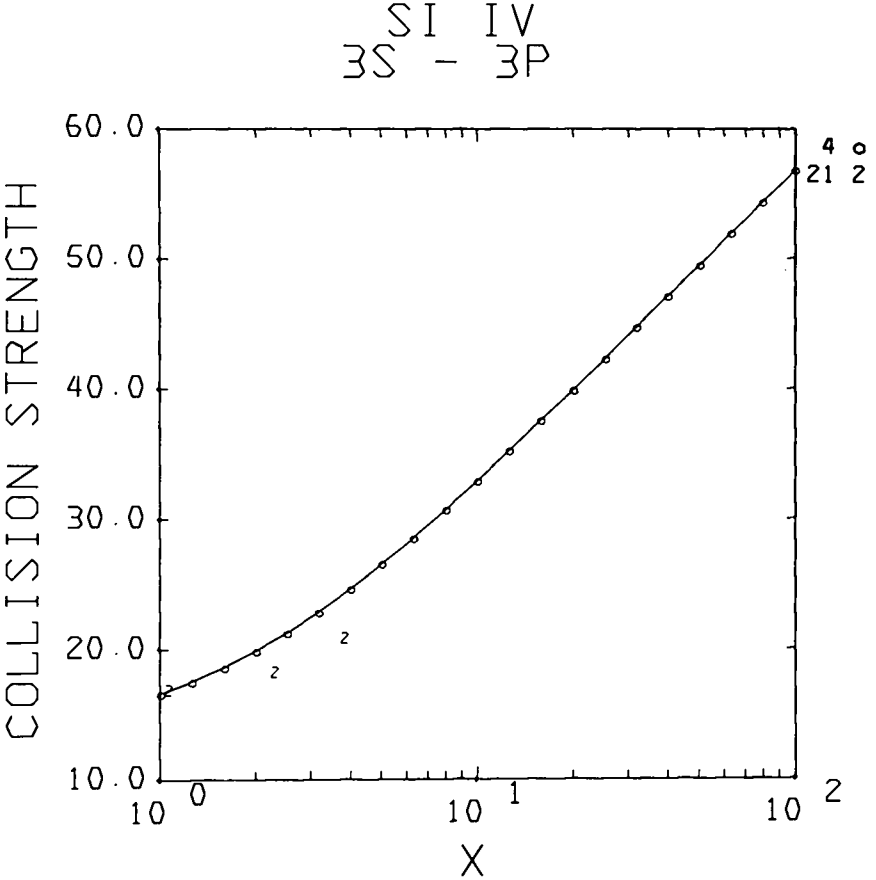
AL VI
2S2 2P4(3P) - 2S1 2P5(3P)

X.SYMBOL	5 ROBB E= 2.945	3 ROBB E= 2.945	4. MANN E= 2.937
1.01	-	-	5.593E+00
1.10	-	2.169E+00	-
1.27	-	-	5.807E+00
1.50	5.640E+00	-	-
1.60	-	-	6.062E+00
2.00	-	5.680E+00	-
2.01	-	-	6.359E+00
2.53	-	-	6.700E+00
3.01	6.569E+00	-	-
3.19	-	-	7.086E+00
4.01	-	-	7.514E+00
4.51	7.034E+00	-	-
5.00	-	8.471E+00	-
5.04	-	-	7.984E+00
6.35	-	-	8.490E+00
7.99	-	-	9.029E+00
10.00	-	1.030E+01	-
10.05	-	-	9.596E+00
12.65	-	-	1.018E+01
15.91	-	-	1.079E+01
20.02	-	-	1.141E+01
25.19	-	-	1.204E+01
31.70	-	-	1.267E+01
39.89	-	-	1.330E+01
50.00	-	1.428E+01	-
50.19	-	-	1.392E+01
63.16	-	-	1.455E+01
79.47	-	-	1.517E+01
100.00	-	1.594E+01	1.579E+01



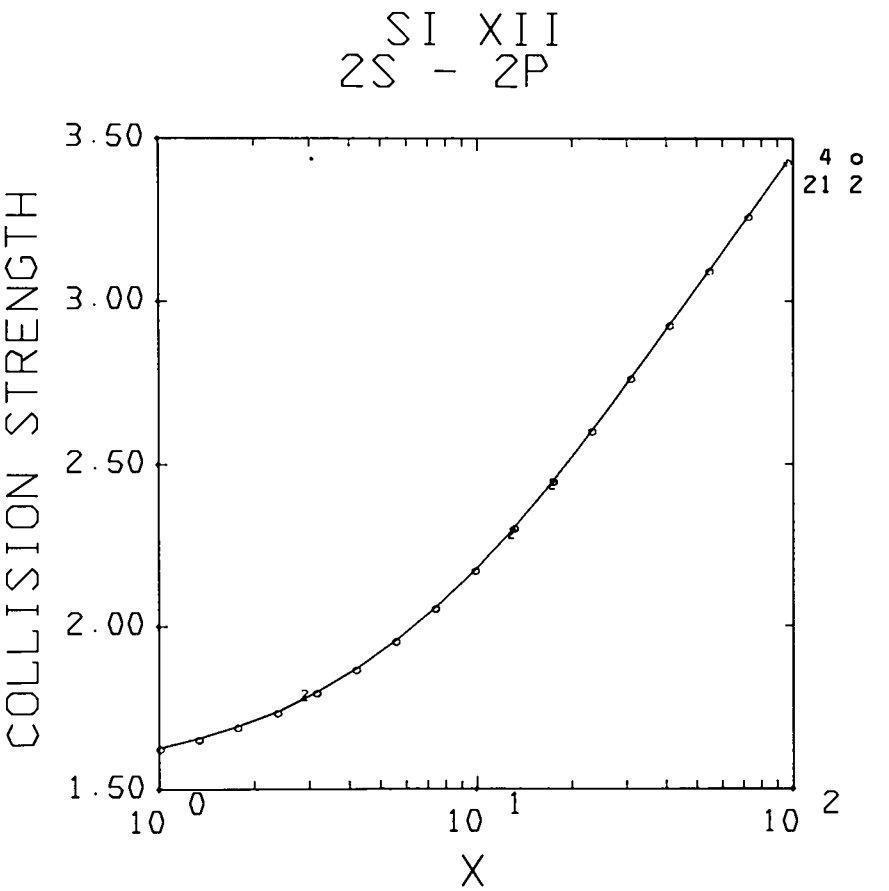
SI IV
3S - 3P

X.	SYMBOL	21 FLOWER E= .652	4 MANN E= .652
1.01		-	1.669E+01
1.07		1.695E+01	-
1.27		-	1.762E+01
1.60		-	1.871E+01
2.01		-	1.997E+01
2.30		1.834E+01	-
2.53		-	2.140E+01
3.19		-	2.300E+01
3.83		2.094E+01	-
4.01		-	2.476E+01
5.04		-	2.666E+01
6.35		-	2.869E+01
7.99		-	3.083E+01
10.05		-	3.305E+01
12.65		-	3.533E+01
15.91		-	3.766E+01
20.02		-	4.003E+01
25.19		-	4.242E+01
31.70		-	4.482E+01
39.89		-	4.724E+01
50.19		-	4.965E+01
63.16		-	5.207E+01
79.47		-	5.449E+01
100.00		-	5.690E+01



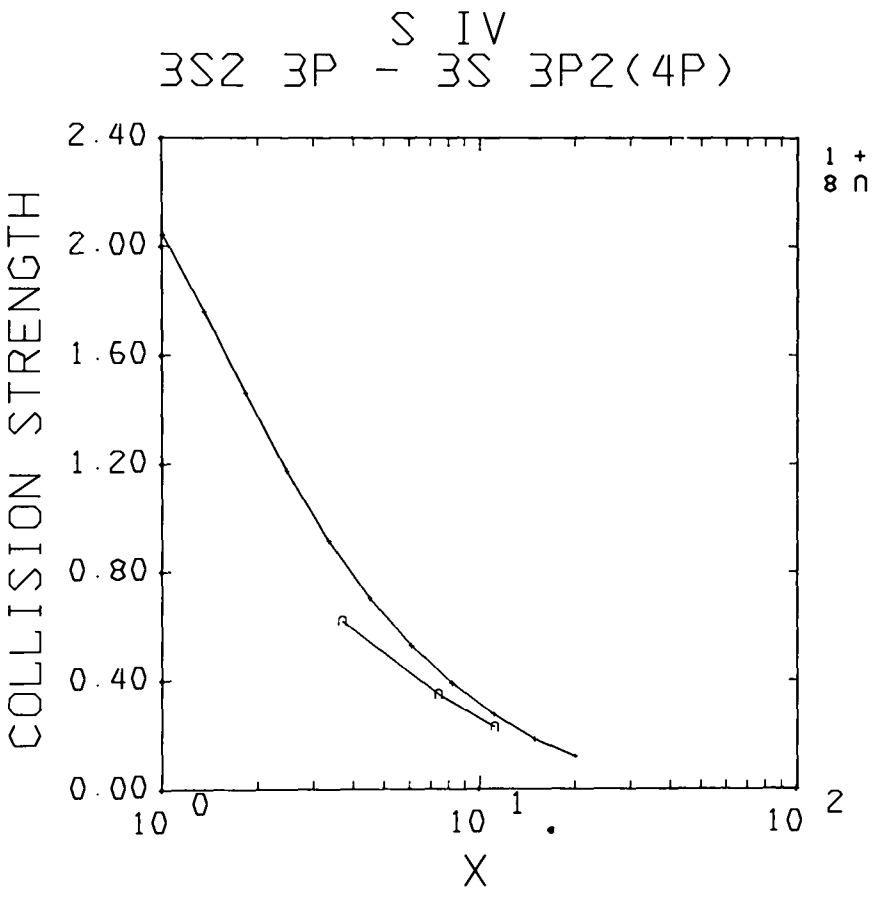
SI XII
2S - 2P

X.	SYMBOL	21 FLOWER E= 1.735	4 MANN E= 1.800
1.01		-	1.629E+00
1.34		-	1.658E+00
1.78		-	1.694E+00
2.37		-	1.741E+00
2.88		1.790E+00	-
3.15		-	1.800E+00
4.19		-	1.872E+00
5.57		-	1.959E+00
7.41		-	2.061E+00
9.85		-	2.177E+00
12.91		2.290E+00	-
13.09		-	2.308E+00
17.30		2.440E+00	-
17.41		-	2.452E+00
23.14		-	2.605E+00
30.76		-	2.766E+00
40.89		-	2.931E+00
54.36		-	3.099E+00
72.26		-	3.266E+00
96.06		-	3.432E+00
127.70		-	3.596E+00
169.76		-	3.757E+00
225.67		-	3.914E+00
300.00		-	4.067E+00



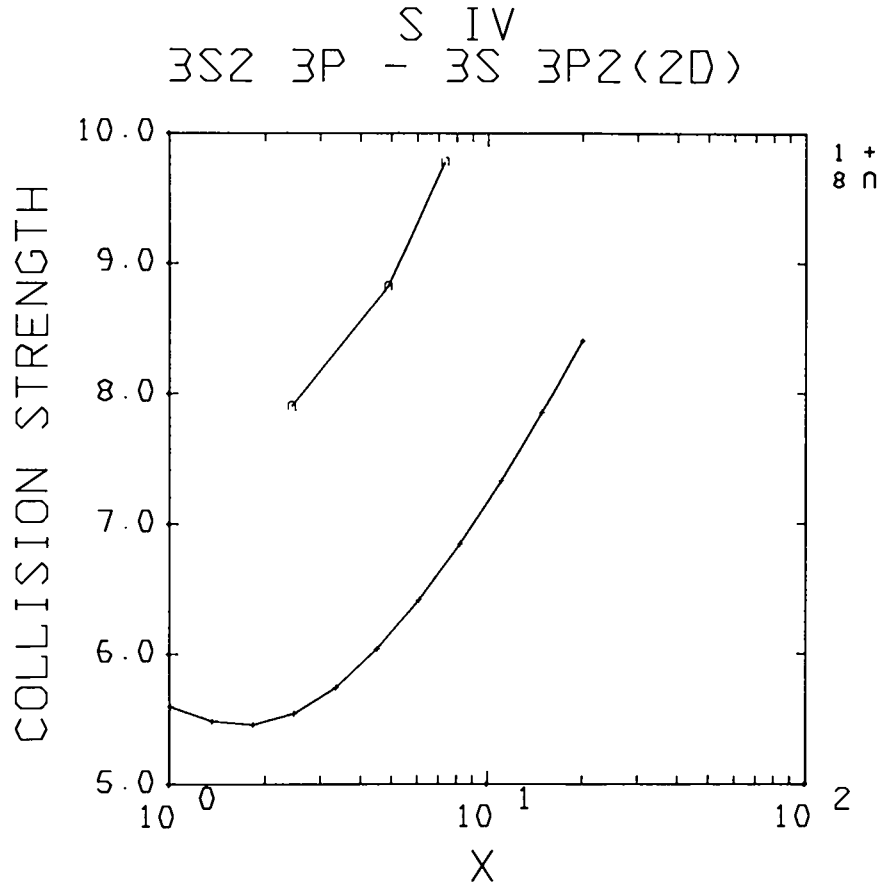
S IV
3S2 3P - 3S 3P2(4P)

X.	SYMBOL	1	8
		MANN	UCL
		E= .654	E= .541
1.01		2.046E+00	-
1.36		1.761E+00	-
1.84		1.463E+00	-
2.47		1.176E+00	-
3.33		9.197E-01	-
3.69		-	6.221E-01
4.49		7.067E-01	-
6.06		5.341E-01	-
7.39		-	3.532E-01
8.17		3.930E-01	-
11.01		2.775E-01	-
11.08		-	2.310E-01
14.84		1.871E-01	-
20.00		1.216E-01	-



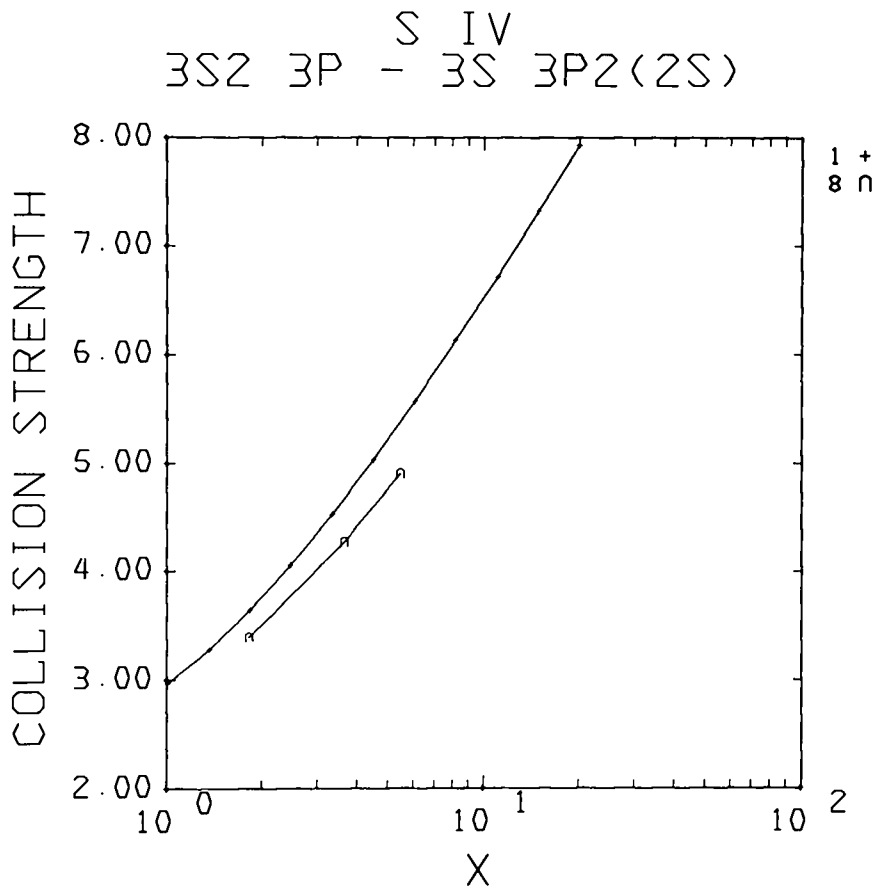
S IV
3S2 3P - 3S 3P2(2D)

X.	SYMBOL	1 MANN E= .852	8 UCL E= .823
1.01		5.603E+00	-
1.36		5.490E+00	-
1.84		5.463E+00	-
2.43		-	7.905E+00
2.47		5.547E+00	-
3.33		5.746E+00	-
4.49		6.044E+00	-
4.86		-	8.827E+00
6.06		6.419E+00	-
7.29		-	9.788E+00
8.17		6.853E+00	-
11.01		7.336E+00	-
14.84		7.859E+00	-
20.00		8.413E+00	-



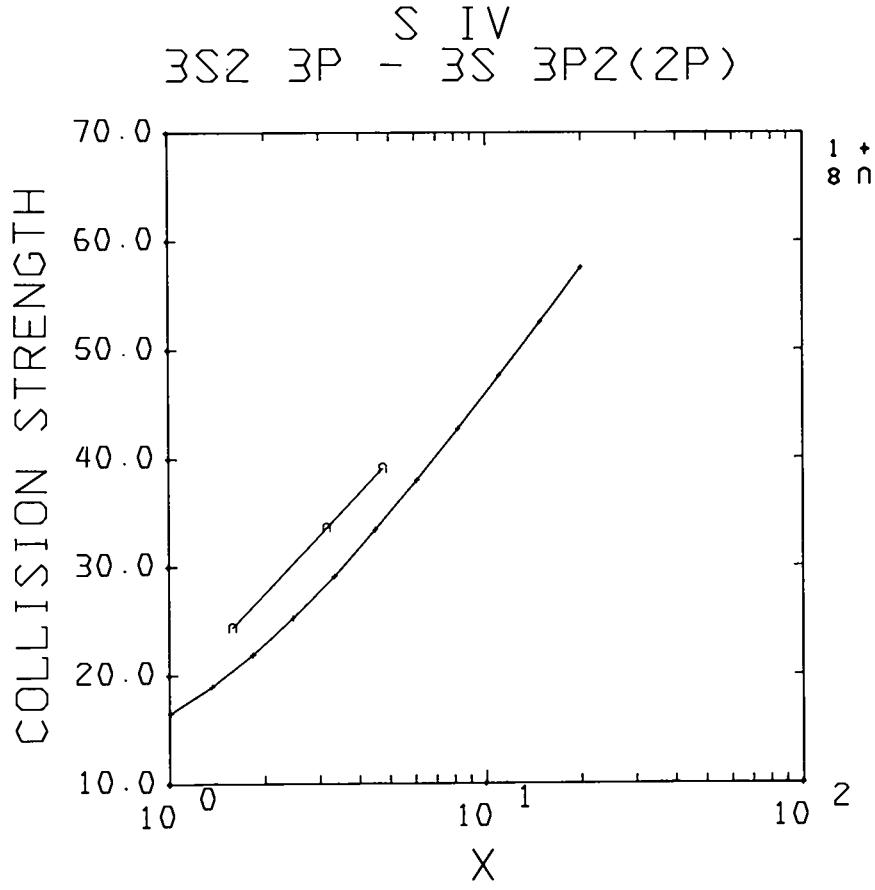
S IV
3S2 3P - 3S 3P2(2S)

X.	SYMBOL	1 MANN E= 1.120	8 UCL E= 1.098
1.01		2.978E+00	-
1.36		3.288E+00	-
1.82		-	3.394E+00
1.84		3.652E+00	-
2.47		4.068E+00	-
3.33		4.533E+00	-
3.64		-	4.283E+00
4.49		5.039E+00	-
5.47		-	4.911E+00
6.06		5.578E+00	-
8.17		6.142E+00	-
11.01		6.727E+00	-
14.84		7.324E+00	-
20.00		7.933E+00	-



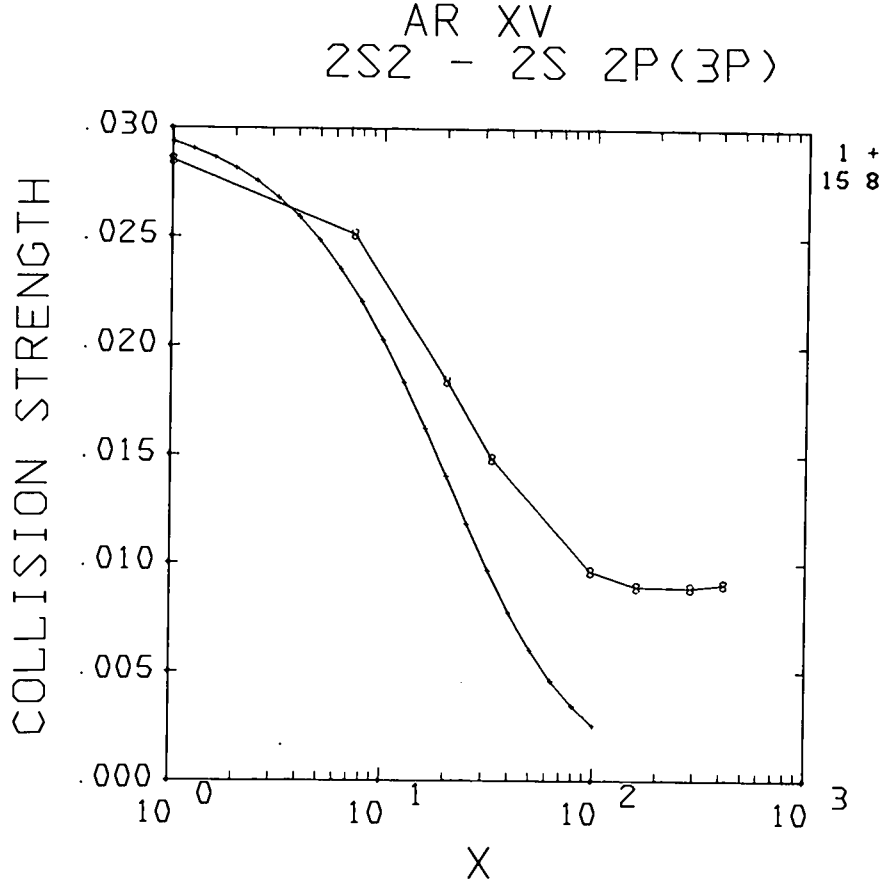
S IV
3S2 3P - 3S 3P2(2P)

X	SYMBOL	1 MANN E= 1.216	8 UC L E= 1.265
1.01		1.657E+01	-
1.36		1.904E+01	-
1.58		-	2.442E+01
1.84		2.198E+01	-
2.47		2.539E+01	-
3.16		-	3.364E+01
3.33		2.925E+01	-
4.49		3.348E+01	-
4.74		-	3.916E+01
6.06		3.802E+01	-
8.17		4.277E+01	-
11.01		4.766E+01	-
14.84		5.261E+01	-
20.00		5.761E+01	-



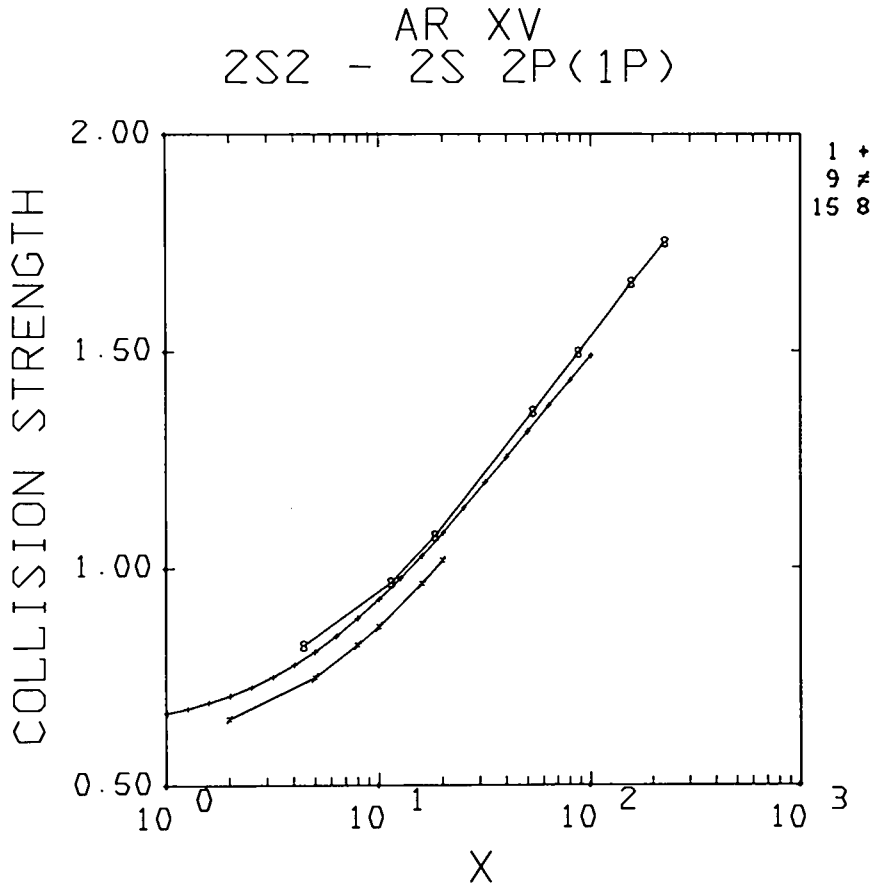
AR XV
2S2 - 2S 2P(3P)

X.	SYMBOL	1 MANN E= 2.173	15 SAMPSON E= 2.543
1.00		-	2.854E-02
1.01		2.939E-02	-
1.27		2.908E-02	-
1.60		2.866E-02	-
2.01		2.818E-02	-
2.53		2.758E-02	-
3.19		2.685E-02	-
4.01		2.595E-02	-
5.04		2.487E-02	-
6.35		2.356E-02	-
7.37		-	2.516E-02
7.99		2.205E-02	-
10.05		2.031E-02	-
12.65		1.837E-02	-
15.91		1.627E-02	-
20.02		1.407E-02	-
20.11		-	1.844E-02
25.19		1.186E-02	-
31.70		9.738E-03	-
32.86		-	1.487E-02
39.89		7.789E-03	-
50.19		6.077E-03	-
63.16		4.635E-03	-
79.47		3.470E-03	-
96.57		-	9.697E-03
100.00		2.561E-03	-
159.30		-	8.977E-03
287.72		-	8.920E-03
415.15		-	9.105E-03



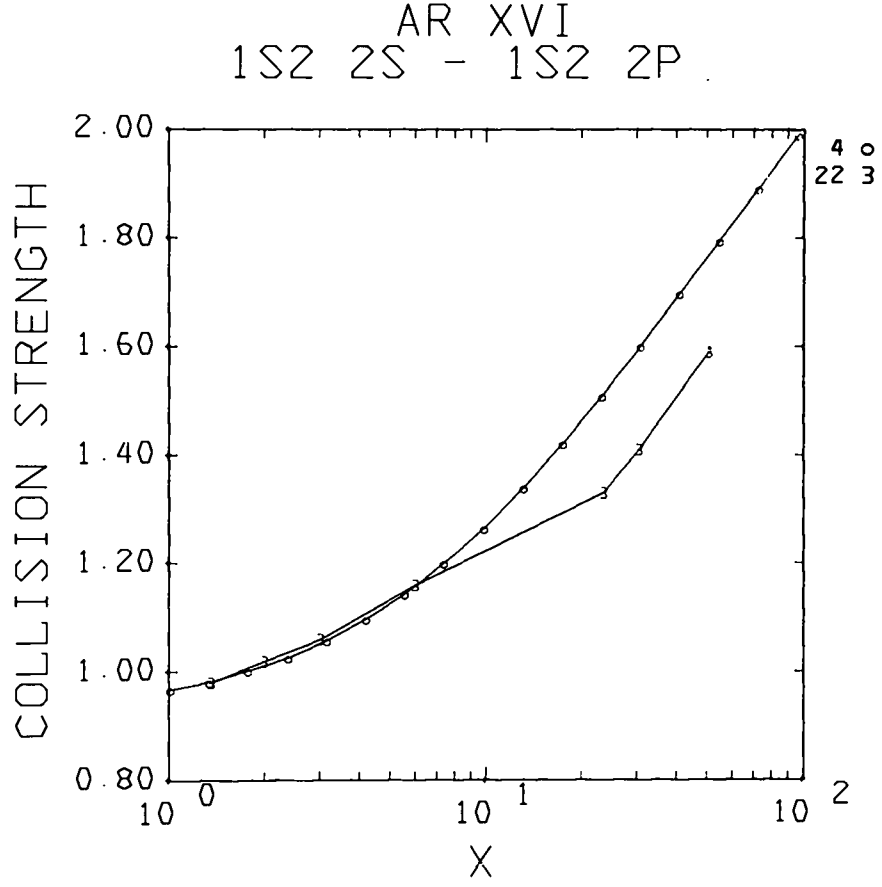
AR XV
2S2 - 2S 2P(1P)

X.SYMBOL	1 MANN E= 3.787	9 YOUNGER E= 4.122	15 SAMPSON E= 4.668
1.01	6.679E-01	-	-
1.27	6.790E-01	-	-
1.60	6.925E-01	-	-
2.00	-	6.540E-01	-
2.01	7.088E-01	-	-
2.53	7.284E-01	-	-
3.19	7.516E-01	-	-
4.01	7.786E-01	-	-
4.47	-	-	8.234E-01
5.00	-	7.500E-01	-
5.04	8.100E-01	-	-
6.35	8.458E-01	-	-
7.99	8.860E-01	-	-
8.00	-	8.260E-01	-
10.00	-	8.680E-01	-
10.05	9.304E-01	-	-
11.41	-	-	9.688E-01
12.65	9.786E-01	-	-
15.91	1.030E+00	-	-
16.00	-	9.660E-01	-
18.35	-	-	1.075E+00
20.00	-	1.020E+00	-
20.02	1.084E+00	-	-
25.19	1.141E+00	-	-
31.70	1.199E+00	-	-
39.89	1.257E+00	-	-
50.19	1.316E+00	-	-
53.06	-	-	1.363E+00
63.16	1.375E+00	-	-
79.47	1.434E+00	-	-
87.76	-	-	1.498E+00
100.00	1.492E+00	-	-
157.17	-	-	1.659E+00
226.57	-	-	1.753E+00



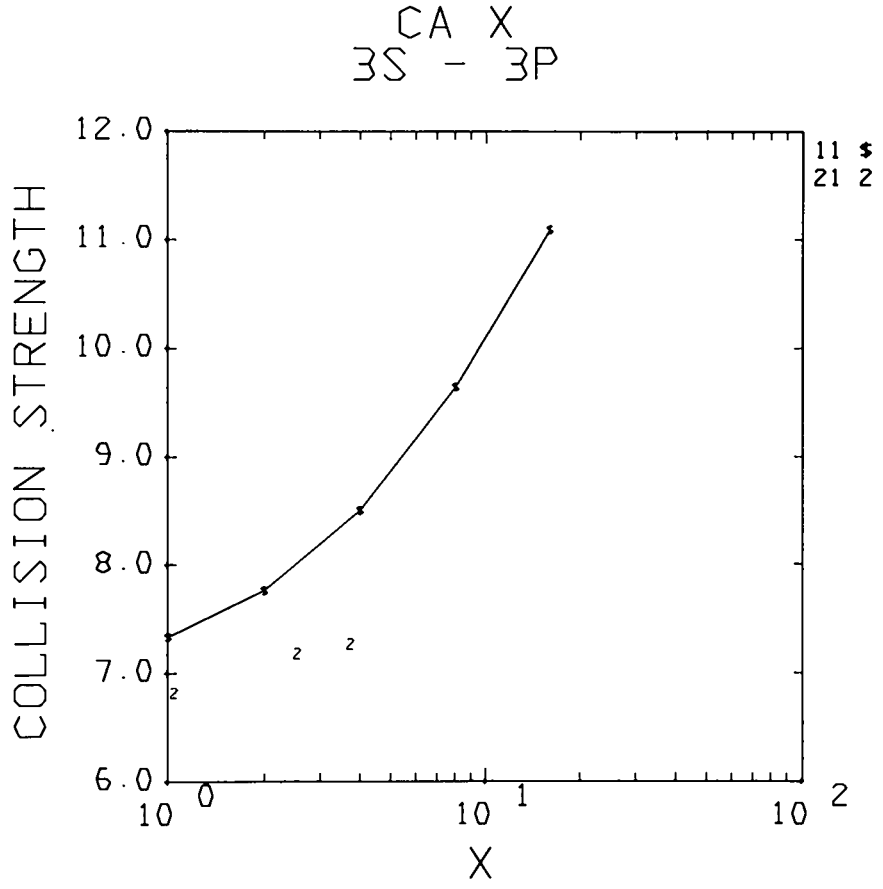
AR XVI
1S2 2S - 1S2 2P

X.SYMBOL	4 MANN E= 2.480	22 HENRY E= 2.309
1.01	9.680E-01	-
1.34	9.824E-01	-
1.36	-	9.800E-01
1.78	1.002E+00	-
2.00	-	1.020E+00
2.37	1.027E+00	-
3.00	-	1.060E+00
3.15	1.059E+00	-
4.19	1.098E+00	-
5.57	1.145E+00	-
6.00	-	1.160E+00
7.41	1.201E+00	-
9.85	1.266E+00	-
13.09	1.340E+00	-
17.41	1.421E+00	-
23.14	1.509E+00	-
23.39	-	1.330E+00
30.32	-	1.410E+00
30.76	1.602E+00	-
40.89	1.698E+00	-
50.24	-	1.590E+00
54.36	1.795E+00	-
72.26	1.893E+00	-
96.06	1.991E+00	-
127.70	2.087E+00	-
169.76	2.181E+00	-
225.67	2.273E+00	-
300.00	2.362E+00	-



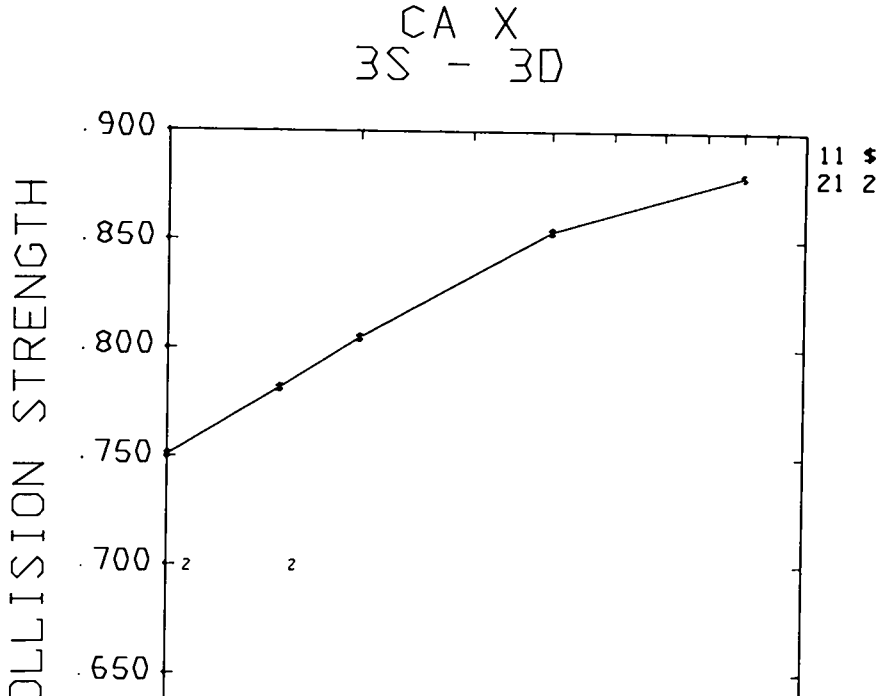
CA X
3S - 3P

X. SYMBOL	11 BLAHA E= 1.618	21 FLOWER E= 1.610
1.00	7.340E+00	-
1.05	-	6.820E+00
2.00	7.770E+00	-
2.54	-	7.190E+00
3.72	-	7.280E+00
4.00	8.510E+00	-
8.00	9.650E+00	-
16.00	1.110E+01	-



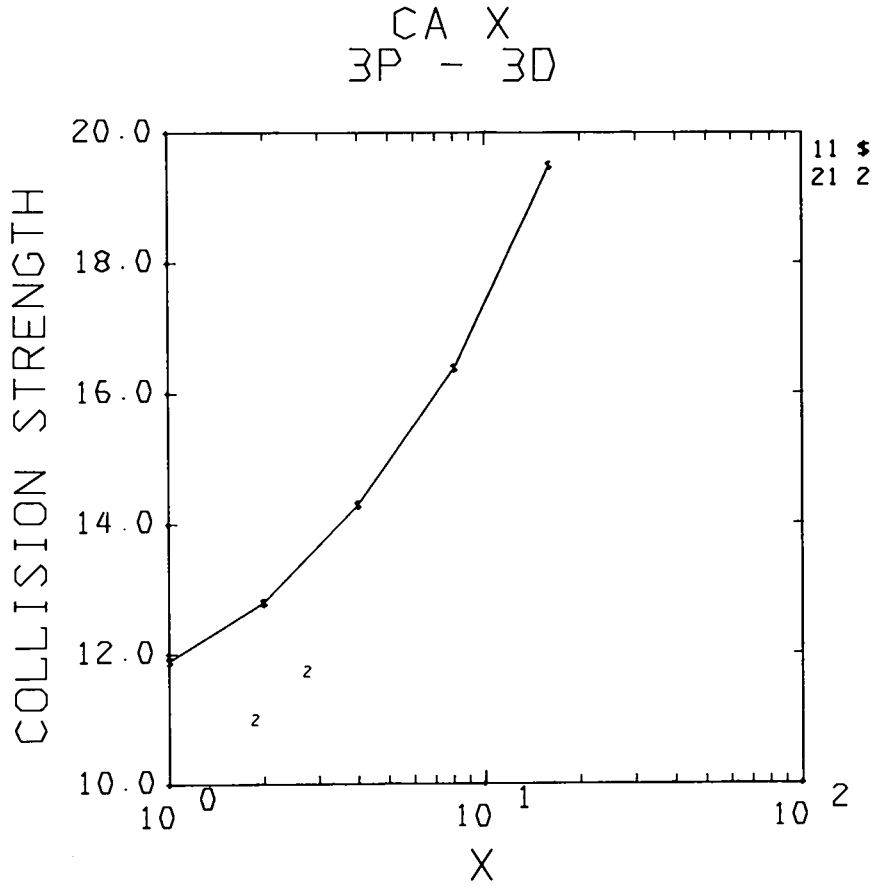
CA X
3S - 3D

X.	SYMBOL	11 BLAHA E= 3.803	21 FLOWER E= 3.800
1.00		7.510E-01	-
1.08		-	7.000E-01
1.50		7.820E-01	-
1.58		-	7.000E-01
2.00		8.050E-01	-
4.00		8.540E-01	-
8.00		8.800E-01	-



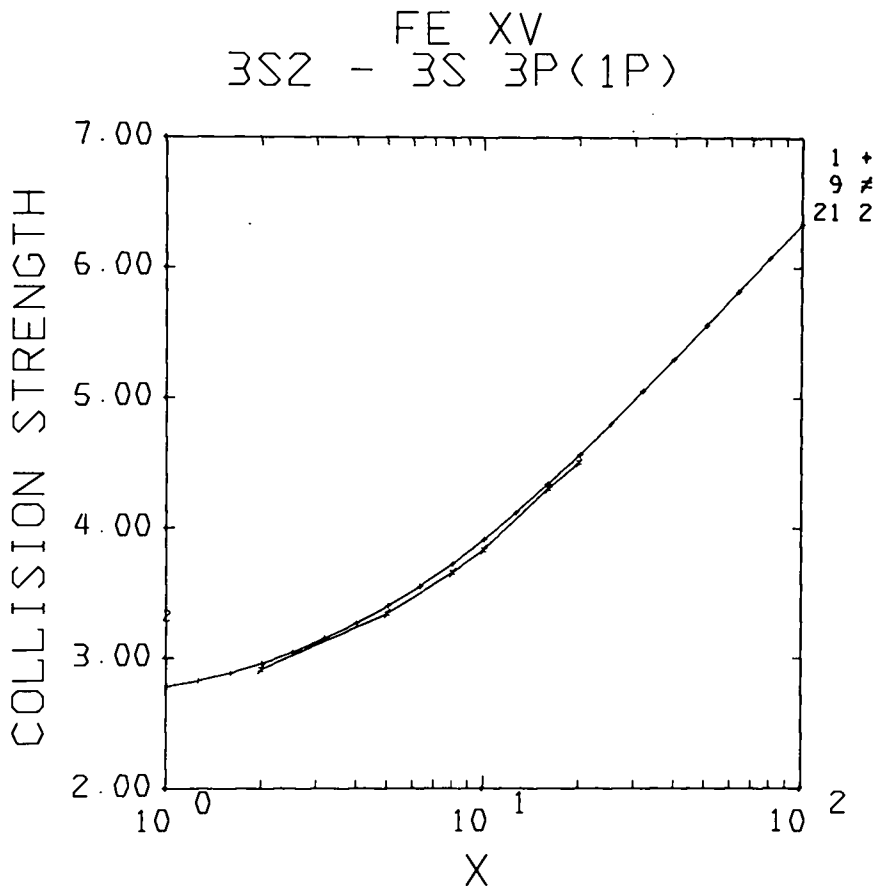
CA X
3P - 3D

X. SYMBOL	11 BLAHA E= 2.185	21 FLOWER E= 2.190
1.00	1.190E+01	-
1.87	-	1.100E+01
2.00	1.280E+01	-
2.74	-	1.175E+01
4.00	1.430E+01	-
8.00	1.640E+01	-
16.00	1.950E+01	-



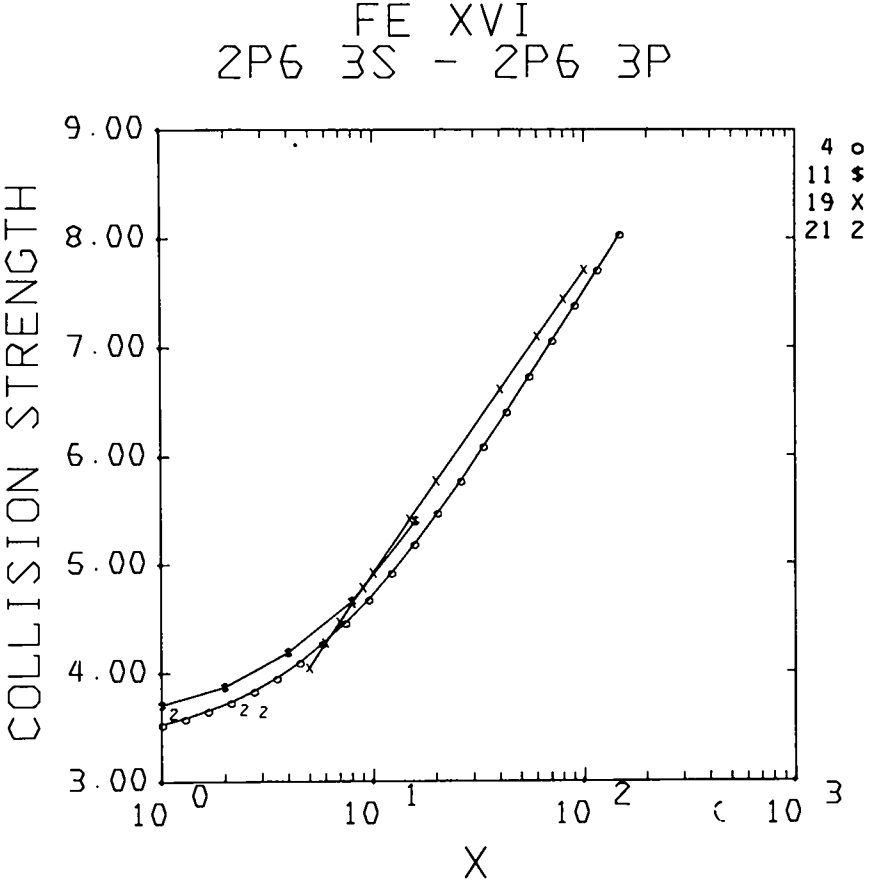
FE XV
3S2 - 3S 3P(1P)

X.	SYMBOL	1	9	21
		MANN	YOUNGER	FLOWER
		E= 3.207	E= 3.207	E= 3.073
1.01		2.784E+00	-	3.330E+00
1.27		2.835E+00	-	-
1.60		2.893E+00	-	-
2.00		-	2.920E+00	-
2.01		2.966E+00	-	-
2.53		3.053E+00	-	-
3.19		3.155E+00	-	-
4.01		3.274E+00	-	-
5.00		-	3.350E+00	-
5.04		3.410E+00	-	-
6.35		3.563E+00	-	-
7.99		3.735E+00	-	-
8.00		-	3.670E+00	-
10.00		-	3.840E+00	-
10.05		3.922E+00	-	-
12.65		4.126E+00	-	-
15.91		4.343E+00	-	-
16.00		-	4.310E+00	-
20.00		-	4.510E+00	-
20.02		4.572E+00	-	-
25.19		4.811E+00	-	-
31.70		5.057E+00	-	-
39.89		5.309E+00	-	-
50.19		5.564E+00	-	-
63.16		5.822E+00	-	-
79.47		6.080E+00	-	-
100.00		6.338E+00	-	-



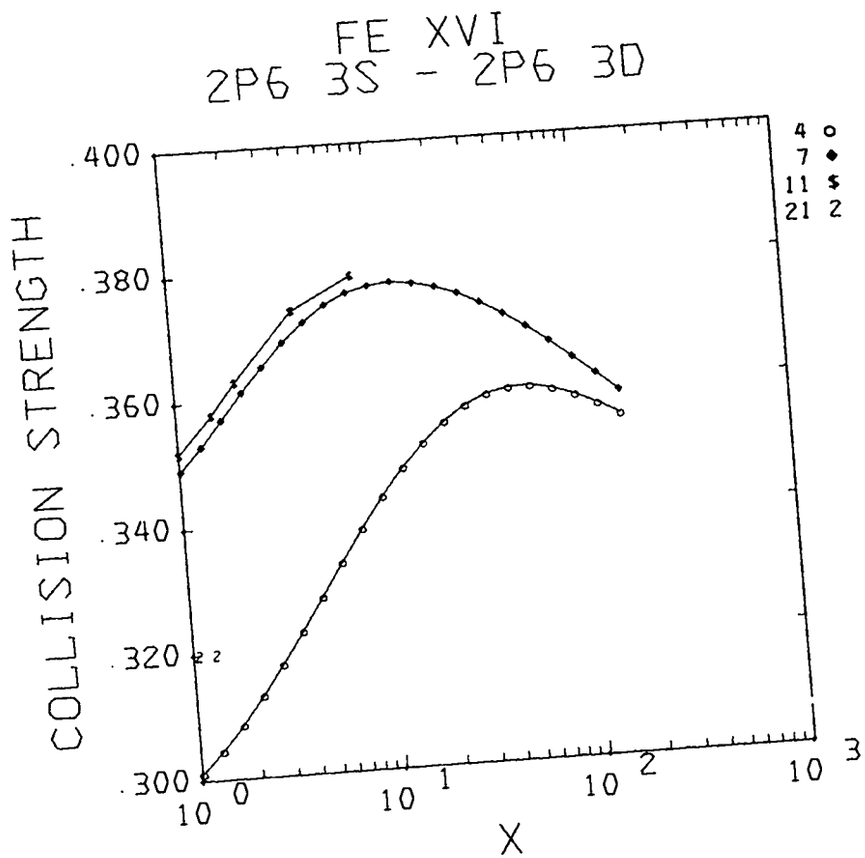
FE XVI
2P6 3S - 2P6 3P

X.SYMBOL	4 MANN E= 2.653	11 BLAHA E= 2.653	19 KIM E= 2.667	21 FLOWER E= 2.640
1.00	-	3.710E+00	-	-
1.01	3.541E+00	-	-	-
1.14	-	-	-	3.630E+00
1.30	3.596E+00	-	-	-
1.67	3.661E+00	-	-	-
2.00	-	3.880E+00	-	-
2.14	3.744E+00	-	-	-
2.46	-	-	-	3.670E+00
2.75	3.846E+00	-	-	-
3.03	-	-	-	3.650E+00
3.53	3.968E+00	-	-	-
4.00	-	4.200E+00	-	-
4.53	4.113E+00	-	-	-
5.00	-	-	4.051E+00	-
5.81	4.282E+00	-	-	-
6.00	-	-	4.285E+00	-
7.00	-	-	4.480E+00	-
7.46	4.475E+00	-	-	-
8.00	-	4.670E+00	4.648E+00	-
9.00	-	-	4.796E+00	-
9.59	4.695E+00	-	-	-
10.00	-	-	4.926E+00	-
12.31	4.937E+00	-	-	-
15.00	-	-	5.426E+00	-
15.81	5.202E+00	-	-	-
16.00	-	5.410E+00	-	-
20.00	-	-	5.777E+00	-
20.29	5.485E+00	-	-	-
26.06	5.785E+00	-	-	-
33.46	6.096E+00	-	-	-
40.00	-	-	6.615E+00	-
42.97	6.415E+00	-	-	-
55.17	6.740E+00	-	-	-
60.00	-	-	7.102E+00	-
70.85	7.068E+00	-	-	-
80.00	-	-	7.447E+00	-
90.97	7.397E+00	-	-	-
100.00	-	-	7.714E+00	-
116.82	7.726E+00	-	-	-
150.00	8.052E+00	-	-	-



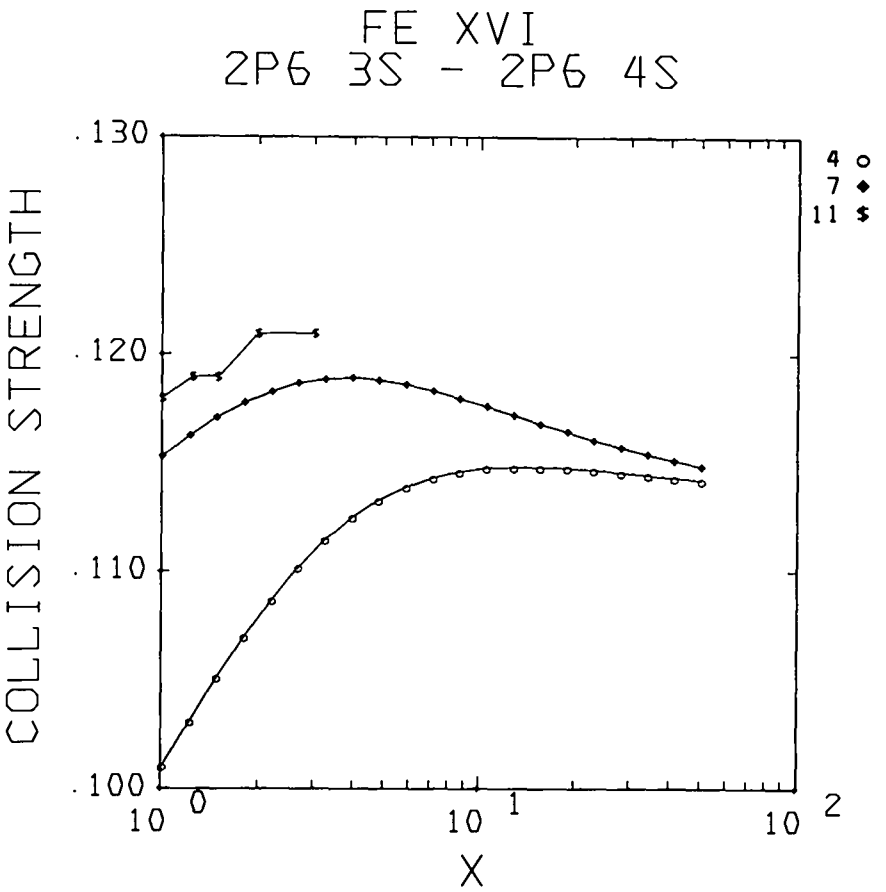
FE XVI
2P6 3S - 2P6 3D

X	SYMBOL	4 MANN E= 6.172	7 MANN E= 0.000	11 BLAHA E= 6.172	21 FLOWER E= 6.150
1.00		-	-	3.520E-01	-
1.01		3.013E-01	3.493E-01	-	3.200E-01
1.06		-	-	-	3.200E-01
1.30		3.047E-01	3.532E-01	3.580E-01	-
1.50		-	-	-	-
1.67		3.087E-01	3.572E-01	3.630E-01	-
2.00		-	-	-	-
2.14		3.132E-01	3.614E-01	-	-
2.75		3.179E-01	3.653E-01	-	-
3.53		3.231E-01	3.690E-01	3.740E-01	-
4.00		-	-	-	-
4.53		3.284E-01	3.721E-01	-	-
5.81		3.337E-01	3.746E-01	-	-
7.46		3.388E-01	3.763E-01	3.790E-01	-
8.00		-	-	-	-
9.59		3.436E-01	3.773E-01	-	-
12.31		3.480E-01	3.776E-01	-	-
15.81		3.518E-01	3.773E-01	-	-
20.29		3.550E-01	3.765E-01	-	-
26.06		3.574E-01	3.752E-01	-	-
33.46		3.589E-01	3.736E-01	-	-
42.97		3.597E-01	3.715E-01	-	-
55.17		3.599E-01	3.694E-01	-	-
70.85		3.592E-01	3.667E-01	-	-
90.97		3.580E-01	3.640E-01	-	-
116.82		3.565E-01	3.612E-01	-	-
150.00		3.545E-01	3.582E-01	-	-



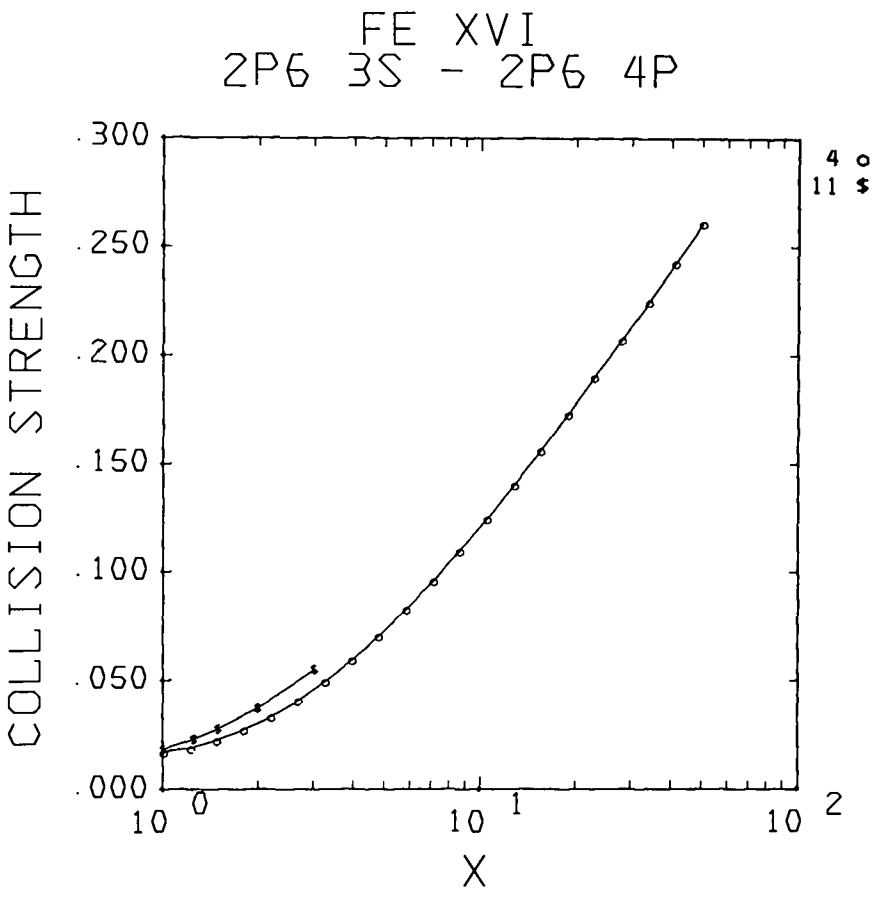
FE XVI
2P6 3S - 2P6 4S

X. SYMBOL	11 BLAHA E= 17.02	7 MANN E= 0.000	4 MANN E= 17.02
1.00	1.180E-01	-	-
1.01	-	1.153E-01	1.011E-01
1.23	-	1.163E-01	1.031E-01
1.25	1.190E-01	-	-
1.50	1.190E-01	1.171E-01	1.051E-01
1.81	-	1.178E-01	1.070E-01
2.00	1.210E-01	-	-
2.20	-	1.183E-01	1.087E-01
2.68	-	1.187E-01	1.103E-01
3.00	1.210E-01	-	-
3.26	-	1.189E-01	1.115E-01
3.96	-	1.189E-01	1.126E-01
4.81	-	1.188E-01	1.133E-01
5.85	-	1.186E-01	1.139E-01
7.11	-	1.184E-01	1.144E-01
8.64	-	1.180E-01	1.146E-01
10.50	-	1.176E-01	1.148E-01
12.76	-	1.173E-01	1.149E-01
15.51	-	1.169E-01	1.149E-01
18.85	-	1.165E-01	1.148E-01
22.91	-	1.161E-01	1.147E-01
27.85	-	1.158E-01	1.146E-01
33.85	-	1.155E-01	1.145E-01
41.14	-	1.152E-01	1.144E-01
50.00	-	1.149E-01	1.143E-01



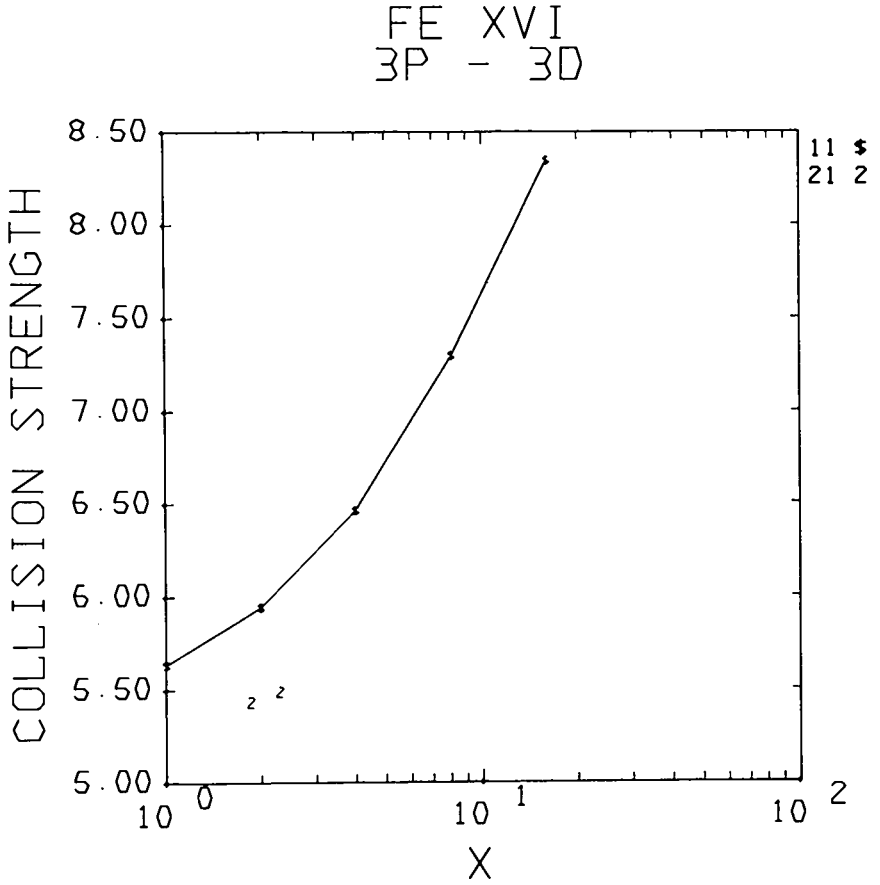
FE XVI
2P6 3S - 2P6 4P

X.SYMBOL	11 BLAHA E= 18.07	4 MANN E= 18.07
1.00	1.850E-02	-
1.01	-	1.721E-02
1.23	-	1.948E-02
1.25	2.310E-02	-
1.50	2.800E-02	2.289E-02
1.81	-	2.760E-02
2.00	3.750E-02	-
2.20	-	3.366E-02
2.68	-	4.111E-02
3.00	5.540E-02	-
3.26	-	4.989E-02
3.96	-	5.993E-02
4.81	-	7.111E-02
5.85	-	8.333E-02
7.11	-	9.648E-02
8.64	-	1.105E-01
10.50	-	1.252E-01
12.76	-	1.407E-01
15.51	-	1.567E-01
18.85	-	1.732E-01
22.91	-	1.902E-01
27.85	-	2.075E-01
33.85	-	2.251E-01
41.14	-	2.430E-01
50.00	-	2.611E-01



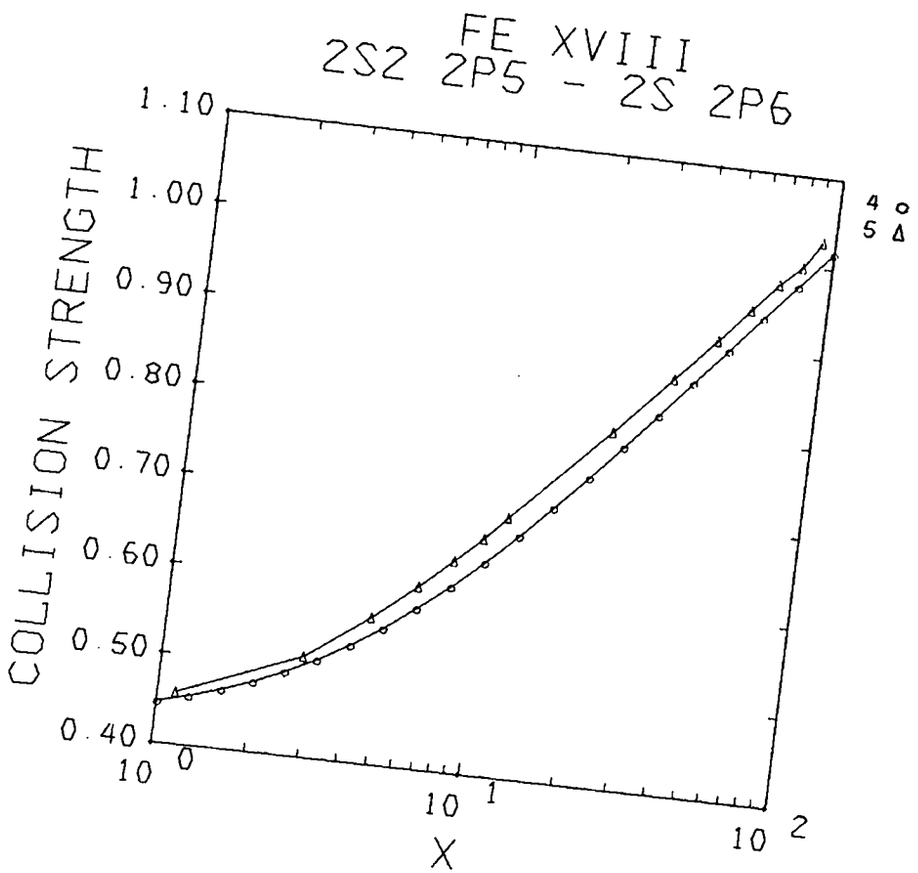
FE XVI
3P - 3D

X.	SYMBOL	11 BLAHA E= 3.518	21 FLOWER E= 3.500
1.00		5.640E+00	-
1.86		-	5.439E+00
2.00		5.950E+00	-
2.29		-	5.495E+00
4.00		6.470E+00	-
8.00		7.300E+00	-
16.00		8.350E+00	-



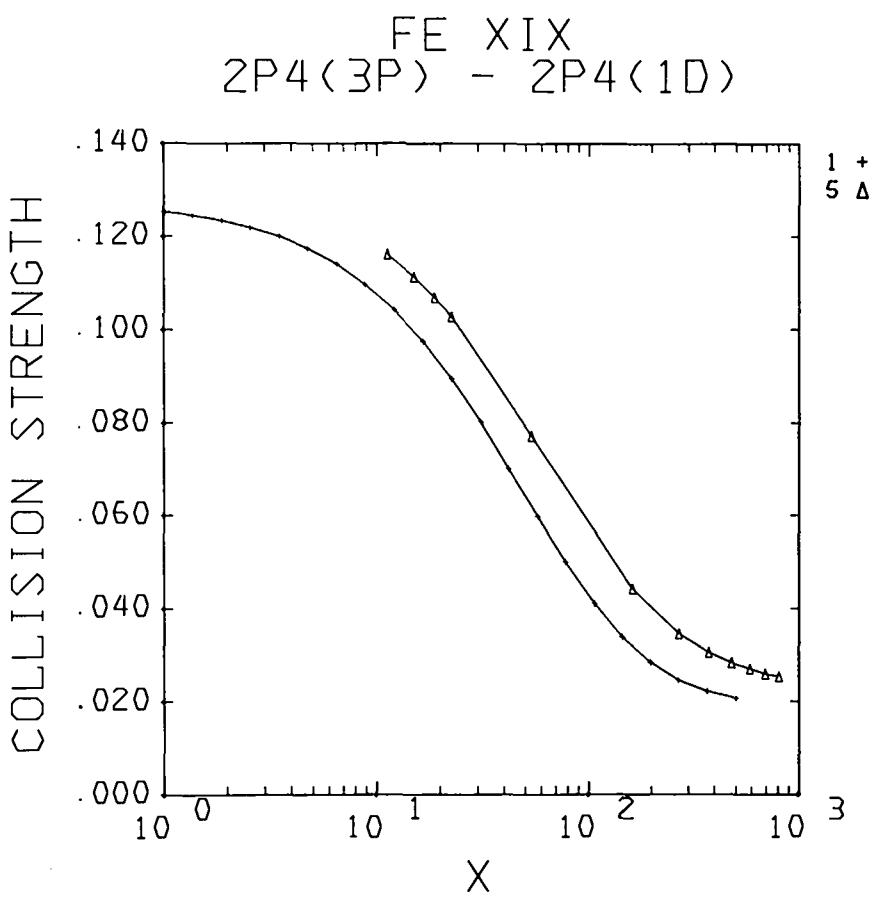
FE XVIII
2S2 2P5 - 2S 2P6

X.SYMBOL	ROBB [5] E= 8.736	MANN [4] E= 9.390
1.01	-	-
1.14	4.580E-01	4.468E-01
1.27	-	-
1.60	-	4.555E-01
2.01	-	4.659E-01
2.53	-	4.782E-01
2.86	5.120E-01	4.929E-01
3.19	-	-
4.01	-	5.102E-01
4.58	5.630E-01	5.301E-01
5.04	-	-
6.29	6.030E-01	5.528E-01
6.35	-	-
7.99	-	5.783E-01
8.01	6.350E-01	6.066E-01
9.73	6.630E-01	-
10.05	-	-
11.44	6.890E-01	6.375E-01
12.65	-	-
15.91	-	6.709E-01
20.02	-	7.061E-01
22.89	7.960E-01	7.430E-01
25.19	-	-
31.70	-	7.812E-01
34.33	8.620E-01	8.204E-01
39.89	-	-
45.77	9.090E-01	8.600E-01
50.19	-	-
57.22	9.470E-01	8.999E-01
63.16	-	-
68.66	9.790E-01	9.396E-01
79.47	-	-
80.10	1.000E+00	9.792E-01
91.54	1.030E+00	-
100.00	-	1.018E+00



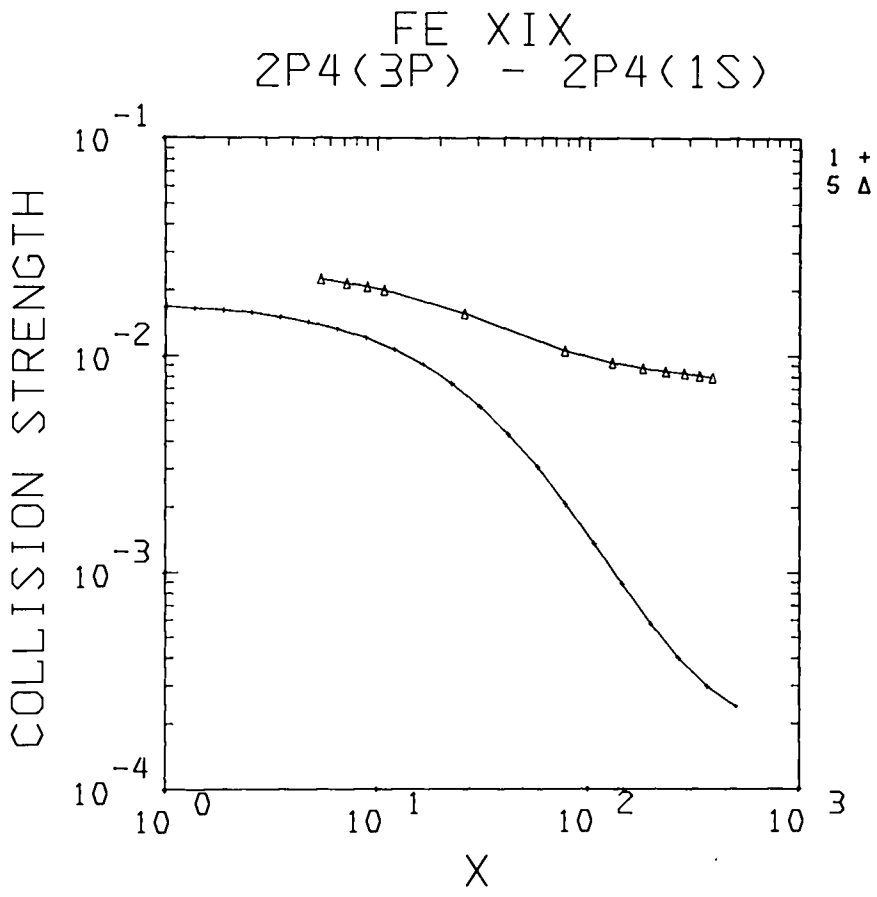
FE XIX
2P4(3P) - 2P4(1D)

X. SYMBOL	1 MANN E= 1.228	5 ROBB E= .935
1.01	1.255E-01	-
1.38	1.247E-01	-
1.88	1.236E-01	-
2.56	1.221E-01	-
3.49	1.202E-01	-
4.76	1.176E-01	-
6.50	1.142E-01	-
8.86	1.099E-01	-
11.23	-	1.163E-01
12.08	1.045E-01	-
14.97	-	1.115E-01
16.48	9.762E-02	-
18.71	-	1.070E-01
22.46	-	1.029E-01
22.47	8.957E-02	-
30.65	8.037E-02	-
41.79	7.035E-02	-
53.47	-	7.740E-02
57.00	6.003E-02	-
77.73	5.017E-02	-
106.00	4.138E-02	-
144.56	3.416E-02	-
160.41	-	4.440E-02
197.14	2.870E-02	-
267.35	-	3.476E-02
268.85	2.487E-02	-
366.64	2.238E-02	-
374.29	-	3.070E-02
481.23	-	2.854E-02
500.00	2.084E-02	-
588.17	-	2.719E-02
695.11	-	2.609E-02
802.05	-	2.550E-02



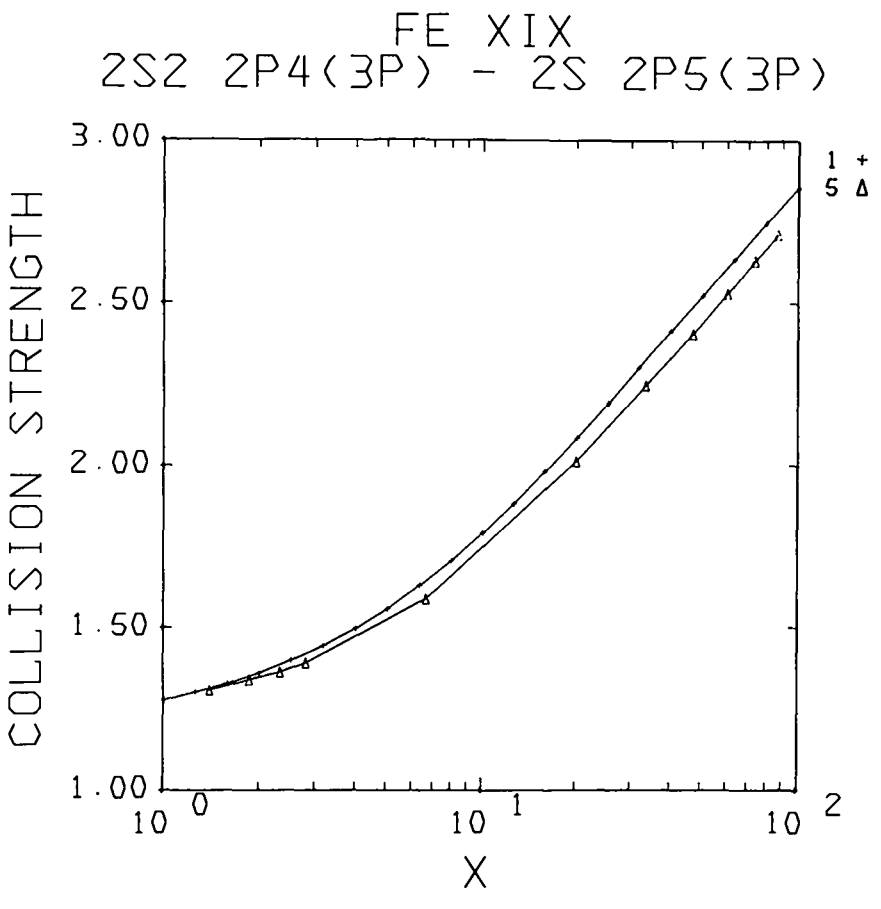
FE XIX
2P4(3P) - 2P4(1S)

X.SYMBOL	1 MANN E= 2.653	5 ROBB E= 1.945
1.01	1.683E-02	-
1.38	1.656E-02	-
1.88	1.619E-02	-
2.56	1.571E-02	-
3.49	1.509E-02	-
4.76	1.430E-02	-
5.40	-	2.255E-02
6.50	1.330E-02	-
7.20	-	2.159E-02
8.86	1.209E-02	-
9.00	-	2.075E-02
10.80	-	2.005E-02
12.08	1.069E-02	-
16.48	9.124E-03	-
22.47	7.473E-03	-
25.71	-	1.565E-02
30.65	5.841E-03	-
41.79	4.346E-03	-
57.00	3.077E-03	-
77.12	-	1.051E-02
77.73	2.086E-03	-
106.00	1.369E-03	-
128.53	-	9.261E-03
144.56	8.879E-04	-
179.94	-	8.761E-03
197.14	5.847E-04	-
231.35	-	8.504E-03
268.85	4.037E-04	-
282.76	-	8.289E-03
334.17	-	8.082E-03
366.64	2.999E-04	-
385.58	-	7.976E-03
500.00	2.420E-04	-



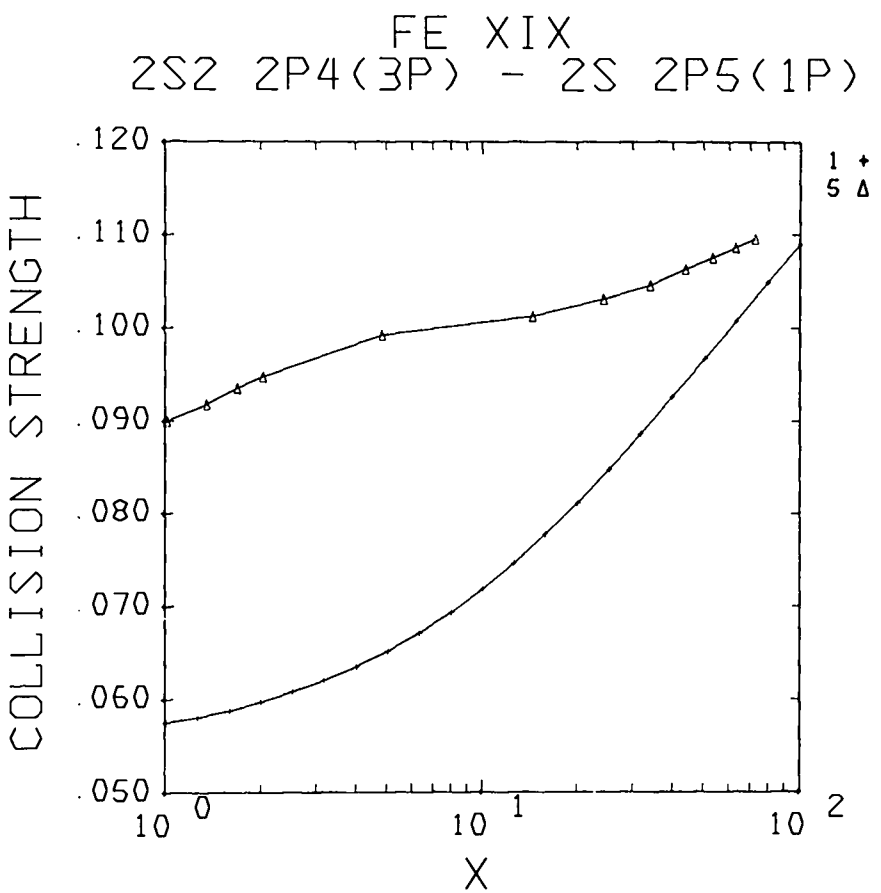
FE XIX
2S2 2P4(3P) - 2S 2P5(3P)

X.	SYMBOL	1 MANN E= 8.386	5 ROBB E= 7.498
1.01		1.280E+00	-
1.27		1.303E+00	-
1.40		-	1.310E+00
1.60		1.330E+00	-
1.87		-	1.341E+00
2.01		1.362E+00	-
2.33		-	1.365E+00
2.53		1.401E+00	-
2.80		-	1.393E+00
3.19		1.447E+00	-
4.01		1.501E+00	-
5.04		1.562E+00	-
6.35		1.631E+00	-
6.67		-	1.592E+00
7.99		1.709E+00	-
10.05		1.794E+00	-
12.65		1.886E+00	-
15.91		1.984E+00	-
20.00		-	2.015E+00
20.02		2.086E+00	-
25.19		2.193E+00	-
31.70		2.303E+00	-
33.34		-	2.247E+00
39.89		2.414E+00	-
46.68		-	2.407E+00
50.19		2.526E+00	-
60.01		-	2.532E+00
63.16		2.638E+00	-
73.35		-	2.633E+00
79.47		2.749E+00	-
86.69		-	2.715E+00
100.00		2.859E+00	-
100.02		-	2.785E+00



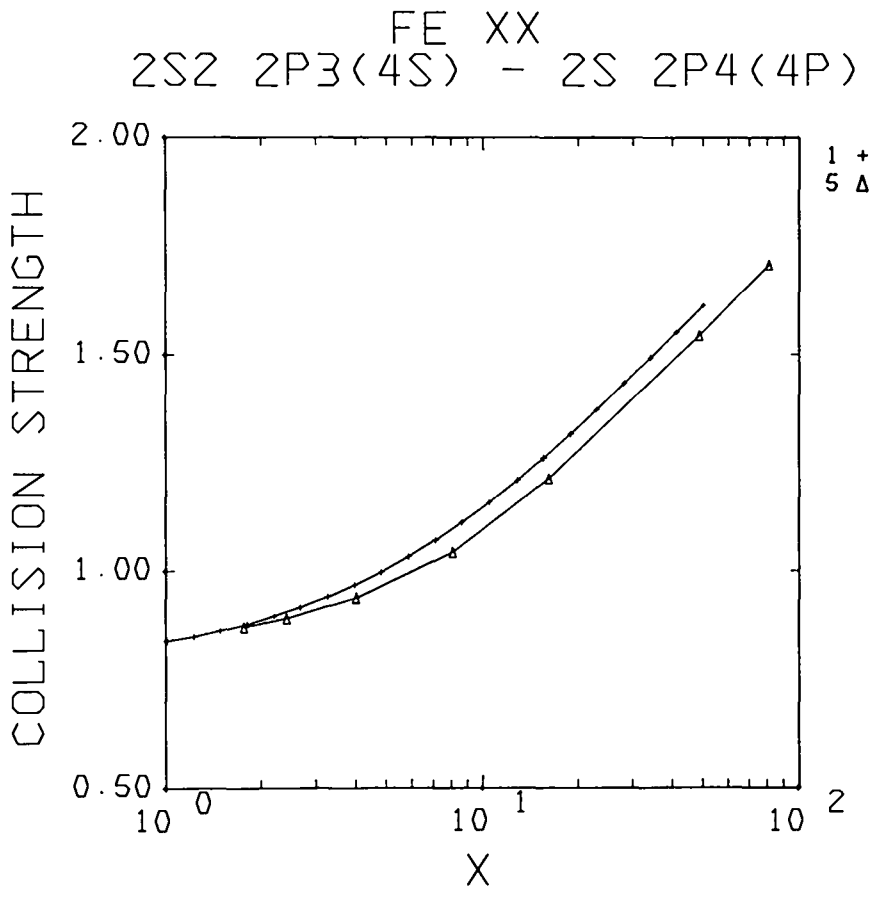
FE XIX
2S2 2P4(3P) - 2S 2P5(1P)

X.SYMBOL	1 MANN E= 11.24	5 ROBB E= 10.33
1.02	5.752E-02	9.009E-02
1.27	5.816E-02	-
1.35	-	9.184E-02
1.60	5.889E-02	-
1.69	-	9.356E-02
2.01	5.980E-02	-
2.03	-	9.478E-02
2.53	6.086E-02	-
3.19	6.212E-02	-
4.01	6.358E-02	-
4.84	-	9.924E-02
5.04	6.528E-02	-
6.35	6.722E-02	-
7.99	6.944E-02	-
10.05	7.195E-02	-
12.65	7.477E-02	-
14.51	-	1.013E-01
15.91	7.788E-02	-
20.02	8.126E-02	-
24.19	-	1.032E-01
25.19	8.489E-02	-
31.70	8.871E-02	-
33.87	-	1.047E-01
39.89	9.267E-02	-
43.54	-	1.064E-01
50.19	9.673E-02	-
53.22	-	1.076E-01
62.89	-	1.088E-01
63.16	1.008E-01	-
72.57	-	1.097E-01
79.47	1.050E-01	-
100.00	1.091E-01	-



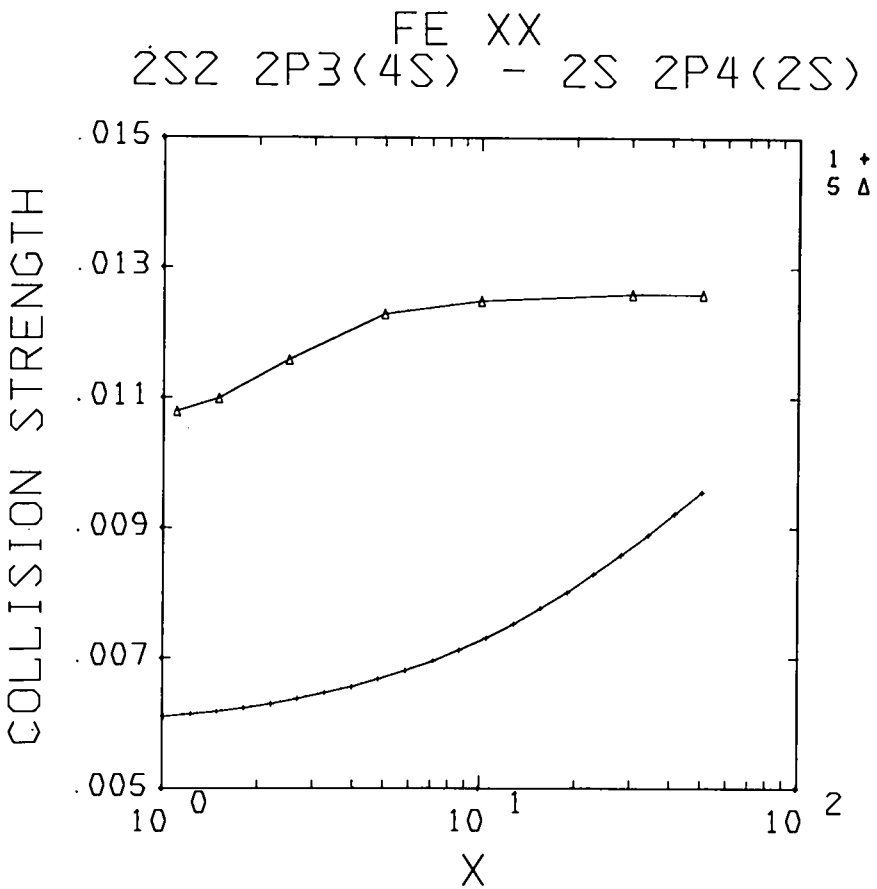
FE XX
2S2 2P3(4S) - 2S 2P4(4P)

X.	SYMBOL	1	5
		MANN	ROBB
		E= 7.189	E= 6.209
1.01		8.405E-01	-
1.23		8.515E-01	-
1.49		8.646E-01	-
1.77		-	8.740E-01
1.81		8.799E-01	-
2.20		8.979E-01	-
2.42		-	8.930E-01
2.68		9.183E-01	-
3.26		9.423E-01	-
3.96		9.697E-01	-
4.03		-	9.400E-01
4.81		1.001E+00	-
5.85		1.036E+00	-
7.11		1.074E+00	-
8.05		-	1.047E+00
8.64		1.116E+00	-
10.50		1.162E+00	-
12.76		1.211E+00	-
15.51		1.263E+00	-
16.11		-	1.216E+00
18.85		1.318E+00	-
22.91		1.375E+00	-
27.85		1.433E+00	-
33.85		1.493E+00	-
41.14		1.553E+00	-
48.32		-	1.545E+00
50.00		1.614E+00	-
80.53		-	1.709E+00



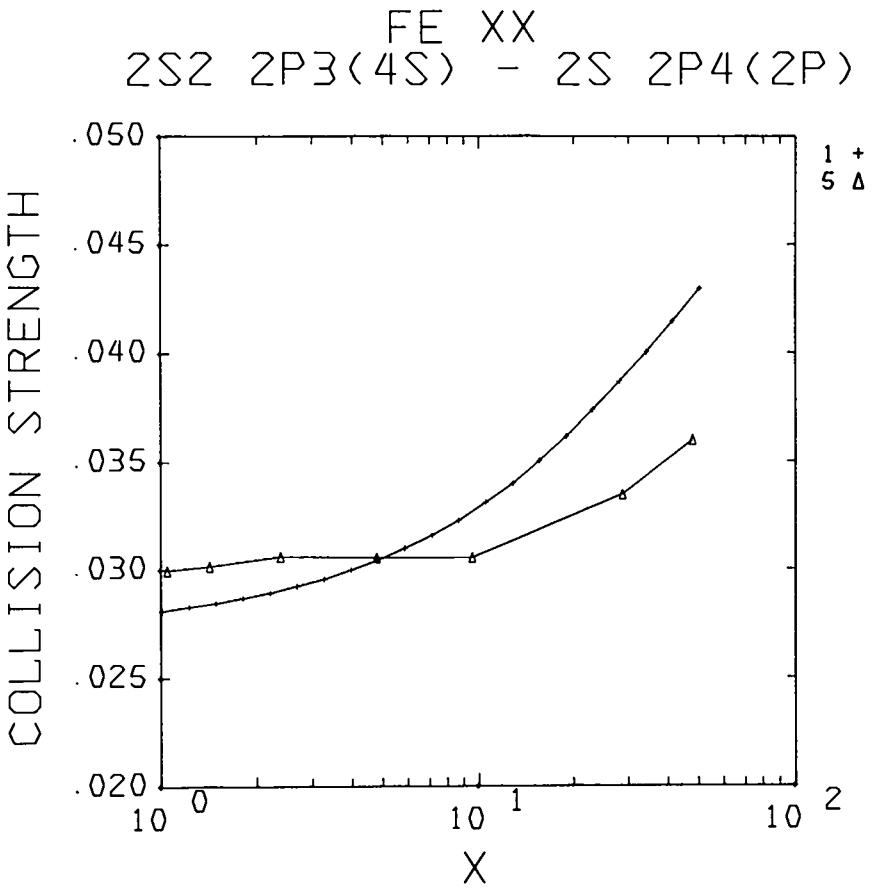
FE XX
2S2 2P3(4S) - 2S 2P4(2S)

X.	SYMBOL	1	5
		MANN	ROBB
		E= 10.60	E= 10.03
1.01		6.102E-03	-
1.10		-	1.080E-02
1.23		6.144E-03	-
1.50		6.193E-03	1.100E-02
1.81		6.246E-03	-
2.20		6.312E-03	-
2.49		-	1.160E-02
2.68		6.389E-03	-
3.26		6.477E-03	-
3.96		6.578E-03	-
4.81		6.693E-03	-
4.99		-	1.230E-02
5.85		6.824E-03	-
7.11		6.972E-03	-
8.64		7.141E-03	-
9.98		-	1.250E-02
10.50		7.330E-03	-
12.76		7.541E-03	-
15.51		7.775E-03	-
18.85		8.031E-03	-
22.91		8.307E-03	-
27.85		8.602E-03	-
29.93		-	1.260E-02
33.85		8.911E-03	-
41.14		9.233E-03	-
49.88		-	1.260E-02
50.00		9.564E-03	-



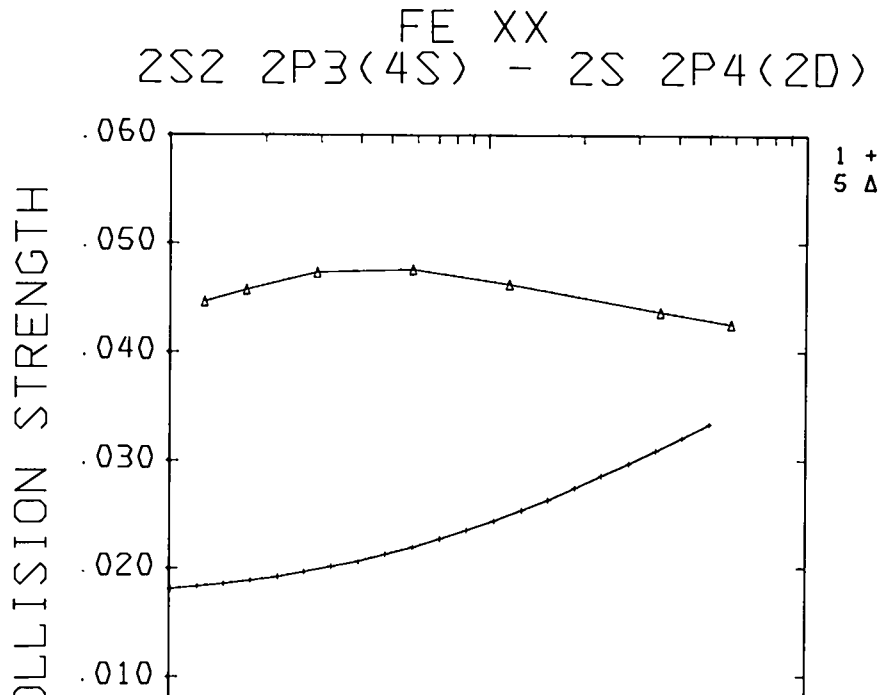
FE XX
2S2 2P3(4S) - 2S 2P4(2P)

X.	SYMBOL	1 MANN E= 11.34	5 ROBB E= 10.50
1.01		2.815E-02	-
1.05		-	3.000E-02
1.23		2.832E-02	-
1.43		-	3.020E-02
1.49		2.850E-02	-
1.81		2.872E-02	-
2.20		2.898E-02	-
2.38		-	3.063E-02
2.68		2.928E-02	-
3.26		2.963E-02	-
3.96		3.003E-02	-
4.76		-	3.059E-02
4.81		3.049E-02	-
5.85		3.102E-02	-
7.11		3.163E-02	-
8.64		3.233E-02	-
9.52		-	3.060E-02
10.50		3.314E-02	-
12.76		3.404E-02	-
15.51		3.506E-02	-
18.85		3.618E-02	-
22.91		3.740E-02	-
27.85		3.870E-02	-
28.56		-	3.850E-02
33.85		4.008E-02	-
41.14		4.152E-02	-
47.60		-	3.600E-02
50.00		4.300E-02	-



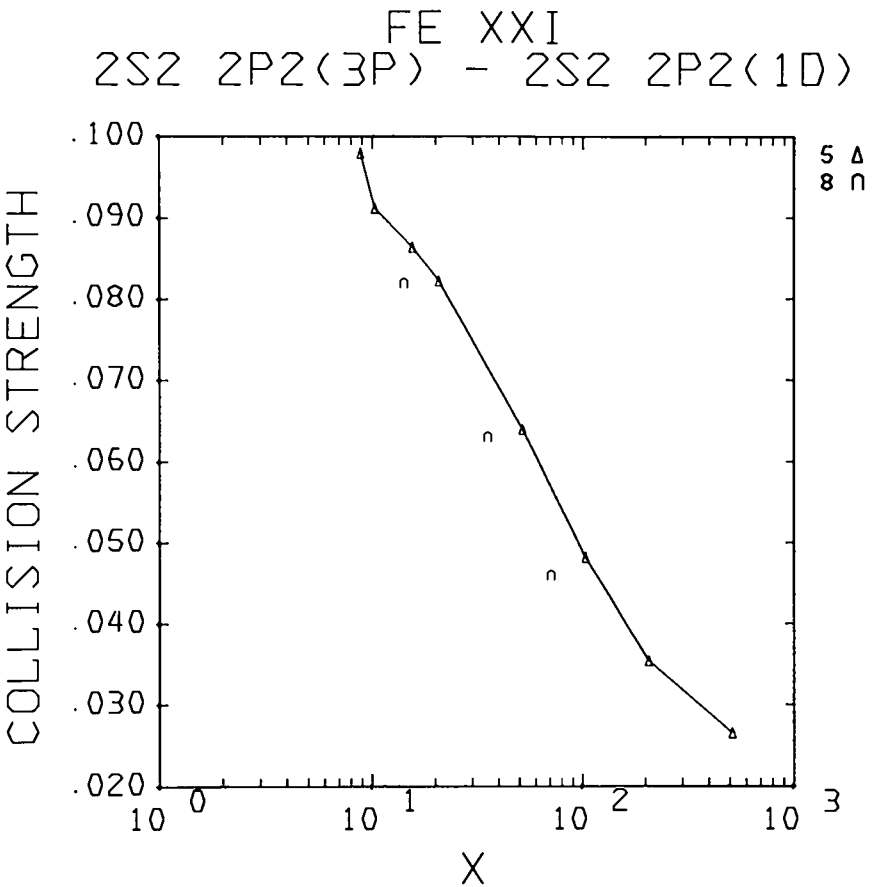
FE XX
2S2 2P3(4S) - 2S 2P4(2D)

X.SYMBOL	1 MANN E= 9.440	5 ROBB E= 8.595
1.01	1.820E-02	-
1.23	1.842E-02	-
1.28	-	4.468E-02
1.49	1.868E-02	-
1.75	-	4.576E-02
1.81	1.898E-02	-
2.20	1.933E-02	-
2.68	1.974E-02	-
2.91	-	4.739E-02
3.26	2.021E-02	-
3.96	2.075E-02	-
4.81	2.135E-02	-
5.82	-	4.763E-02
5.85	2.202E-02	-
7.11	2.276E-02	-
8.64	2.357E-02	-
10.50	2.446E-02	-
11.63	-	4.627E-02
12.76	2.541E-02	-
15.51	2.642E-02	-
18.85	2.748E-02	-
22.91	2.860E-02	-
27.85	2.975E-02	-
33.85	3.094E-02	-
34.90	-	4.372E-02
41.14	3.215E-02	-
50.00	3.337E-02	-
58.17	-	4.260E-02



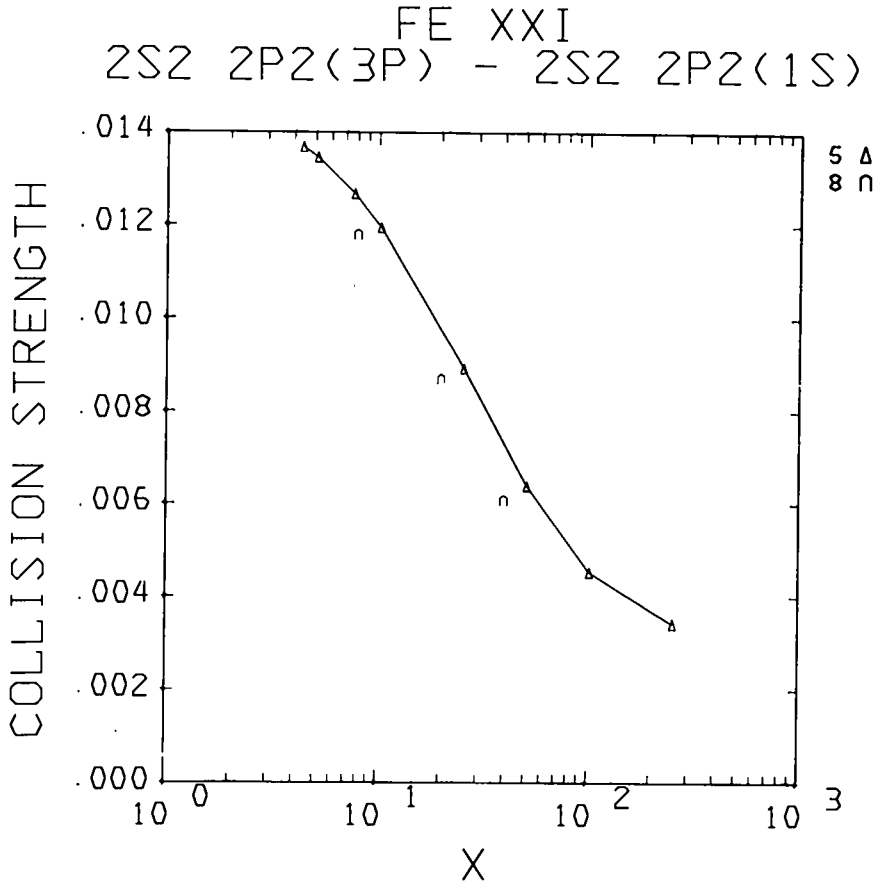
FE XXI
2S2 2P2(3P) - 2S2 2P2(1D)

X	SYMBOL	5 ROBB E= .967	8 UCL E= 1.410
8.79		9.806E-02	-
10.34		9.128E-02	-
14.18		-	8.200E-02
15.51		8.646E-02	-
20.68		8.237E-02	-
35.46		-	6.310E-02
51.71		6.410E-02	-
70.92		-	4.610E-02
103.41		4.823E-02	-
206.83		3.553E-02	-
517.06		2.659E-02	-



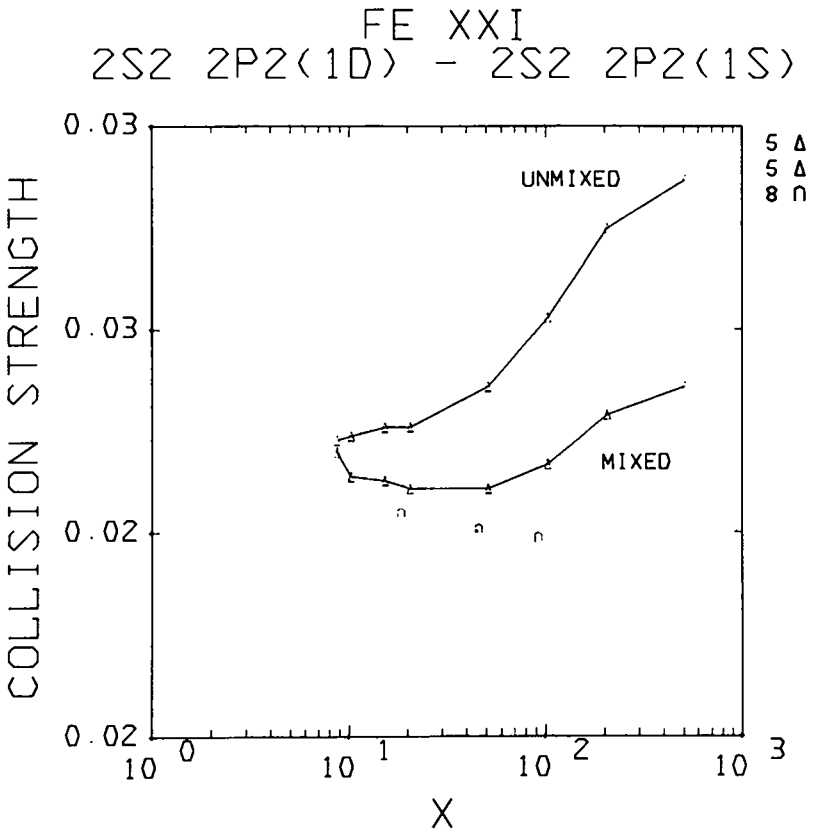
FE XXI
2S2 2P2(3P) - 2S2 2P2(1S)

X.	SYMBOL	5 ROBB E= 1.948	8 UCL E= 2.506
4.36		1.369E-02	-
5.13		1.348E-02	-
7.70		1.270E-02	-
7.98		-	1.180E-02
10.27		1.197E-02	-
19.95		-	8.700E-03
25.67		8.933E-03	-
39.90		-	6.100E-03
51.33		6.421E-03	-
102.67		4.566E-03	-
256.67		3.436E-03	-



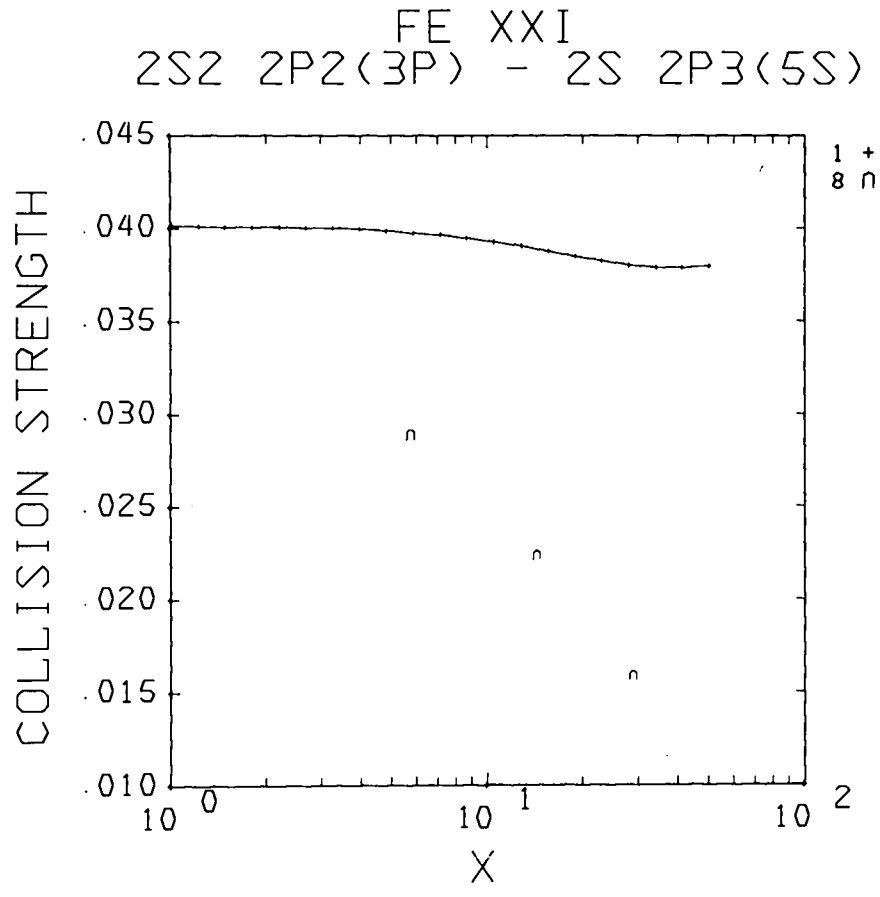
FE XXI
2S2 2P2(1D) - 2S2 2P2(1S)

X.	SYMBOL	8 UCL E= 1.096	5 ROBB E= 0.000	5 ROBB E= .981
8.66		-	2.230E-02	2.200E-02
10.19		-	2.240E-02	2.140E-02
15.29		-	2.260E-02	2.130E-02
18.24		2.050E-02	-	-
20.39		-	2.260E-02	2.110E-02
45.60		2.010E-02	-	-
50.97		-	2.360E-02	2.110E-02
91.21		1.990E-02	-	-
101.94		-	2.530E-02	2.170E-02
203.87		-	2.750E-02	2.290E-02
509.68		-	2.870E-02	2.360E-02



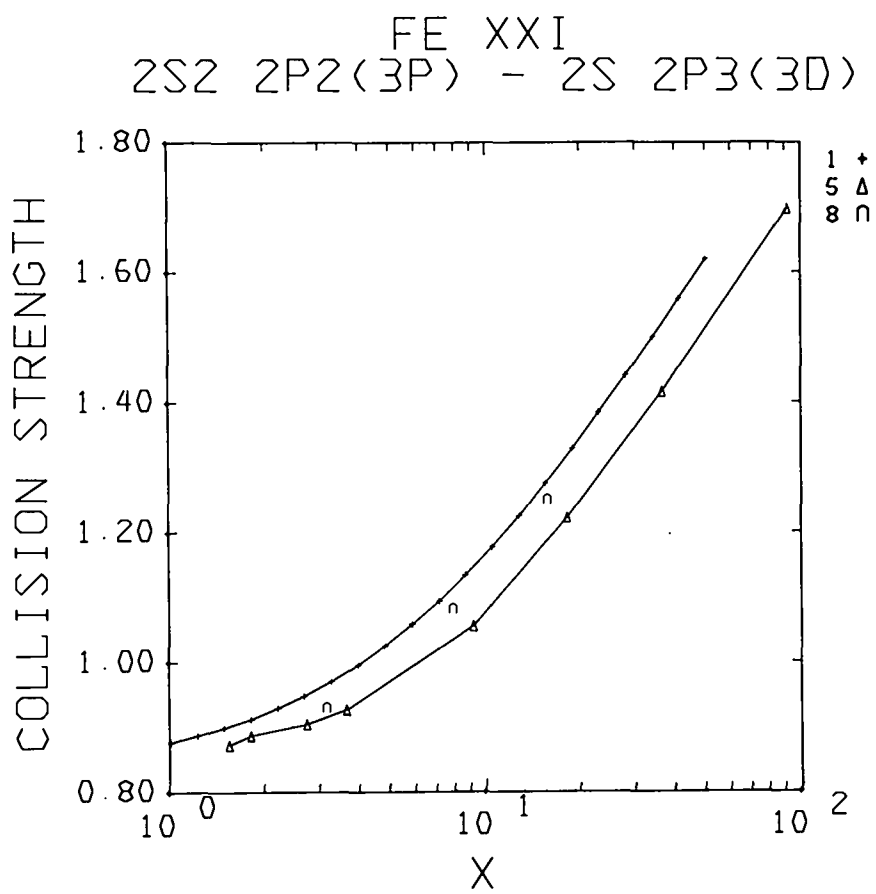
FE XXI
2S2 2P2(3P) - 2S 2P3(5S)

X.SYMBOL	1 MANN E= 3.856	8 UCL E= 3.492
1.01	4.019E-02	-
1.23	4.013E-02	-
1.49	4.012E-02	-
1.81	4.011E-02	-
2.20	4.010E-02	-
2.68	4.008E-02	-
3.26	4.004E-02	-
3.96	3.999E-02	-
4.81	3.990E-02	-
5.73	-	2.890E-02
5.85	3.980E-02	-
7.11	3.967E-02	-
8.64	3.950E-02	-
10.50	3.930E-02	-
12.76	3.906E-02	-
14.32	-	2.240E-02
15.51	3.880E-02	-
18.85	3.853E-02	-
22.91	3.828E-02	-
27.85	3.807E-02	-
28.63	-	1.590E-02
33.85	3.794E-02	-
41.14	3.792E-02	-
50.00	3.802E-02	-



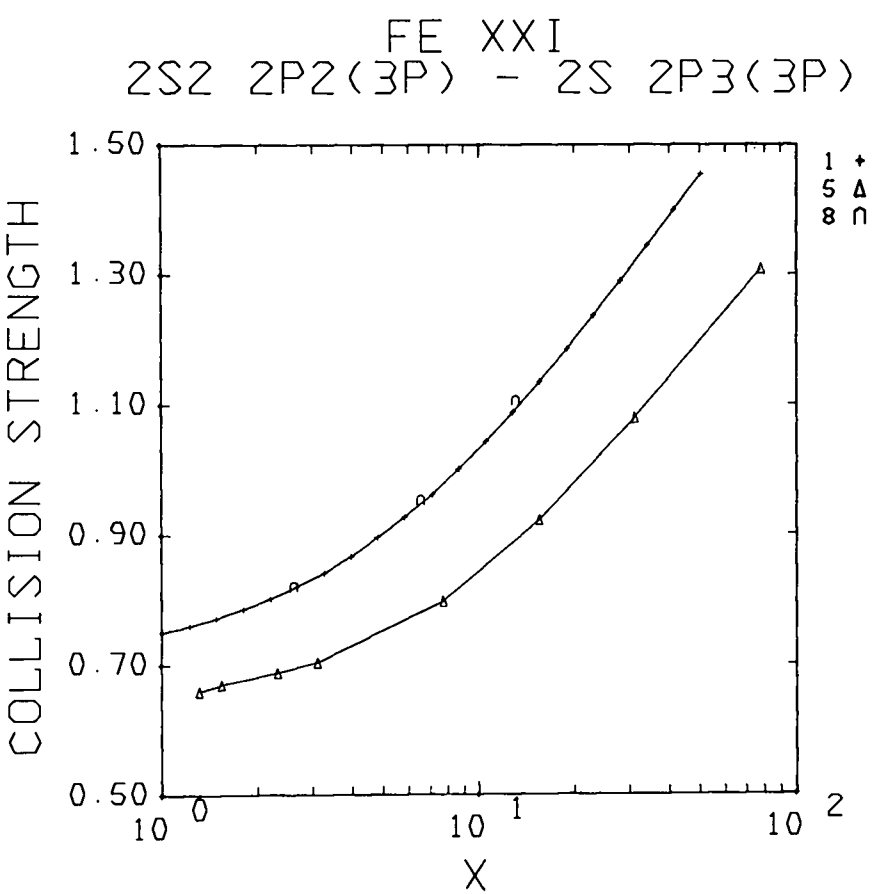
FE XXI
2S2 2P2(3P) - 2S 2P3(3D)

X.	SYMBOL	1 MANN E= 6.456	5 ROBB E= 5.501	8 UCL E= 6.366
1.01		8.776E-01	-	-
1.23		8.876E-01	-	-
1.49		8.996E-01	-	-
1.55		-	8.737E-01	-
1.82		9.137E-01	8.879E-01	-
2.20		9.302E-01	-	-
2.68		9.491E-01	-	-
2.73		-	9.056E-01	-
3.14		-	-	9.302E-01
3.26		9.714E-01	-	-
3.64		-	9.274E-01	-
3.96		9.970E-01	-	-
4.81		1.026E+00	-	-
5.85		1.059E+00	-	-
7.11		1.095E+00	-	-
7.85		-	-	1.084E+00
8.64		1.135E+00	-	-
9.09		-	1.057E+00	-
10.50		1.179E+00	-	-
12.76		1.226E+00	-	-
15.51		1.277E+00	-	-
15.71		-	-	1.252E+00
18.18		-	1.223E+00	-
18.85		1.330E+00	-	-
22.91		1.385E+00	-	-
27.85		1.442E+00	-	-
33.85		1.501E+00	-	-
36.36		-	1.418E+00	-
41.14		1.561E+00	-	-
50.00		1.621E+00	-	-
90.89		-	1.698E+00	-



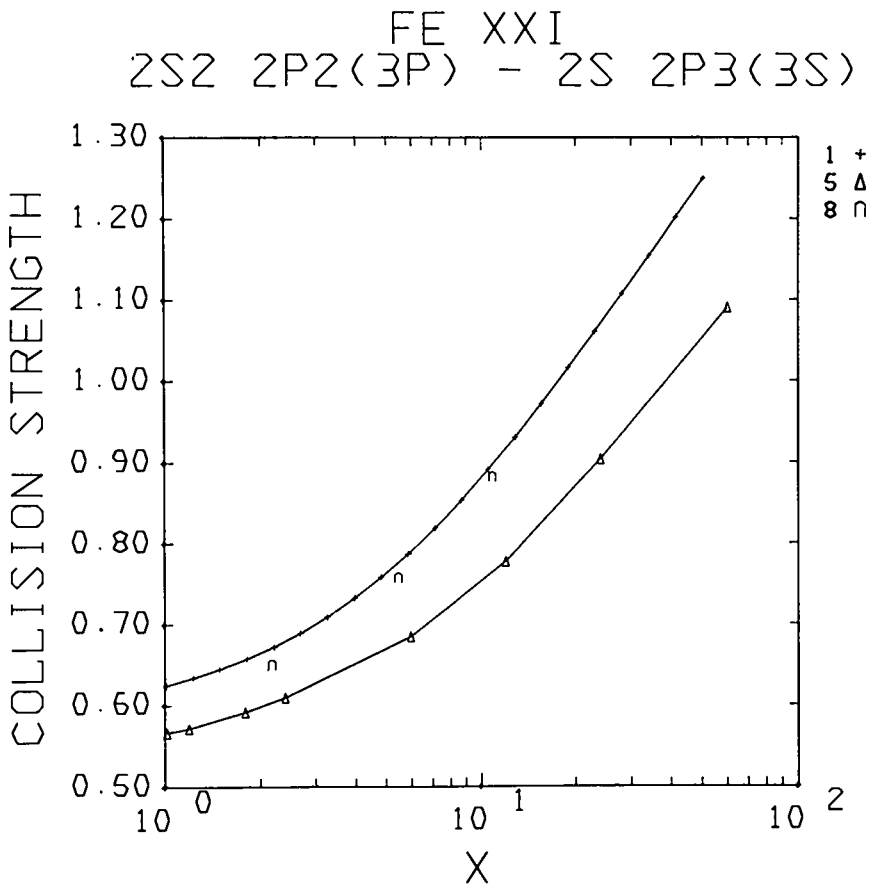
FE XXI
2S2 2P2(3P) - 2S 2P3(3P)

X	SYMBOL	1 MANN E= 7.681	5 ROBB E= 6.468	8 UCL E= 7.656
1.01		7.507E-01	-	-
1.23		7.607E-01	-	-
1.31		-	6.592E-01	-
1.49		7.725E-01	-	-
1.55		-	6.708E-01	-
1.81		7.865E-01	-	-
2.20		8.024E-01	-	-
2.32		-	6.886E-01	-
2.61		-	-	8.210E-01
2.68		8.214E-01	-	-
3.09		-	7.051E-01	-
3.26		8.433E-01	-	-
3.96		8.683E-01	-	-
4.81		8.966E-01	-	-
5.85		9.284E-01	-	-
6.53		-	-	9.536E-01
7.11		9.636E-01	-	-
7.73		-	7.986E-01	-
8.64		1.002E+00	-	-
10.50		1.044E+00	-	-
12.76		1.089E+00	-	-
13.06		-	-	1.107E+00
15.46		-	9.234E-01	-
15.51		1.136E+00	-	-
18.85		1.186E+00	-	-
22.91		1.238E+00	-	-
27.85		1.291E+00	-	-
30.92		-	1.081E+00	-
33.85		1.346E+00	-	-
41.14		1.401E+00	-	-
50.00		1.456E+00	-	-
77.30		-	1.309E+00	-



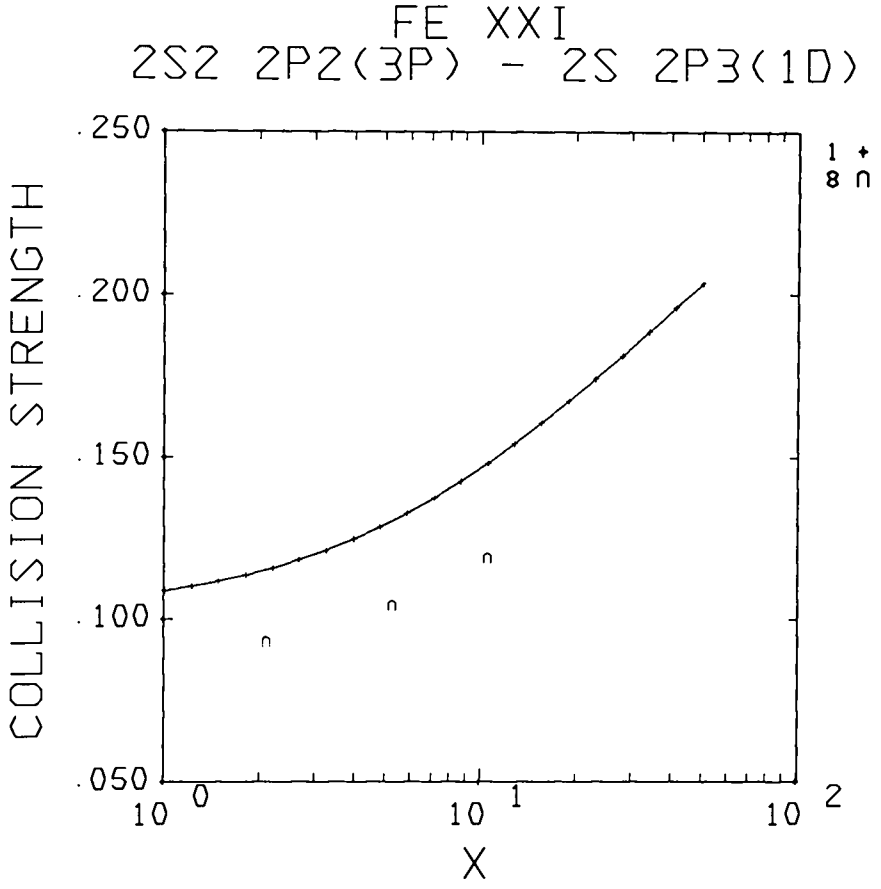
FE XXI
2S2 2P2(3P) - 2S 2P3(3S)

X.	SYMBOL	1 MANN E= 9.069	5 ROBB E= 9.385	8 UCL E= 9.215
1.01		6.256E-01	5.672E-01	-
1.19		-	5.732E-01	-
1.23		6.349E-01	-	-
1.49		6.459E-01	-	-
1.79		-	5.932E-01	-
1.81		6.588E-01	-	-
2.17		-	-	5.513E-01
2.20		6.735E-01	-	-
2.39		-	6.104E-01	-
2.68		6.909E-01	-	-
3.26		7.109E-01	-	-
3.96		7.337E-01	-	-
4.81		7.594E-01	-	-
5.43		-	-	7.579E-01
5.85		7.881E-01	-	-
5.96		-	6.857E-01	-
7.11		8.198E-01	-	-
8.64		8.543E-01	-	-
10.50		8.915E-01	-	-
10.85		-	-	8.826E-01
11.93		-	7.780E-01	-
12.76		9.313E-01	-	-
15.51		9.732E-01	-	-
18.85		1.017E+00	-	-
22.91		1.062E+00	-	-
23.85		-	9.050E-01	-
27.85		1.108E+00	-	-
33.85		1.156E+00	-	-
41.14		1.203E+00	-	-
50.00		1.251E+00	-	-
59.63		-	1.091E+00	-



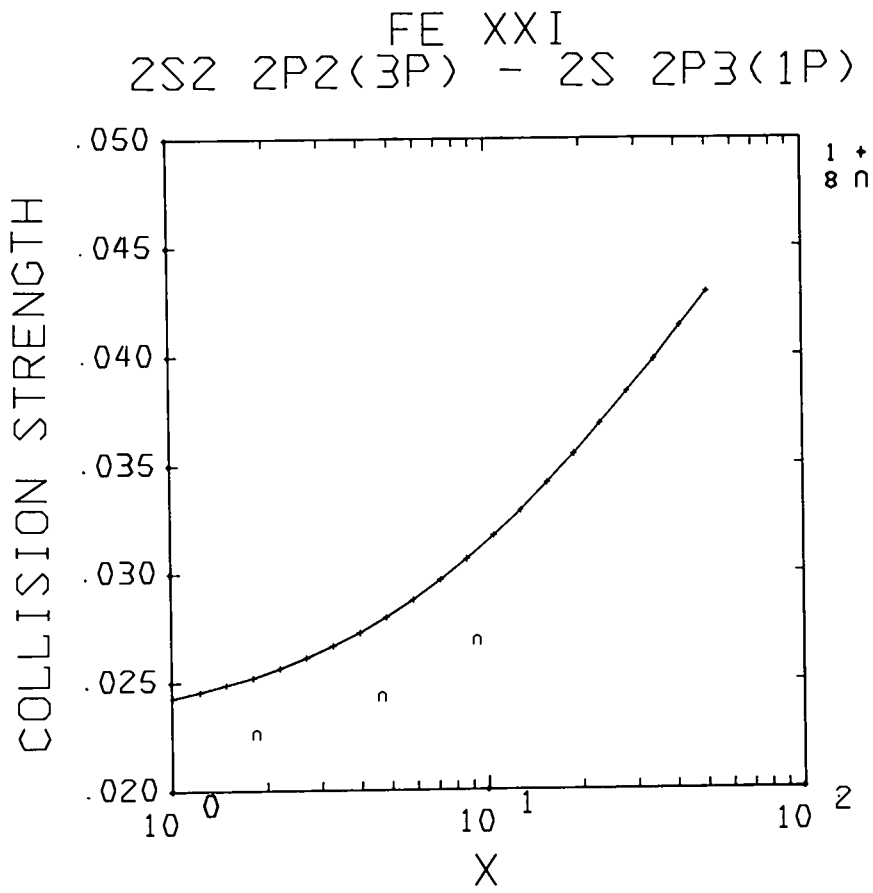
FE XXI
2S2 2P2(3P) - 2S 2P3(1D)

X.SYMBOL	8 UCL E= 9.526	1 MANN E= 9.388
1.01	-	1.090E-01
1.23	-	1.103E-01
1.49	-	1.120E-01
1.81	-	1.139E-01
2.10	9.320E-02	-
2.20	-	1.160E-01
2.68	-	1.186E-01
3.26	-	1.215E-01
3.96	-	1.249E-01
4.81	-	1.287E-01
5.25	1.045E-01	-
5.85	-	1.329E-01
7.11	-	1.376E-01
8.64	-	1.427E-01
10.50	1.191E-01	1.483E-01
12.76	-	1.543E-01
15.51	-	1.606E-01
18.85	-	1.673E-01
22.91	-	1.742E-01
27.85	-	1.814E-01
33.85	-	1.888E-01
41.14	-	1.963E-01
50.00	-	2.038E-01



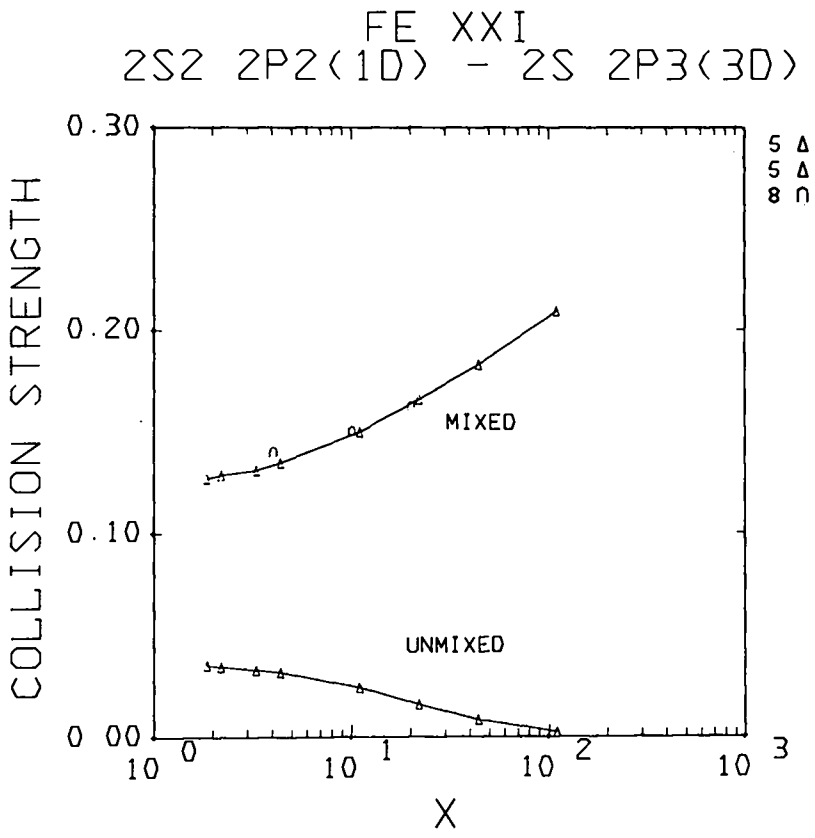
FE XXI
2S2 2P2(3P) - 2S 2P3(1P)

X.	SYMBOL	8 UCL E= 10.82	1 MANN E= 10.51
1.01		-	2.434E-02
1.23		-	2.460E-02
1.49		-	2.490E-02
1.81		-	2.524E-02
1.85		2.260E-02	-
2.20		-	2.566E-02
2.68		-	2.614E-02
3.26		-	2.669E-02
3.96		-	2.732E-02
4.62		2.430E-02	-
4.81		-	2.803E-02
5.85		-	2.883E-02
7.11		-	2.971E-02
8.64		-	3.069E-02
9.24		2.690E-02	-
10.50		-	3.177E-02
12.76		-	3.293E-02
15.51		-	3.418E-02
18.85		-	3.550E-02
22.91		-	3.690E-02
27.85		-	3.835E-02
33.85		-	3.985E-02
41.14		-	4.139E-02
50.00		-	4.295E-02



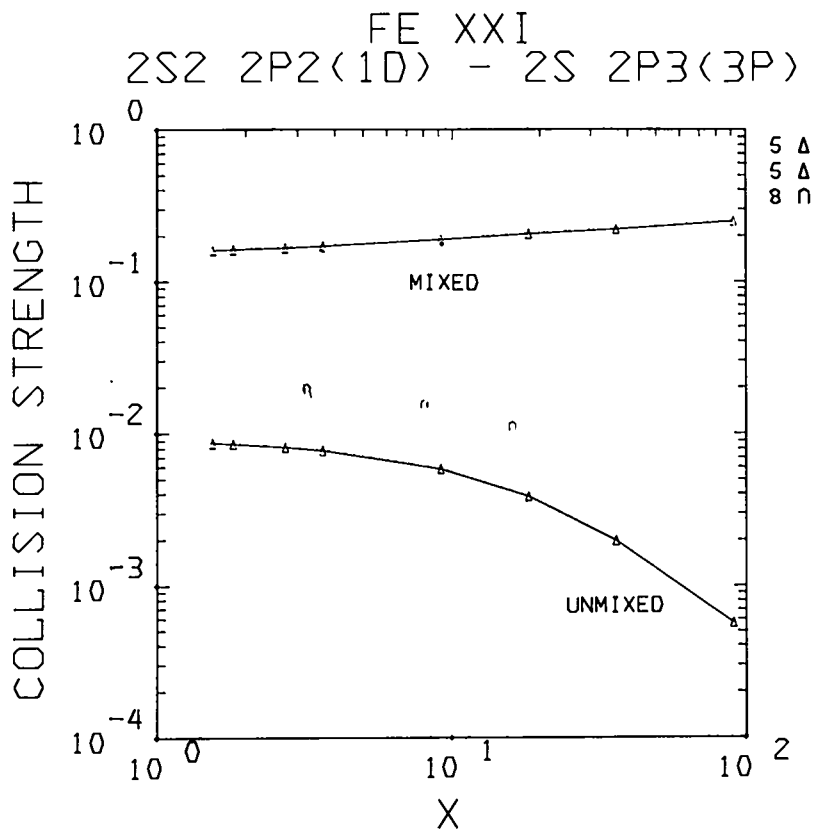
FE XXI
2S2 2P2(1D) - 2S 2P3(3D)

X.	SYMBOL	8 UCL E= 4.956	5 ROBB E= 0.000	5 ROBB E= 4.534
1.87		-	3.550E-02	1.274E-01
2.21		-	3.500E-02	1.292E-01
3.31		-	3.340E-02	1.317E-01
4.04		1.400E-01	-	-
4.41		-	3.190E-02	1.351E-01
10.09		1.504E-01	-	-
11.03		-	2.440E-02	1.503E-01
20.18		1.624E-01	-	-
22.06		-	1.620E-02	1.662E-01
44.11		-	8.480E-03	1.831E-01
110.28		-	2.520E-03	2.096E-01



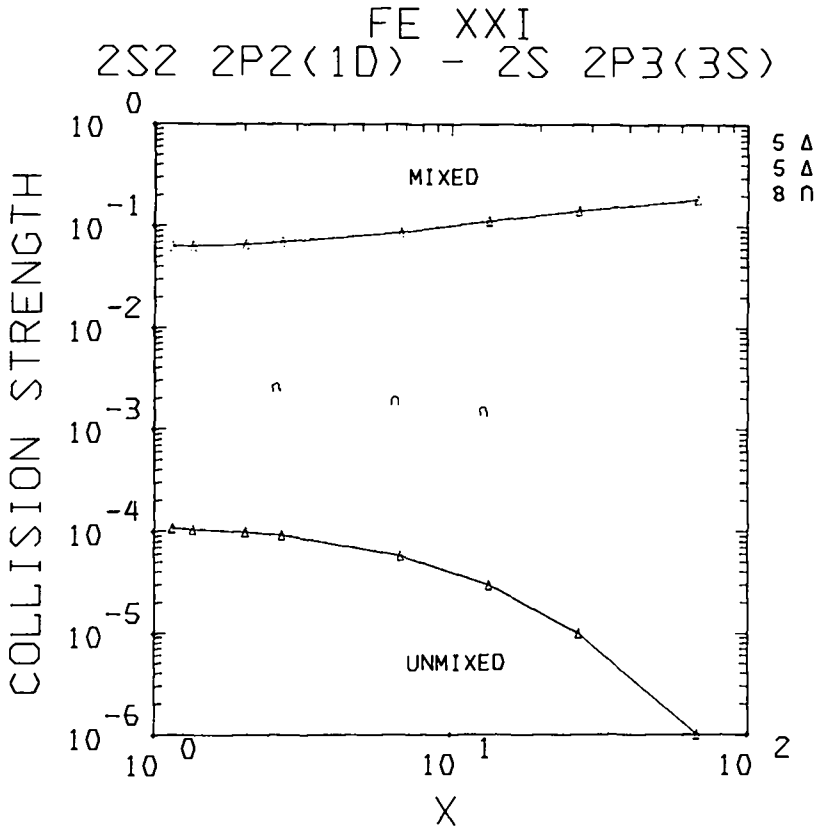
FE XXI
2S2 2P2(1D) - 2S 2P3(3P)

X	SYMBOL	8 UCL E= 6.246	5 ROBB E= 0.000	5 ROBB E= 5.501
1.55		-	8.690E-03	1.610E-01
1.82		-	8.570E-03	1.637E-01
2.73		-	8.170E-03	1.680E-01
3.20		2.000E-02	-	-
3.64		-	7.800E-03	1.720E-01
8.01		1.540E-02	-	-
9.09		-	5.900E-03	1.896E-01
16.01		1.110E-02	-	-
18.18		-	3.870E-03	2.047E-01
36.36		-	1.980E-03	2.219E-01
90.89		-	5.710E-04	2.486E-01



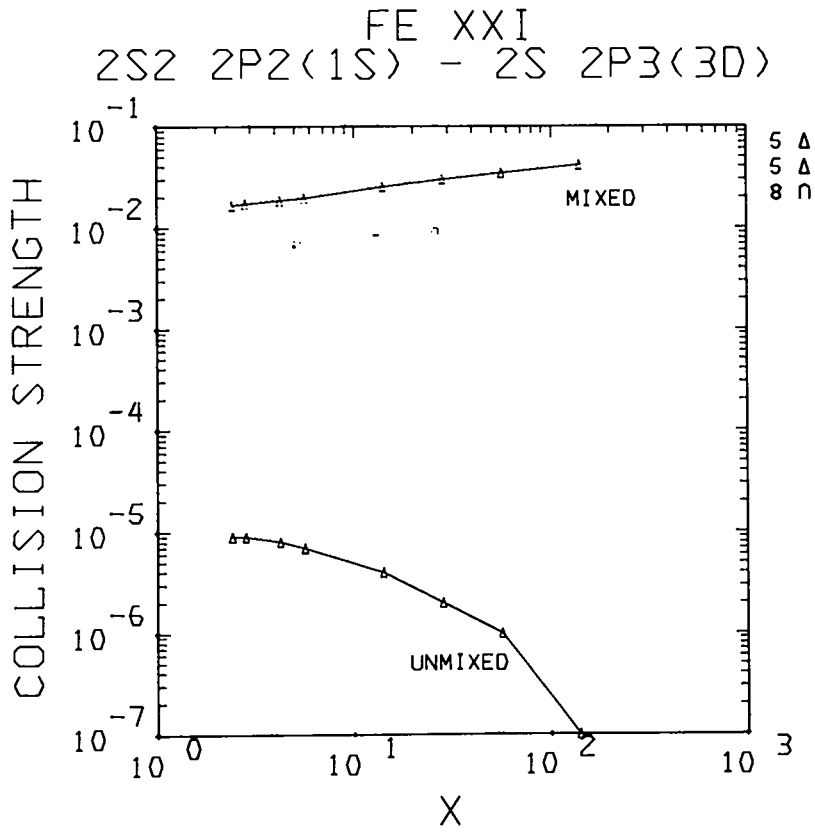
FE XXI
2S2 2P2(1D) - 2S 2P3(3S)

X.	SYMBOL	8 UCL E= 7.805	5 ROBB E= 0.000	5 ROBB E= 7.418
1.15		-	1.070E-04	6.290E-02
1.35		-	1.050E-04	6.350E-02
2.02		-	9.800E-05	6.620E-02
2.56		2.500E-03	-	-
2.70		-	9.100E-05	6.390E-02
6.41		1.900E-03	-	-
6.74		-	5.800E-05	8.720E-02
12.81		1.500E-03	-	-
13.48		-	3.000E-05	1.110E-01
26.96		-	1.000E-05	1.420E-01
67.40		-	1.000E-06	1.840E-01



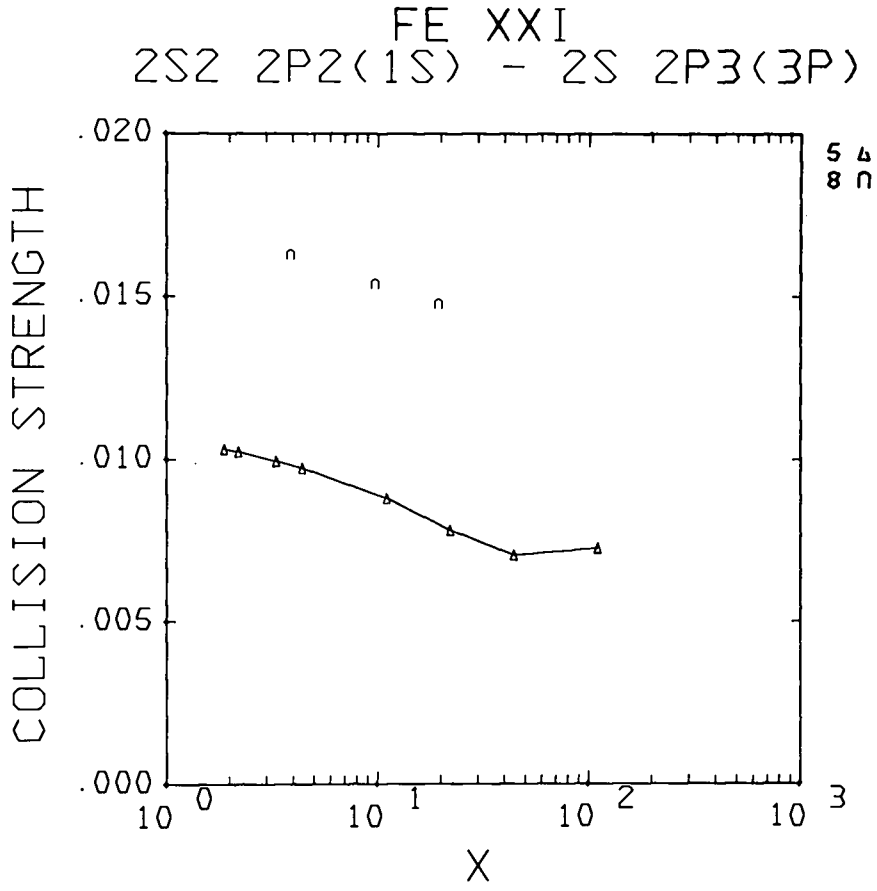
FE XXI
2S2 2P2(1S) - 2S 2P3(3D)

X.	SYMBOL	8 UCL E= 3.859	5 ROBB E= 0.000	5 ROBB E= 3.553
2.39		-	9.000E-06	1.672E-02
2.81		-	9.000E-06	1.731E-02
4.22		-	8.000E-06	1.860E-02
5.18		6.800E-03	-	-
5.63		-	7.000E-06	1.988E-02
12.96		7.800E-03	-	-
14.07		-	4.000E-06	2.532E-02
25.91		9.000E-03	-	-
28.15		-	2.000E-06	3.004E-02
56.29		-	1.000E-06	3.487E-02
140.73		-	1.000E-07	4.152E-02



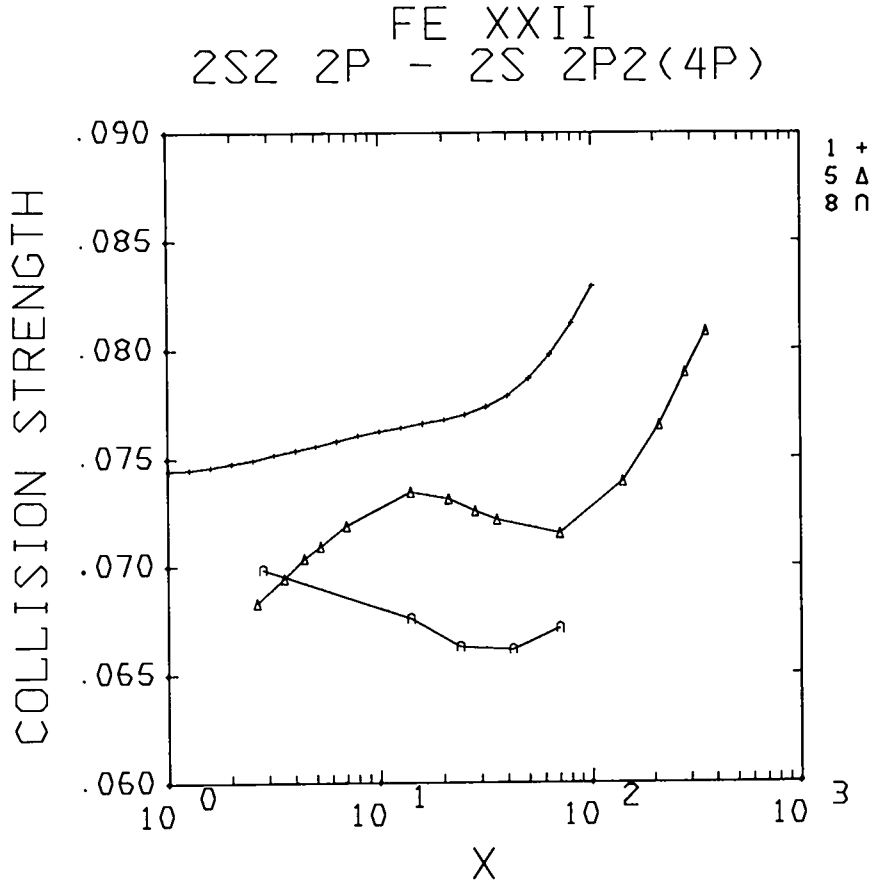
FE XXI
2S2 2P2(1S) - 2S 2P3(3P)

X.	SYMBOL	8 UCL E= 5.149	5 ROBB E= 4.520
1.88		-	1.034E-02
2.21		-	1.024E-02
3.32		-	9.970E-03
3.88		1.630E-02	-
4.42		-	9.760E-03
9.71		1.540E-02	-
11.06		-	8.820E-03
19.42		1.480E-02	-
22.12		-	7.830E-03
44.25		-	7.067E-03
110.62		-	7.290E-03



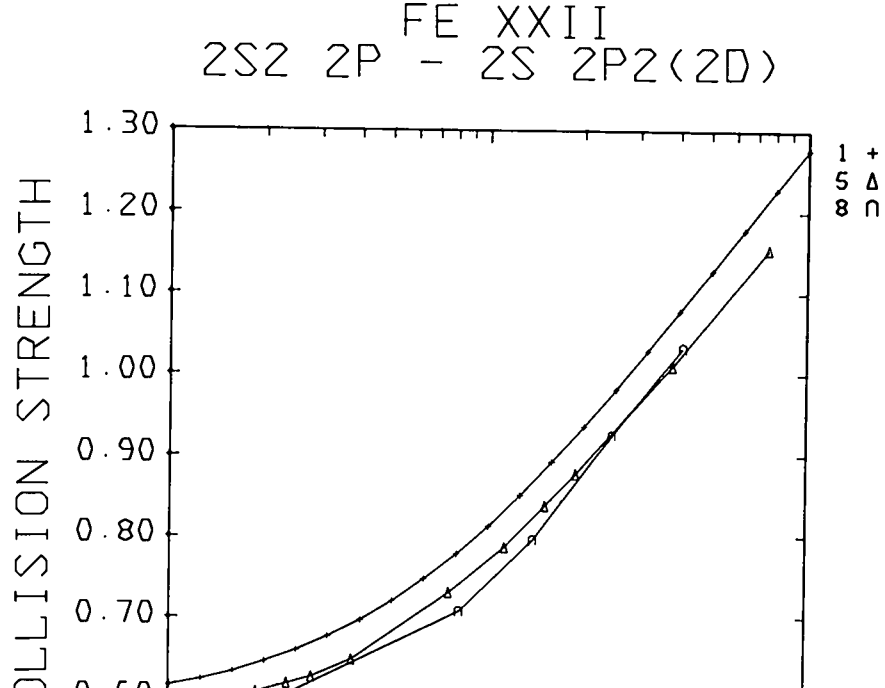
FE XXII
2S2 2P - 2S 2P2(4P)

X.SYMBOL	1 MANN E= 3.586	5 ROBB E= 2.843	8 JCL E= 3.558
1.01	7.447E-02	-	-
1.27	7.448E-02	-	-
1.60	7.462E-02	-	-
2.01	7.477E-02	-	-
2.53	7.496E-02	-	-
2.64	-	6.835E-02	-
2.80	-	-	5.990E-02
3.19	7.516E-02	-	-
3.52	-	6.948E-02	-
4.01	7.539E-02	-	-
4.40	-	7.039E-02	-
5.04	7.558E-02	-	-
5.28	-	7.097E-02	-
6.35	7.582E-02	-	-
7.03	-	7.192E-02	-
7.99	7.604E-02	-	-
10.05	7.625E-02	-	-
12.65	7.643E-02	-	-
14.01	-	-	5.760E-02
14.07	-	7.348E-02	-
15.91	7.659E-02	-	-
20.02	7.676E-02	-	-
21.10	-	7.315E-02	-
23.82	-	-	6.630E-02
25.19	7.699E-02	-	-
28.14	-	7.259E-02	-
31.70	7.735E-02	-	-
35.17	-	7.218E-02	-
39.89	7.789E-02	-	-
42.04	-	-	6.620E-02
50.19	7.869E-02	-	-
63.16	7.979E-02	-	-
70.06	-	-	6.720E-02
70.35	-	7.157E-02	-
79.47	8.121E-02	-	-
100.00	8.293E-02	-	-
140.70	-	7.396E-02	-
211.04	-	7.654E-02	-
281.39	-	7.897E-02	-
351.74	-	8.086E-02	-



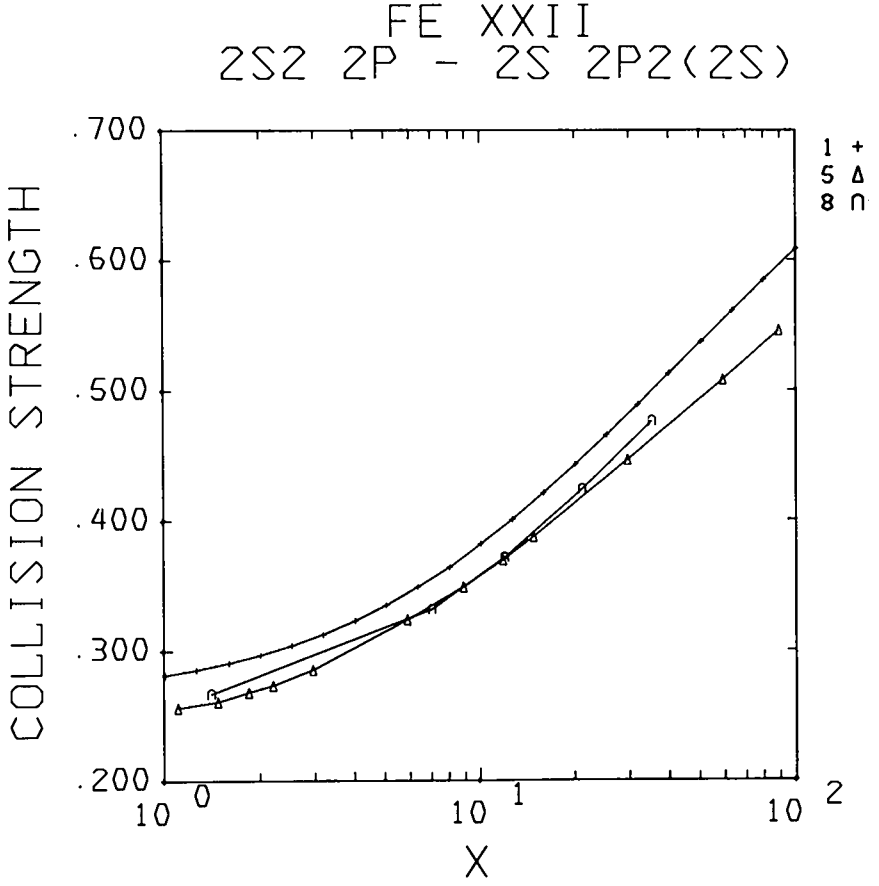
FE XXII
2S2 2P - 2S 2P2(2D)

X.	SYMBOL	1 MANN E= 5.935	5 ROBB E= 5.293	8 UCL E= 6.139
1.01		6.169E-01	-	-
1.27		6.248E-01	-	-
1.42		-	5.897E-01	-
1.60		6.346E-01	-	-
1.63		-	-	5.748E-01
1.89		-	6.084E-01	-
2.01		6.465E-01	-	-
2.36		-	6.190E-01	-
2.53		6.608E-01	-	-
2.83		-	6.277E-01	-
3.19		6.776E-01	-	-
3.78		-	6.490E-01	-
4.01		6.979E-01	-	-
5.04		7.215E-01	-	-
6.35		7.487E-01	-	-
7.56		-	7.322E-01	-
7.99		7.795E-01	-	-
8.14		-	-	7.084E-01
10.05		8.140E-01	-	-
11.34		-	7.879E-01	-
12.65		8.517E-01	-	-
13.85		-	-	7.964E-01
15.11		-	8.390E-01	-
15.91		8.927E-01	-	-
18.89		-	8.783E-01	-
20.02		9.364E-01	-	-
24.43		-	-	9.248E-01
25.19		9.824E-01	-	-
31.70		1.030E+00	-	-
37.79		-	1.011E+00	-
39.89		1.079E+00	-	-
40.72		-	-	1.033E+00
50.19		1.129E+00	-	-
63.16		1.179E+00	-	-
75.57		-	1.155E+00	-
79.47		1.229E+00	-	-
100.00		1.278E+00	-	-
113.36		-	1.239E+00	-
151.14		-	1.299E+00	-
188.93		-	1.345E+00	-



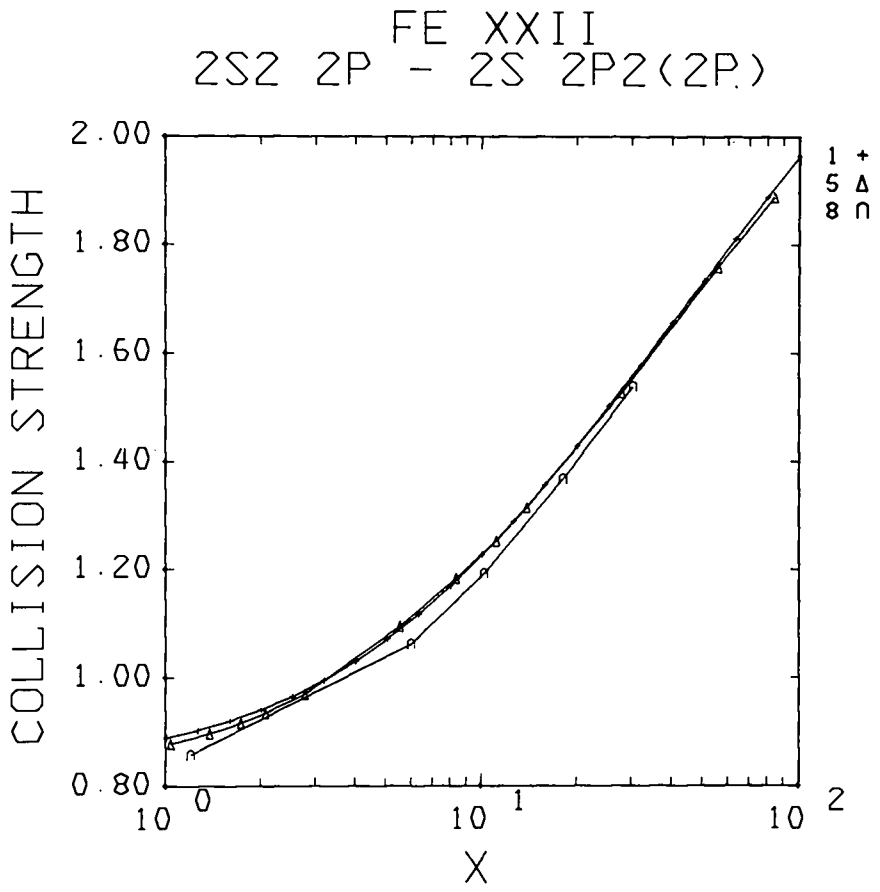
FE XXII
2S2 2P - 2S 2P2(2S)

X.SYMBOL	1 MANN E= 6.727	5 ROBB E= 6.781	8 JCL E= 7.093
1.01	2.820E-01	-	-
1.11	-	2.565E-01	-
1.27	2.861E-01	-	-
1.41	-	-	2.673E-01
1.47	-	2.617E-01	-
1.60	2.912E-01	-	-
1.84	-	2.689E-01	-
2.01	2.973E-01	-	-
2.21	-	2.741E-01	-
2.53	3.045E-01	-	-
2.95	-	2.856E-01	-
3.19	3.133E-01	-	-
4.01	3.236E-01	-	-
5.04	3.356E-01	-	-
5.90	-	3.244E-01	-
6.35	3.495E-01	-	-
7.05	-	-	3.321E-01
7.99	3.651E-01	-	-
8.85	-	3.498E-01	-
10.05	3.824E-01	-	-
11.80	-	3.698E-01	-
11.98	-	-	3.719E-01
12.65	4.014E-01	-	-
14.75	-	3.877E-01	-
15.91	4.219E-01	-	-
20.02	4.436E-01	-	-
21.15	-	-	4.246E-01
25.19	4.663E-01	-	-
29.49	-	4.467E-01	-
31.70	4.897E-01	-	-
35.24	-	-	4.766E-01
39.89	5.136E-01	-	-
50.19	5.378E-01	-	-
58.99	-	5.088E-01	-
63.16	5.619E-01	-	-
79.47	5.859E-01	-	-
88.48	-	5.467E-01	-
100.00	6.097E-01	-	-
117.98	-	5.731E-01	-
147.47	-	5.931E-01	-



FE XXII
2S2 2P - 2S 2P2(2P)

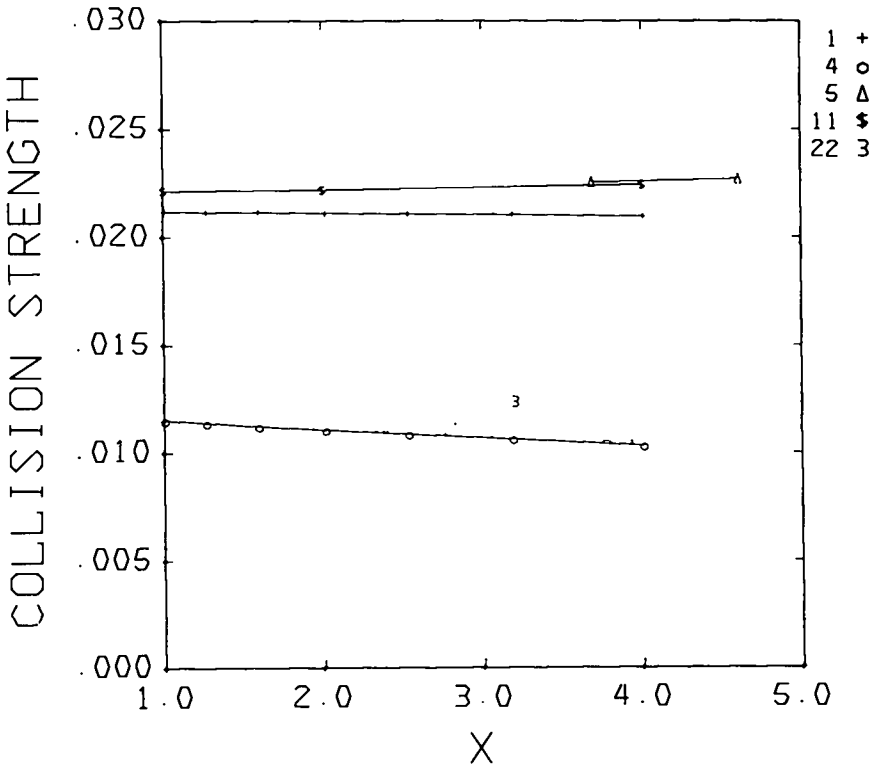
X.SYMBOL	1 MANN E= 7.959	5 R088 E= 7.216	8 JCL E= 8.321
1.01	8.897E-01	-	-
1.04	-	8.780E-01	-
1.20	-	-	9.582E-01
1.27	9.039E-01	-	-
1.39	-	8.978E-01	-
1.60	9.212E-01	-	-
1.73	-	9.171E-01	-
2.01	9.422E-01	-	-
2.08	-	9.365E-01	-
2.53	9.668E-01	-	-
2.77	-	9.717E-01	-
3.19	9.967E-01	-	-
4.01	1.032E+00	-	-
5.04	1.072E+00	-	-
5.54	-	1.097E+00	-
6.01	-	-	1.064E+00
6.35	1.119E+00	-	-
7.99	1.171E+00	-	-
8.31	-	1.186E+00	-
10.05	1.228E+00	-	-
10.22	-	-	1.193E+00
11.09	-	1.254E+00	-
12.65	1.291E+00	-	-
13.86	-	1.317E+00	-
15.91	1.359E+00	-	-
18.03	-	-	1.369E+00
20.02	1.430E+00	-	-
25.19	1.504E+00	-	-
27.72	-	1.528E+00	-
30.04	-	-	1.540E+00
31.70	1.580E+00	-	-
39.89	1.657E+00	-	-
50.19	1.735E+00	-	-
55.43	-	1.760E+00	-
63.16	1.813E+00	-	-
79.47	1.890E+00	-	-
83.15	-	1.889E+00	-
100.00	1.967E+00	-	-
110.86	-	1.984E+00	-
138.58	-	2.060E+00	-

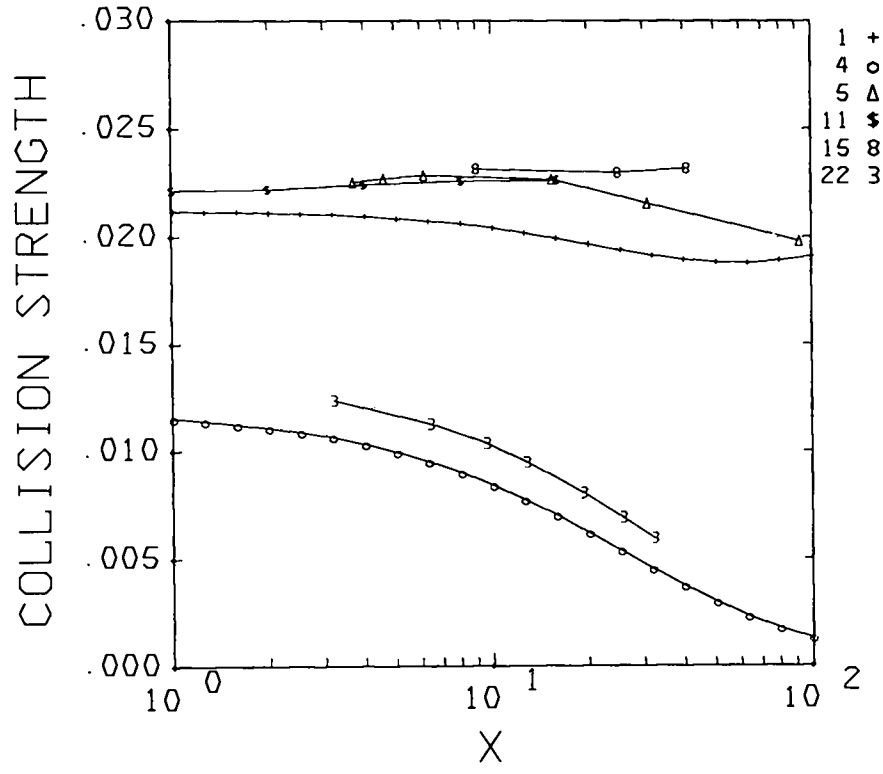


FE XXIII
2S2 - 2S 2P(3P)

X.SYMBOL	1 MANN E= 3.703	4 MANN E= 0.000	5 ROBB E= 3.255	11 BLAHA E= 3.878	15 SAMPSON E= 4.260	22 HENRY E= 3.121
1.00	-	-	-	2.217E-02	-	-
1.01	2.124E-02	1.154E-02	-	-	-	-
1.27	2.120E-02	1.142E-02	-	-	-	-
1.60	2.117E-02	1.129E-02	-	-	-	-
2.00	-	-	-	2.222E-02	-	-
2.01	2.115E-02	1.113E-02	-	-	-	-
2.53	2.111E-02	1.093E-02	-	-	-	-
3.19	2.106E-02	1.068E-02	-	-	-	-
3.20	-	-	-	-	-	1.240E-02
3.69	-	-	2.257E-02	-	-	-
4.00	2.099E-02	1.039E-02	-	2.246E-02	-	-
4.61	-	-	2.275E-02	-	-	-
5.04	2.089E-02	1.001E-02	-	-	-	-
6.14	-	-	2.289E-02	-	-	-
6.35	2.077E-02	9.577E-03	-	-	-	-
6.40	-	-	-	-	-	1.130E-02
7.99	2.062E-02	9.065E-03	-	-	-	-
8.00	-	-	-	2.262E-02	-	-
8.93	-	-	-	-	2.316E-02	-
9.60	-	-	-	-	-	1.040E-02
10.05	2.043E-02	8.471E-03	-	-	-	-
12.65	2.021E-02	7.796E-03	-	-	-	-
12.80	-	-	-	-	-	9.530E-03
15.36	-	-	2.271E-02	-	-	-
15.91	1.996E-02	7.047E-03	-	-	-	-
16.00	-	-	-	2.265E-02	-	-
19.20	-	-	-	-	-	8.090E-03
20.02	1.968E-02	6.238E-03	-	-	-	-
24.80	-	-	-	-	2.303E-02	-
25.19	1.940E-02	5.399E-03	-	-	-	-
25.60	-	-	-	-	-	6.930E-03
30.72	-	-	2.159E-02	-	-	-
31.70	1.915E-02	4.557E-03	-	-	-	-
32.00	-	-	-	-	-	5.990E-03
39.89	1.895E-02	3.745E-03	-	-	-	-
40.67	-	-	-	-	2.321E-02	-
50.19	1.884E-02	2.996E-03	-	-	-	-
63.16	1.882E-02	2.333E-03	-	-	-	-
79.47	1.891E-02	1.770E-03	-	-	-	-
92.17	-	-	1.983E-02	-	-	-
100.00	1.911E-02	1.311E-03	-	-	-	-
120.00	-	-	-	-	2.449E-02	-
153.61	-	-	1.966E-02	-	-	-
199.34	-	-	-	-	2.598E-02	-
358.01	-	-	-	-	2.784E-02	-
516.69	-	-	-	-	2.901E-02	-

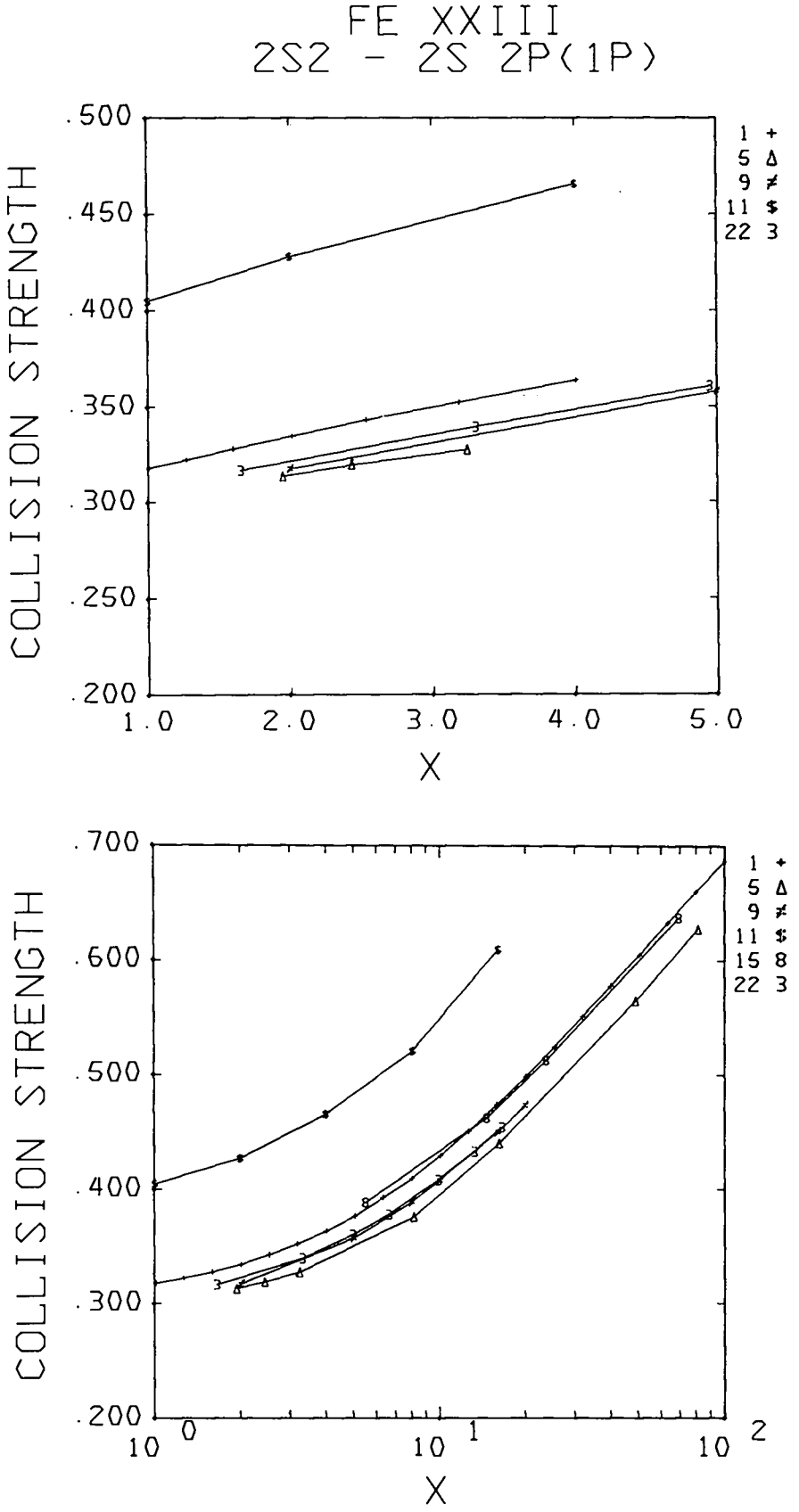
FE XXIII
2S2 - 2S 2P(3P)





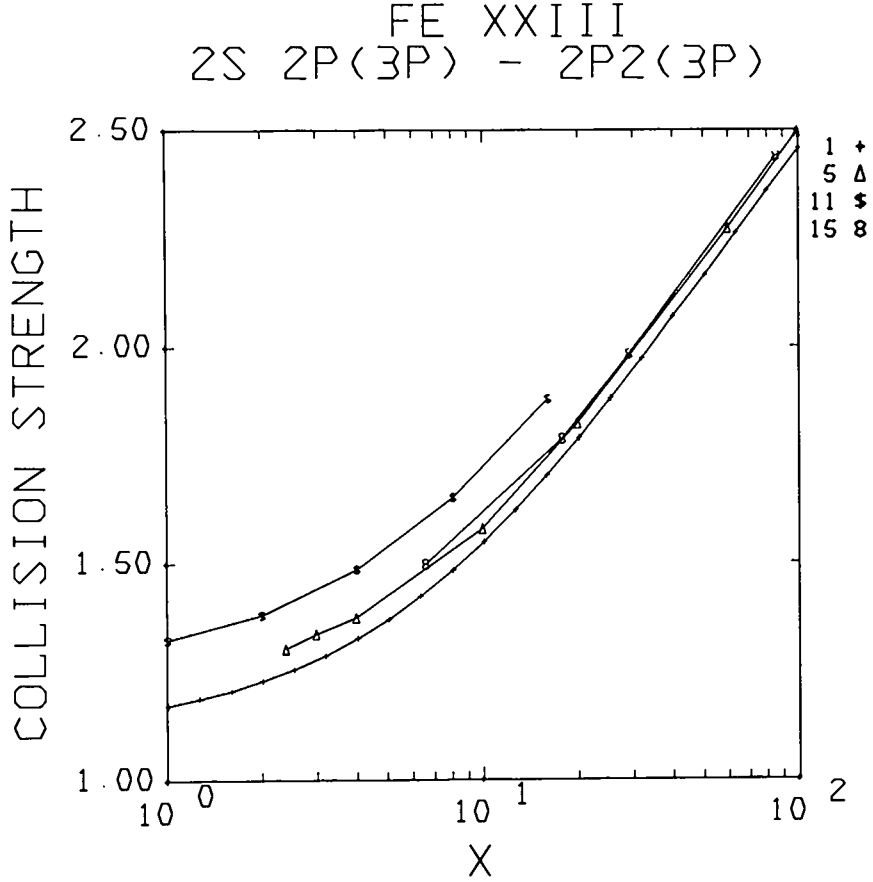
FE XXIII
2S2 - 2S 2P(1P)

X.	SYMBOL	1 MANN E= 6.478	5 ROBB E= 6.170	9 YOUNGER E= 6.807	11 BLAHA E= 6.860	15 SAMPSON E= 7.493	22 HENRY E= 6.072
1.00		-	-	-	4.050E-01	-	-
1.01		3.183E-01	-	-	-	-	-
1.27		3.228E-01	-	-	-	-	-
1.60		3.284E-01	-	-	-	-	-
1.65		-	-	-	-	-	3.170E-01
1.94		-	3.140E-01	-	-	-	-
2.00		-	-	3.180E-01	4.280E-01	-	-
2.01		3.351E-01	-	-	-	-	-
2.43		-	3.200E-01	-	-	-	-
2.53		3.432E-01	-	-	-	-	-
3.19		3.528E-01	-	-	-	-	-
3.24		-	3.280E-01	-	-	-	-
3.30		-	-	-	-	-	3.400E-01
4.00		3.643E-01	-	-	4.660E-01	-	-
4.95		-	-	-	-	-	3.610E-01
5.00		-	-	3.580E-01	-	-	-
5.04		3.777E-01	-	-	-	-	-
5.51		-	-	-	-	3.893E-01	-
6.35		3.931E-01	-	-	-	-	-
6.60		-	-	-	-	-	3.790E-01
7.99		4.106E-01	-	-	-	-	-
8.00		-	-	3.900E-01	5.210E-01	-	-
8.10		-	3.770E-01	-	-	-	-
9.90		-	-	-	-	-	4.090E-01
10.00		-	-	4.090E-01	-	-	-
10.05		4.301E-01	-	-	-	-	-
12.65		4.515E-01	-	-	-	-	-
13.20		-	-	-	-	-	4.340E-01
14.53		-	-	-	-	4.628E-01	-
15.91		4.747E-01	-	-	-	-	-
16.00		-	-	4.510E-01	6.100E-01	-	-
16.21		-	4.410E-01	-	-	-	-
16.50		-	-	-	-	-	4.550E-01
20.00		-	-	4.740E-01	-	-	-
20.02		4.993E-01	-	-	-	-	-
23.56		-	-	-	-	5.134E-01	-
25.19		5.250E-01	-	-	-	-	-
31.70		5.516E-01	-	-	-	-	-
39.69		5.788E-01	-	-	-	-	-
48.62		-	5.660E-01	-	-	-	-
50.19		6.062E-01	-	-	-	-	-
63.16		6.337E-01	-	-	-	-	-
68.67		-	-	-	-	6.380E-01	-
79.47		6.610E-01	-	-	-	-	-
81.04		-	6.290E-01	-	-	-	-
100.00		6.890E-01	-	-	-	-	-
113.78		-	-	-	-	7.049E-01	-
204.00		-	-	-	-	7.765E-01	-
294.22		-	-	-	-	8.180E-01	-


FE XXIII
2S2 - 2S 2P(1P)
COLLISION STRENGTH
.500
.450
.400
.350
.300
.250
.200
1.0
2.0
3.0
4.0
5.0
X
1 +
5 Δ
9 ≠
11 $
22 3
COLLISION STRENGTH
.700
.600
.500
.400
.300
.200
10 0
10 1
10 2
X
1 +
5 Δ
9 ≠
11 $
15 8
22 3

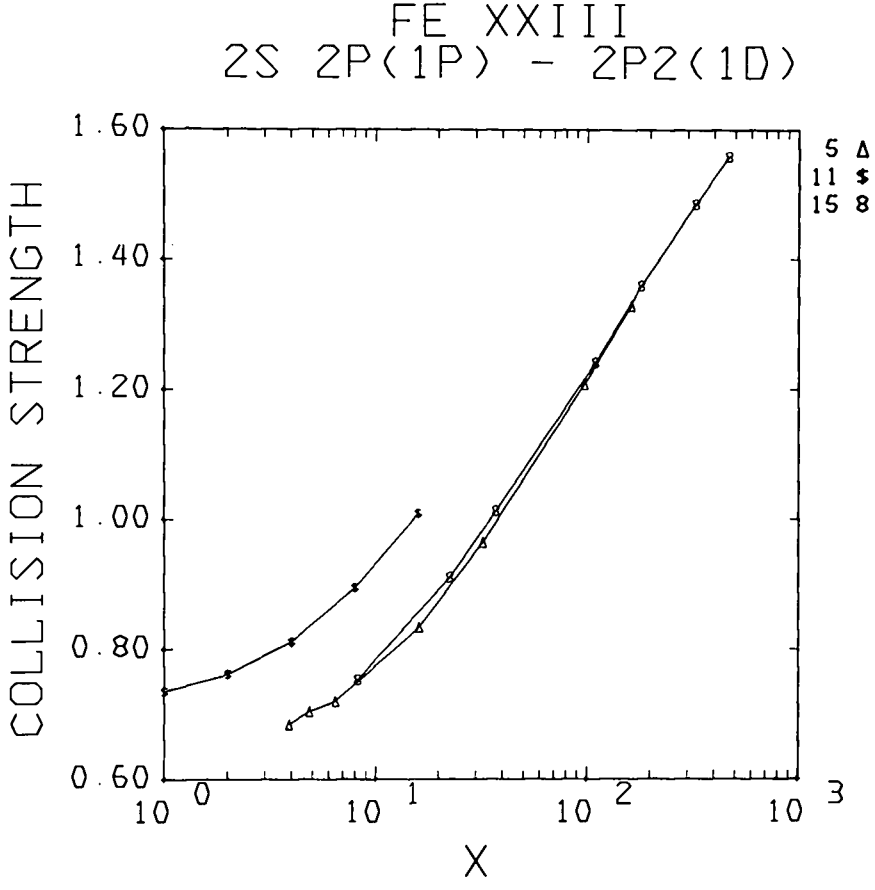
FE XXIII
2S 2P(3P) - 2P2(3P)

X	SYMBOL	1 MANN E= 5.547	5 ROBB E= 5.040	11 BLAHA E= 5.631	15 SAMPSON E= 6.050
1.00		-	-	1.325E+00	-
1.01		1.175E+00	-	-	-
1.27		1.190E+00	-	-	-
1.60		1.208E+00	-	-	-
2.00		-	-	1.382E+00	-
2.01		1.231E+00	-	-	-
2.38		-	1.305E+00	-	-
2.53		1.258E+00	-	-	-
2.98		-	1.339E+00	-	-
3.19		1.290E+00	-	-	-
3.97		-	1.377E+00	-	-
4.00		1.329E+00	-	1.489E+00	-
5.04		1.374E+00	-	-	-
6.35		1.426E+00	-	-	-
6.59		-	-	-	1.500E+00
7.99		1.486E+00	-	-	-
8.00		-	-	1.654E+00	-
9.92		-	1.581E+00	-	-
10.05		1.553E+00	-	-	-
12.65		1.626E+00	-	-	-
15.91		1.706E+00	-	-	-
16.00		-	-	1.880E+00	-
17.76		-	-	-	1.788E+00
19.84		-	1.825E+00	-	-
20.02		1.792E+00	-	-	-
25.19		1.881E+00	-	-	-
28.93		-	-	-	1.983E+00
31.70		1.975E+00	-	-	-
39.89		2.070E+00	-	-	-
50.19		2.168E+00	-	-	-
59.52		-	2.274E+00	-	-
63.16		2.265E+00	-	-	-
79.47		2.363E+00	-	-	-
84.80		-	-	-	2.441E+00
99.21		-	2.496E+00	-	-
100.00		2.459E+00	-	-	-
140.67		-	-	-	2.689E+00
252.40		-	-	-	2.951E+00
364.14		-	-	-	3.103E+00



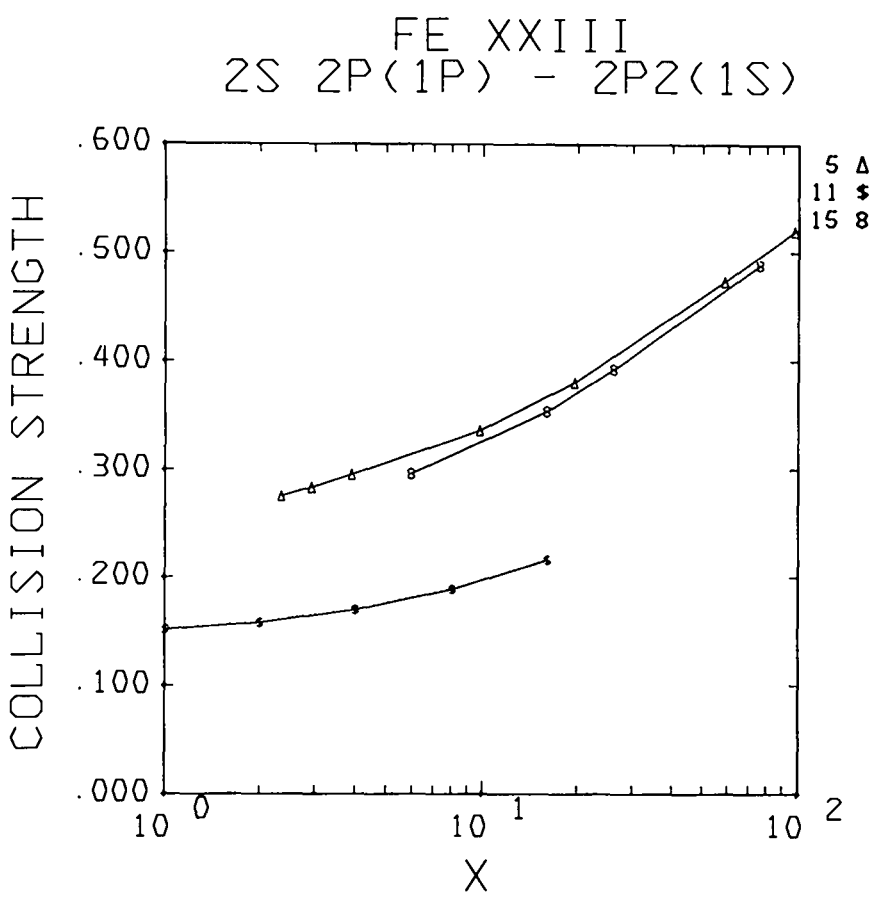
FE XXIII
2S 2P(1P) - 2P2(1D)

X. SYMBOL	5 ROBB E= 3.093	11 BLAHA E= 4.075	15 SAMPSON E= 4.708
1.00	-	7.360E-01	-
2.00	-	7.630E-01	-
3.88	6.850E-01	-	-
4.00	-	8.130E-01	-
4.85	7.050E-01	-	-
6.47	7.220E-01	-	-
8.00	-	8.960E-01	-
8.18	-	-	7.547E-01
16.00	-	1.010E+00	-
16.17	8.350E-01	-	-
22.54	-	-	9.118E-01
32.33	9.670E-01	-	-
36.90	-	-	1.015E+00
96.99	1.210E+00	-	-
108.70	-	-	1.243E+00
161.66	1.330E+00	-	-
180.50	-	-	1.361E+00
324.10	-	-	1.487E+00
467.70	-	-	1.560E+00



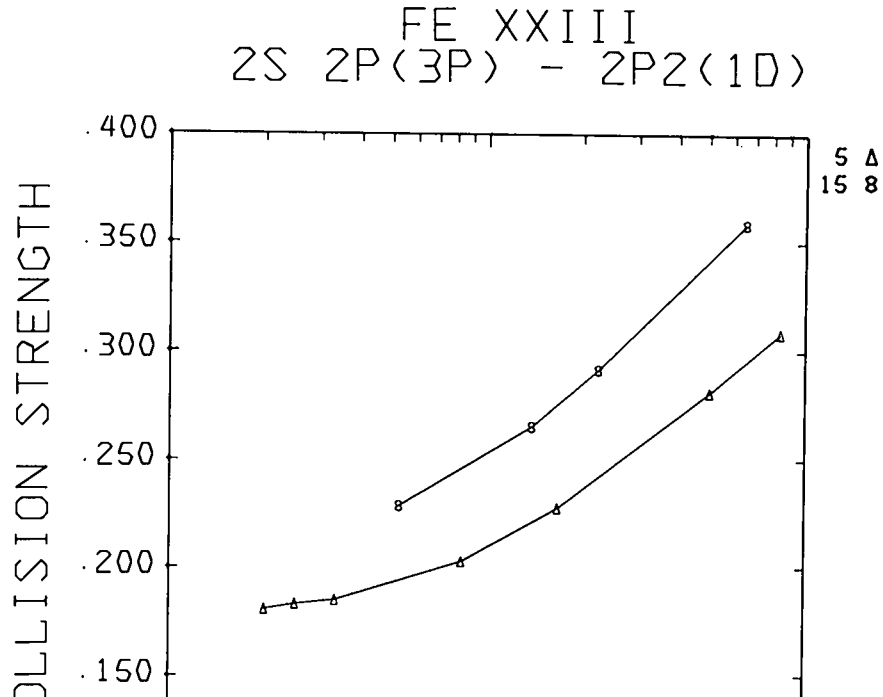
FE XXIII
2S 2P(1P) - 2P2(1S)

X.SYMBOL	5 ROBB E= 5.139	11 BLAHA E= 6.071	15 SAMPSON E= 6.815
1.00	-	1.520E-01	-
2.00	-	1.590E-01	-
2.34	2.760E-01	-	-
2.92	2.840E-01	-	-
3.89	2.960E-01	-	-
4.00	-	1.710E-01	-
5.96	-	-	2.965E-01
8.00	-	1.900E-01	-
9.73	3.360E-01	-	-
15.88	-	-	3.534E-01
16.00	-	2.170E-01	-
19.46	3.810E-01	-	-
25.80	-	-	3.929E-01
58.38	4.750E-01	-	-
75.39	-	-	4.899E-01
97.30	5.210E-01	-	-
124.98	-	-	5.412E-01
224.17	-	-	5.961E-01
323.36	-	-	6.279E-01



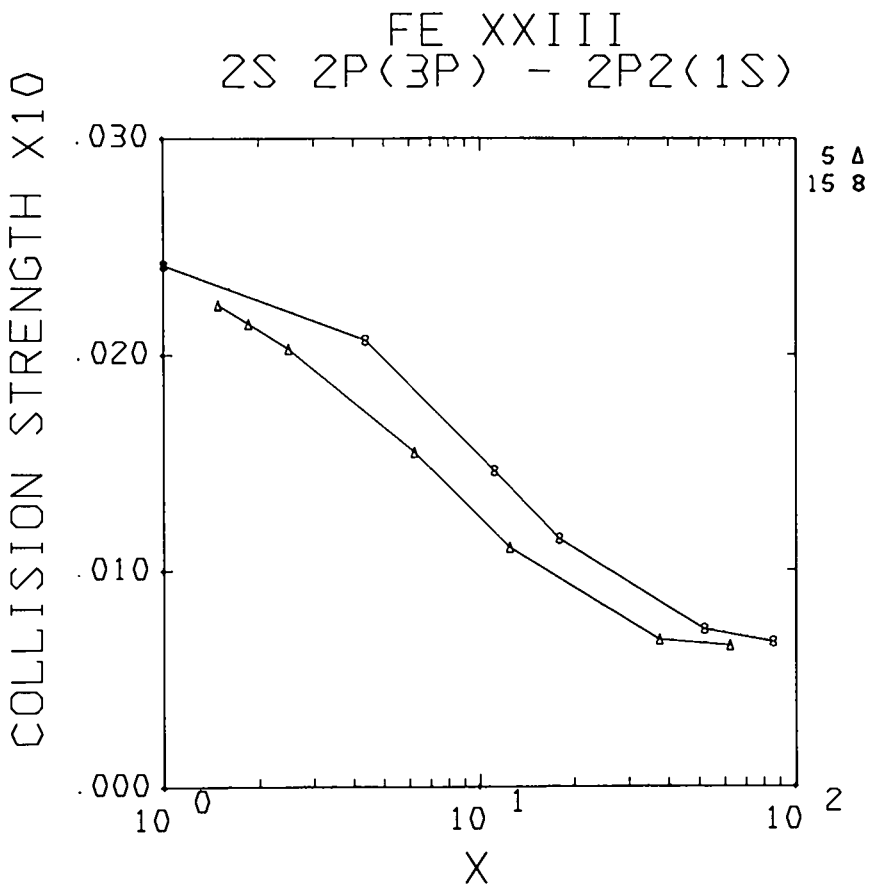
FE XXIII
2S 2P(3P) - 2P2(1D)

X	SYMBOL	15 SAMPSON E= 7.940	5 ROBB E= 6.008
2.00		-	1.810E-01
2.50		-	1.832E-01
3.33		-	1.853E-01
5.26		2.286E-01	-
8.32		-	2.031E-01
13.77		2.653E-01	-
16.64		-	2.280E-01
22.28		2.917E-01	-
49.93		-	2.813E-01
64.85		3.588E-01	-
83.22		-	3.088E-01
107.42		3.957E-01	-
192.56		4.357E-01	-
277.70		4.590E-01	-



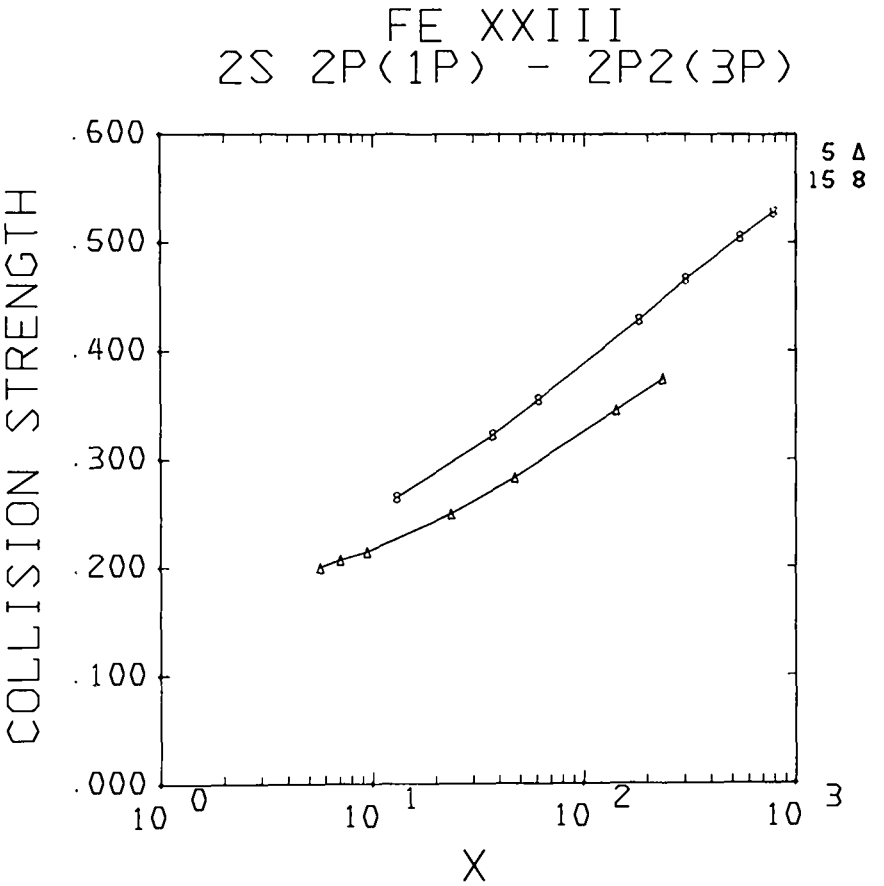
FE XXIII
2S 2P(3P) - 2P2(1S)

X	SYMBOL	15 SAMPSON E= 10.05	5 ROBB E= 8.054
1.00		2.417E-03	-
1.49		-	2.233E-03
1.86		-	2.147E-03
2.48		-	2.033E-03
4.36		2.069E-03	-
6.21		-	1.553E-03
11.09		1.467E-03	-
12.42		-	1.114E-03
17.82		1.153E-03	-
37.25		-	6.840E-04
51.46		7.283E-04	-
62.08		-	6.560E-04
85.10		6.690E-04	-
152.38		6.674E-04	-
219.65		6.824E-04	-



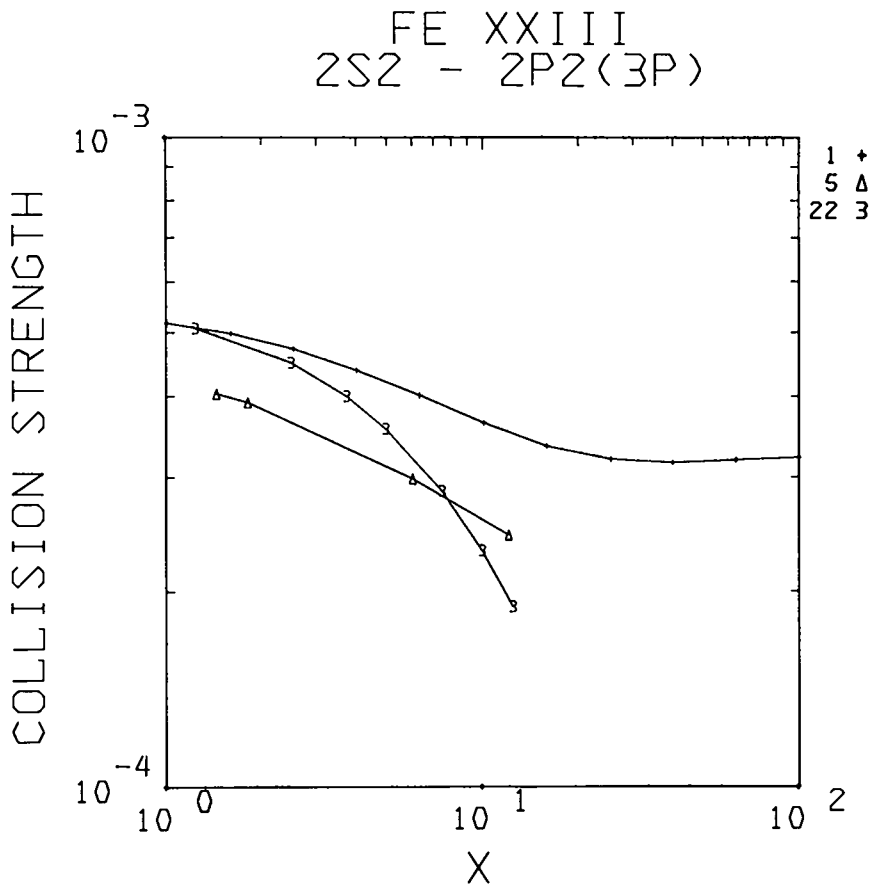
FE XXIII
2S 2P(1P) - 2P2(3P)

X	SYMBOL	15 SAMPSON E= 2.818	5 ROBB E= 2.125
5.65		-	2.006E-01
7.06		-	2.084E-01
9.41		-	2.154E-01
13.00		2.653E-01	-
23.53		-	2.501E-01
36.99		3.228E-01	-
47.06		-	2.836E-01
60.98		3.554E-01	-
141.18		-	3.455E-01
180.94		4.293E-01	-
235.29		-	3.741E-01
300.90		4.665E-01	-
540.82		5.058E-01	-
780.74		5.284E-01	-



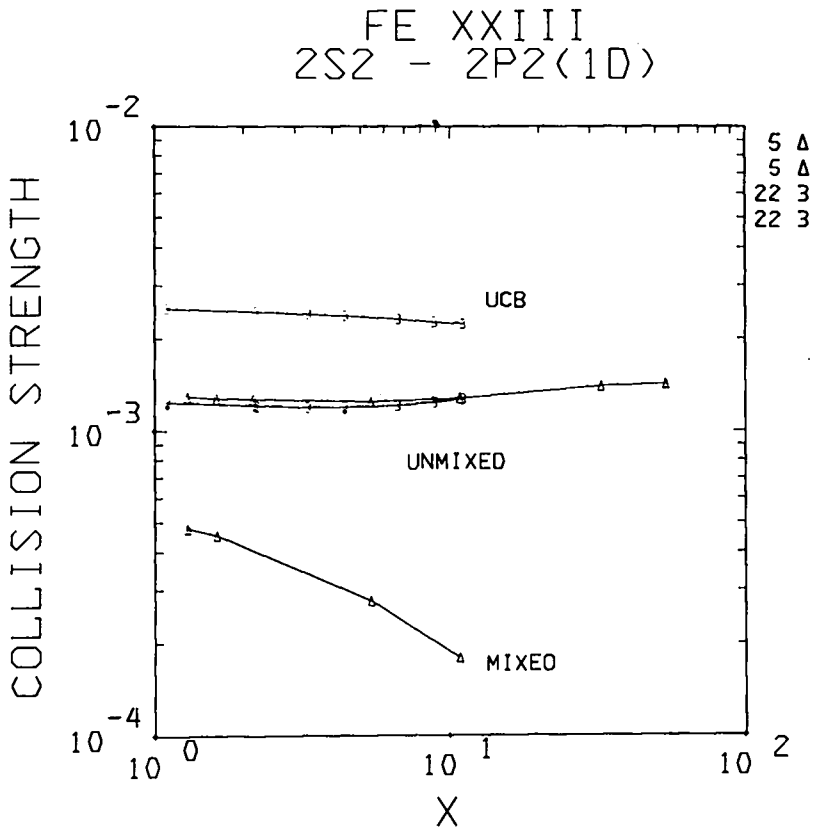
FE XXIII
2S2 - 2P2(3P)

X.	SYMBOL	22 HENRY E= 8.054	5 ROBB E= 8.295	1 MANN E= 9.249
1.01		-	-	5.198E-04
1.24		5.100E-04	-	-
1.45		-	4.040E-04	-
1.60		-	-	5.005E-04
1.81		-	3.920E-04	-
2.48		4.510E-04	-	-
2.53		-	-	4.736E-04
3.72		4.010E-04	-	-
4.01		-	-	4.397E-04
4.96		3.570E-04	-	-
6.03		-	2.990E-04	-
6.35		-	-	4.013E-04
7.44		2.860E-04	-	-
9.92		2.320E-04	-	-
10.05		-	-	3.642E-04
12.06		-	2.450E-04	-
12.40		1.900E-04	-	-
15.91		-	-	3.359E-04
25.19		-	-	3.206E-04
39.89		-	-	3.169E-04
63.16		-	-	3.193E-04
100.00		-	-	3.229E-04



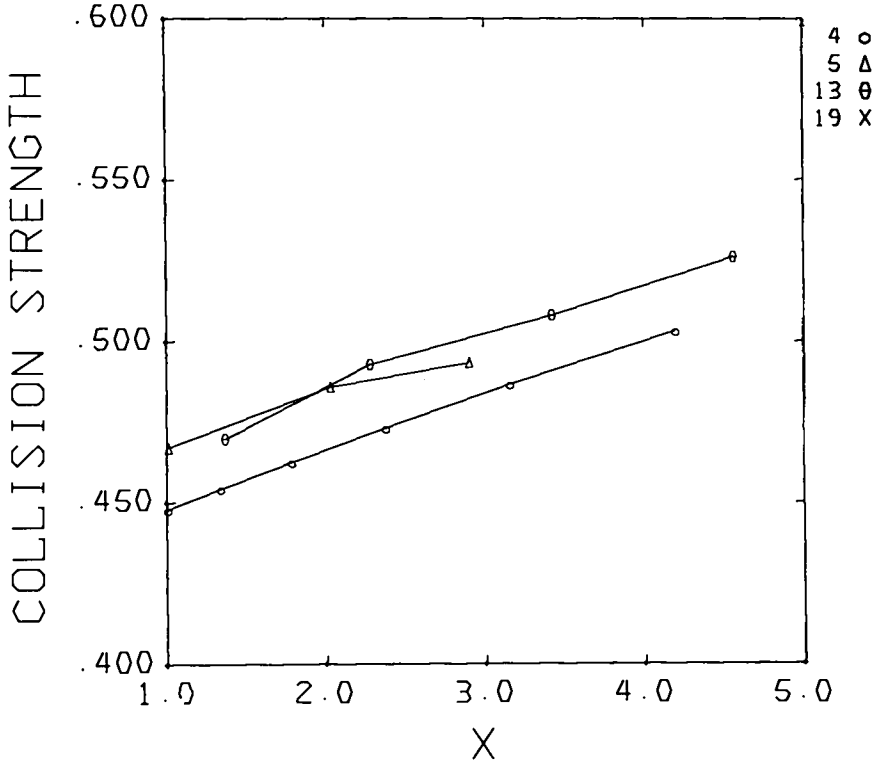
FE XXIII
2S2 - 2P2(1D)

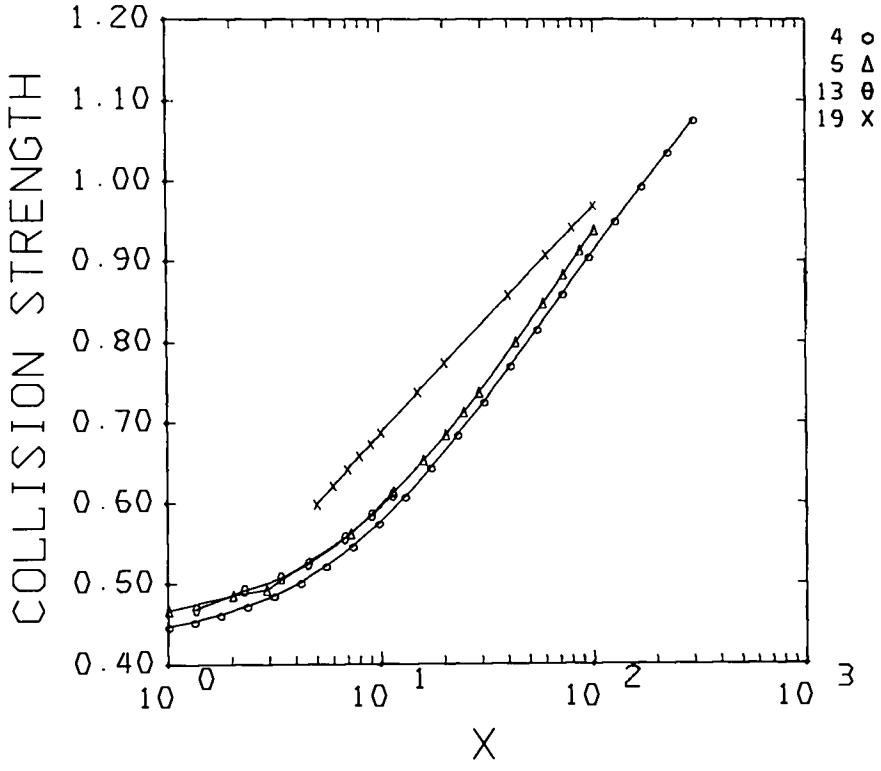
X.SYMBOL	22 HENRY E= 9.070	22 HENRY E= 0.000	5 ROBB E= 0.000	5 ROBB E= 9.263
1.10	2.520E-03	1.240E-03	-	-
1.30	-	-	1.300E-03	4.790E-04
1.62	-	-	1.280E-03	4.570E-04
2.16	-	-	1.270E-03	-
2.20	2.460E-03	1.210E-03	-	-
3.30	2.420E-03	1.200E-03	-	-
4.40	2.390E-03	1.200E-03	-	-
5.40	-	-	1.250E-03	2.790E-04
6.60	2.330E-03	1.210E-03	-	-
8.80	2.280E-03	1.240E-03	-	-
10.80	-	-	1.280E-03	1.800E-04
11.00	2.240E-03	1.270E-03	-	-
32.39	-	-	1.400E-03	-
53.98	-	-	1.430E-03	-



FE XXIV
1S2 2S - 1S2 2P

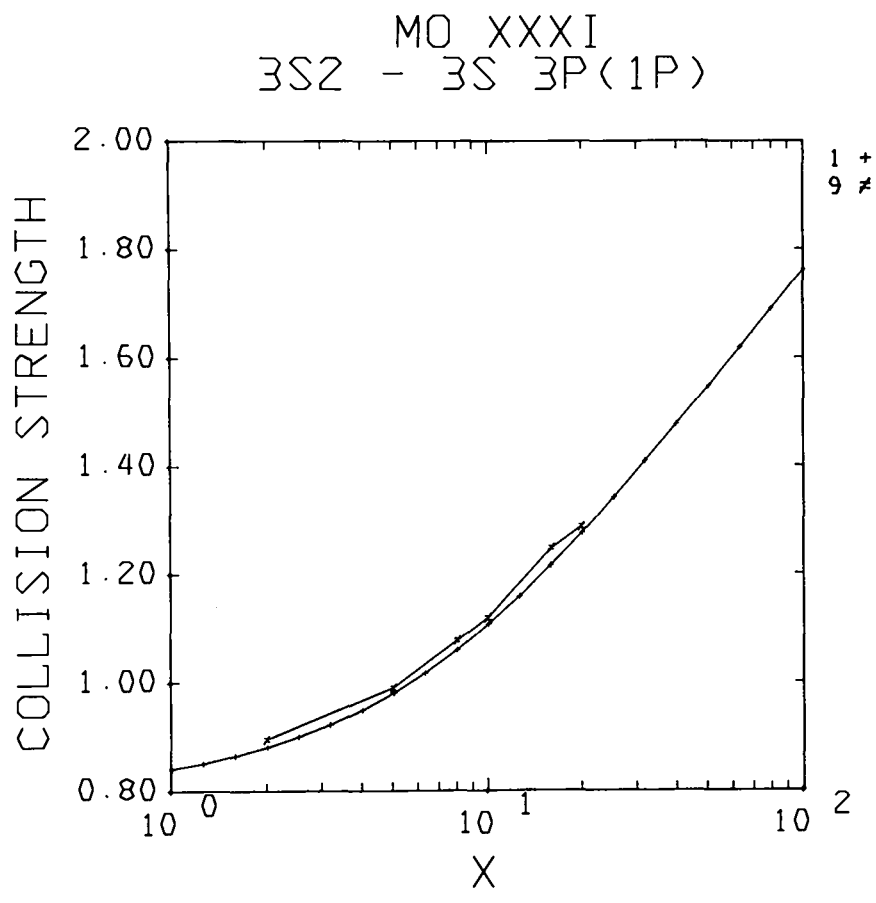
X.SYMBOL	4 MANN E= 4.289	5 ROBB E= 3.451	13 CALLAWAY E= 4.388	19 KIM E= 4.400
1.01	4.482E-01	4.673E-01	-	-
1.34	4.546E-01	-	-	-
1.37	-	-	4.700E-01	-
1.78	4.628E-01	-	-	-
2.03	-	4.860E-01	-	-
2.28	-	-	4.930E-01	-
2.37	4.734E-01	-	-	-
2.90	-	4.934E-01	-	-
3.15	4.869E-01	-	-	-
3.42	-	-	5.080E-01	-
4.19	5.033E-01	-	-	-
4.56	-	-	5.260E-01	-
5.00	-	-	-	5.987E-01
5.57	5.237E-01	-	-	-
6.00	-	-	-	6.225E-01
6.84	-	-	5.580E-01	-
7.00	-	-	-	6.423E-01
7.24	-	5.628E-01	-	-
7.41	5.482E-01	-	-	-
8.00	-	-	-	6.594E-01
9.00	-	-	-	6.744E-01
9.12	-	-	5.860E-01	-
9.85	5.768E-01	-	-	-
10.00	-	-	-	6.876E-01
11.39	-	-	6.110E-01	-
11.59	-	6.146E-01	-	-
13.09	6.095E-01	-	-	-
15.00	-	-	-	7.382E-01
15.94	-	6.536E-01	-	-
17.41	6.459E-01	-	-	-
20.00	-	-	-	7.736E-01
20.28	-	6.858E-01	-	-
23.14	6.855E-01	-	-	-
24.63	-	7.136E-01	-	-
28.98	-	7.377E-01	-	-
30.76	7.276E-01	-	-	-
40.00	-	-	-	8.582E-01
40.89	7.714E-01	-	-	-
43.47	-	8.008E-01	-	-
54.36	8.162E-01	-	-	-
57.95	-	8.479E-01	-	-
60.00	-	-	-	9.074E-01
72.26	8.614E-01	-	-	-
72.44	-	8.945E-01	-	-
80.00	-	-	-	9.421E-01
86.93	-	9.143E-01	-	-
96.06	9.064E-01	-	-	-
100.00	-	-	-	9.691E-01
101.42	-	9.394E-01	-	-
127.70	9.508E-01	-	-	-
169.76	9.942E-01	-	-	-
225.67	1.037E+00	-	-	-
300.00	1.078E+00	-	-	-


FE XXIV
1S2 2S - 1S2 2P
COLLISION STRENGTH
.600
.550
.500
.450
.400
1.0
2.0
3.0
4.0
5.0
X
4 o
5 Δ
13 θ
19 X


COLLISION STRENGTH
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
10 0
10 1
10 2
10 3
X
4 o
5 Δ
13 θ
19 X

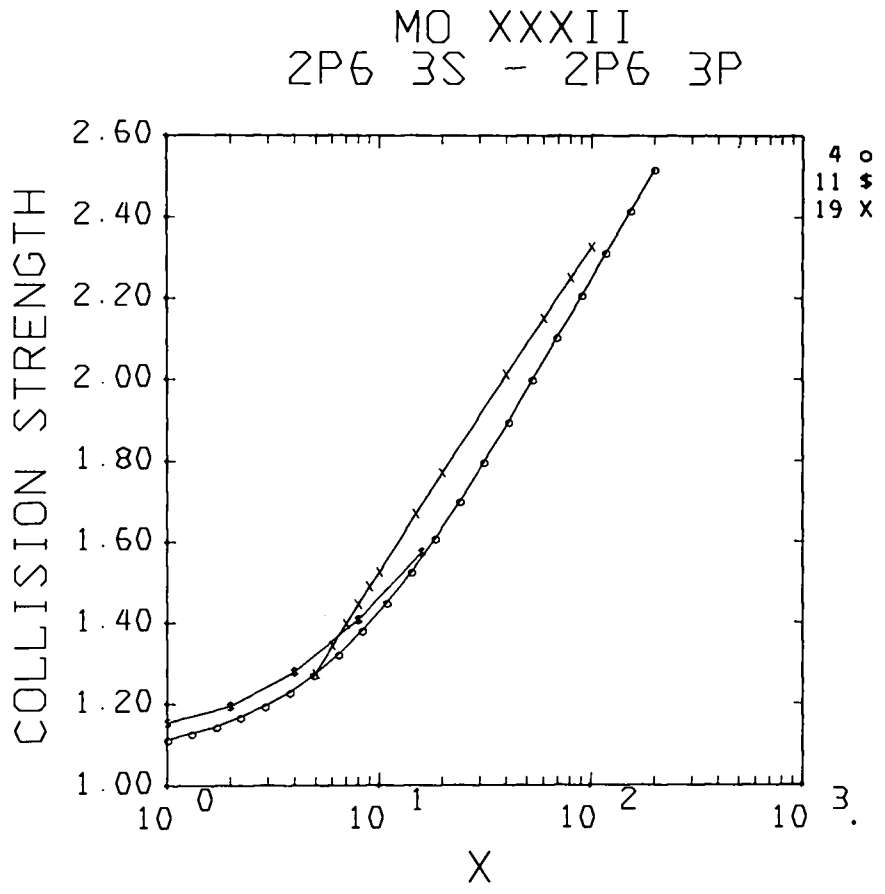
MO XXXI
3S2 - 3S 3P(1P)

X. SYMBOL	1	9
	MANN	YOUNGER
	E= 7.722	E= 7.760
1.01	8.418E-01	-
1.27	8.525E-01	-
1.60	8.656E-01	-
2.00	-	8.970E-01
2.01	8.815E-01	-
2.53	9.008E-01	-
3.19	9.233E-01	-
4.01	9.506E-01	-
5.00	-	9.910E-01
5.04	9.826E-01	-
6.35	1.020E+00	-
7.99	1.062E+00	-
8.00	-	1.080E+00
10.00	-	1.120E+00
10.05	1.109E+00	-
12.65	1.161E+00	-
15.91	1.218E+00	-
16.00	-	1.250E+00
20.00	-	1.290E+00
20.02	1.279E+00	-
25.19	1.343E+00	-
31.70	1.410E+00	-
39.89	1.479E+00	-
50.19	1.550E+00	-
63.16	1.621E+00	-
79.47	1.692E+00	-
100.00	1.764E+00	-



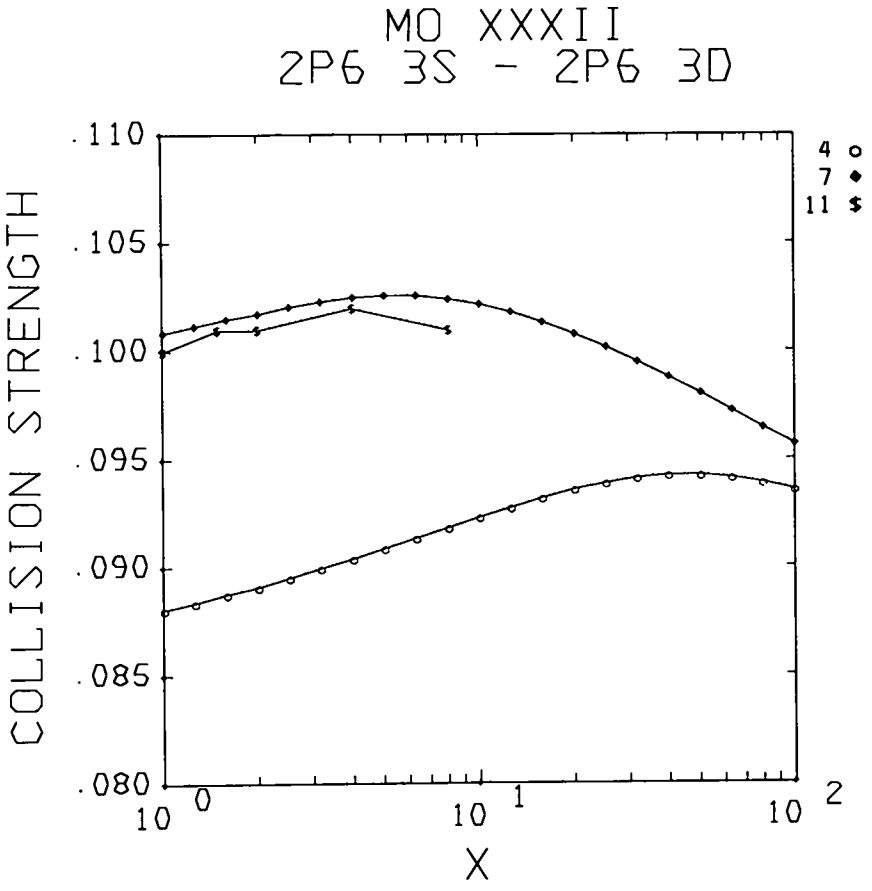
MO XXXII
2P6 3S - 2P6 3P

X.SYMBOL	19 KIM E= 6.529	11 BLAHA E= 5.148	4 MANN E= 6.424
1.00	-	1.155E+00	-
1.01	-	-	1.116E+00
1.32	-	-	1.139E+00
1.71	-	-	1.148E+00
2.00	-	1.197E+00	-
2.23	-	-	1.171E+00
2.91	-	-	1.199E+00
3.79	-	-	1.233E+00
4.00	-	1.282E+00	-
4.94	-	-	1.275E+00
5.00	1.277E+00	-	-
6.00	1.344E+00	-	-
6.43	-	-	1.325E+00
7.00	1.400E+00	-	-
8.00	1.448E+00	1.410E+00	-
8.38	-	-	1.384E+00
9.00	1.491E+00	-	-
10.00	1.528E+00	-	-
10.91	-	-	1.452E+00
14.21	-	-	1.528E+00
15.00	1.671E+00	-	-
16.00	-	1.576E+00	-
18.51	-	-	1.612E+00
20.00	1.772E+00	-	-
24.12	-	-	1.703E+00
31.42	-	-	1.799E+00
40.00	2.012E+00	-	-
40.93	-	-	1.899E+00
53.32	-	-	2.002E+00
60.00	2.152E+00	-	-
69.45	-	-	2.106E+00
80.00	2.251E+00	-	-
90.47	-	-	2.211E+00
100.00	2.328E+00	-	-
117.86	-	-	2.315E+00
153.53	-	-	2.418E+00
200.00	-	-	2.520E+00



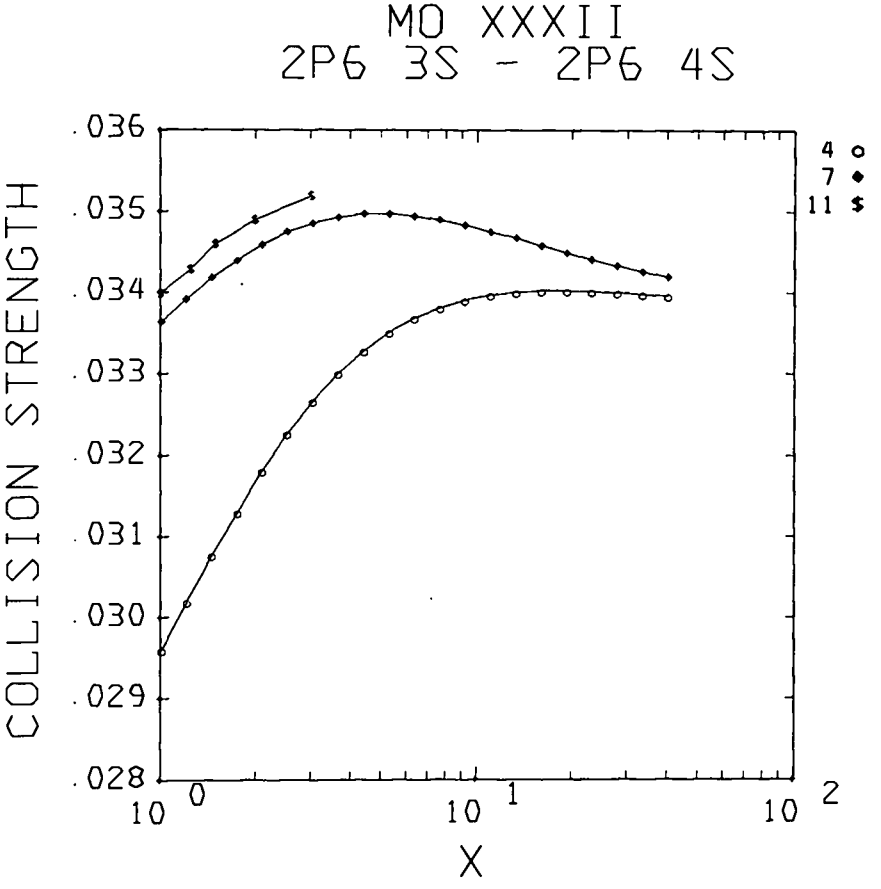
MO XXXII
2P6 3S - 2P6 3D

X.SYMBOL	11 BLAHA E= 13.79	7 MANN E= 0.000	4 MANN E= 14.13
1.00	1.000E-01	-	-
1.01	-	1.009E-01	8.809E-02
1.27	-	1.012E-01	8.842E-02
1.50	1.010E-01	-	-
1.60	-	1.015E-01	8.880E-02
2.00	1.010E-01	-	-
2.01	-	1.017E-01	8.912E-02
2.53	-	1.020E-01	8.955E-02
3.19	-	1.023E-01	9.000E-02
4.00	1.020E-01	1.025E-01	9.046E-02
5.04	-	1.026E-01	9.094E-02
6.35	-	1.026E-01	9.142E-02
7.99	-	1.024E-01	9.187E-02
8.00	1.010E-01	-	-
10.05	-	1.022E-01	9.234E-02
12.65	-	1.018E-01	9.280E-02
15.91	-	1.013E-01	9.323E-02
20.02	-	1.008E-01	9.361E-02
25.19	-	1.002E-01	9.392E-02
31.70	-	9.951E-02	9.415E-02
39.89	-	9.879E-02	9.426E-02
50.19	-	9.804E-02	9.426E-02
63.16	-	9.726E-02	9.413E-02
79.47	-	9.647E-02	9.391E-02
100.00	-	9.568E-02	9.360E-02



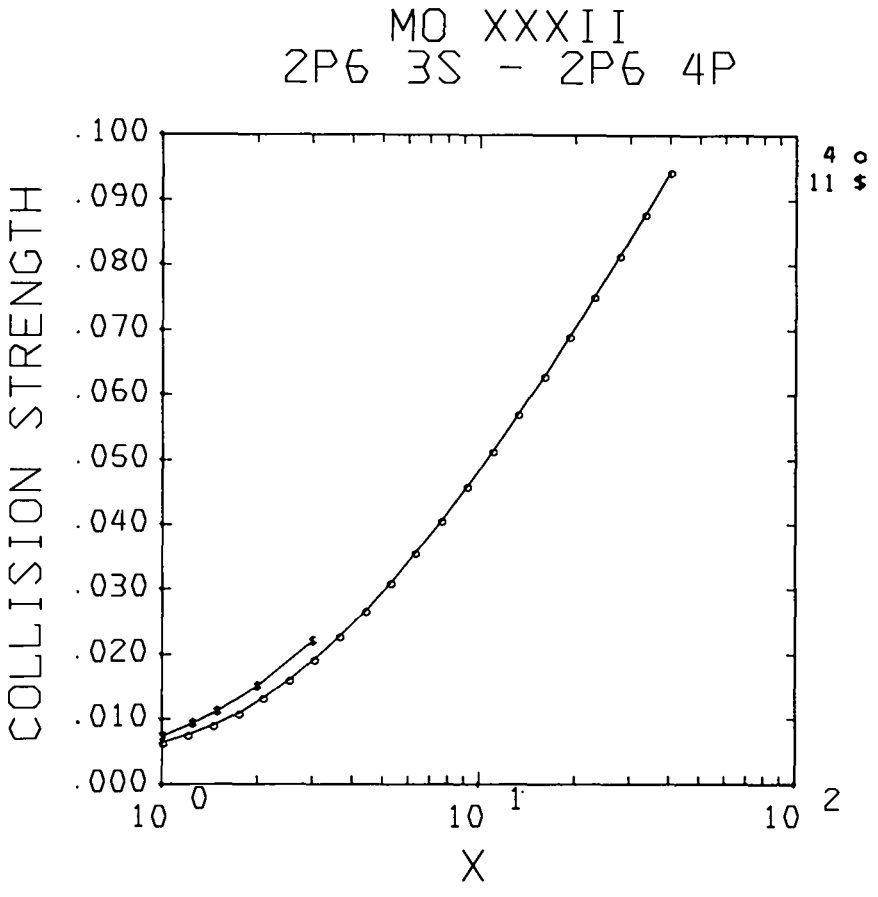
MO XXXII
2P6 3S - 2P6 4S

X. SYMBOL	11 BLAHA E= 60.43	7 MANN E= 0.000	4 MANN E= 60.45
1.00	3.400E-02	-	-
1.01	-	3.365E-02	2.961E-02
1.21	-	3.393E-02	3.020E-02
1.25	3.430E-02	-	-
1.46	-	3.419E-02	3.077E-02
1.50	3.460E-02	-	-
1.75	-	3.441E-02	3.131E-02
2.00	3.490E-02	-	-
2.11	-	3.460E-02	3.181E-02
2.53	-	3.475E-02	3.227E-02
3.00	3.520E-02	-	-
3.05	-	3.486E-02	3.267E-02
3.66	-	3.494E-02	3.301E-02
4.40	-	3.497E-02	3.329E-02
5.29	-	3.498E-02	3.352E-02
6.36	-	3.495E-02	3.369E-02
7.64	-	3.490E-02	3.382E-02
9.18	-	3.483E-02	3.392E-02
11.04	-	3.476E-02	3.398E-02
13.27	-	3.467E-02	3.401E-02
15.95	-	3.459E-02	3.403E-02
19.17	-	3.450E-02	3.403E-02
23.04	-	3.441E-02	3.402E-02
27.69	-	3.434E-02	3.401E-02
33.28	-	3.427E-02	3.399E-02
40.00	-	3.420E-02	3.397E-02



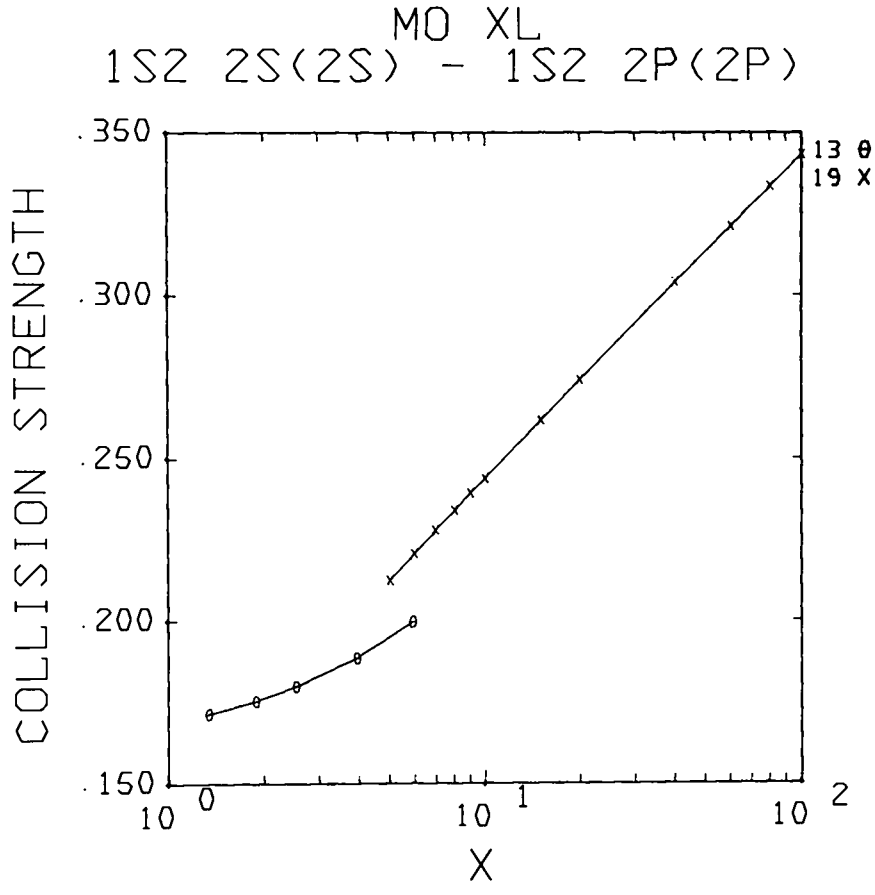
MO XXXII
2P6 3S - 2P6 4P

X.	SYMBOL	11 BLAHA E= 63.00	4 MANN E= 63.08
1.00		7.500E-03	-
1.01		-	6.607E-03
1.21		-	7.720E-03
1.25		9.470E-03	-
1.46		-	9.209E-03
1.50		1.140E-02	-
1.75		-	1.111E-02
2.00		1.520E-02	-
2.11		-	1.343E-02
2.53		-	1.619E-02
3.00		2.220E-02	-
3.05		-	1.937E-02
3.66		-	2.295E-02
4.40		-	2.692E-02
5.29		-	3.124E-02
6.36		-	3.589E-02
7.64		-	4.084E-02
9.18		-	4.605E-02
11.04		-	5.151E-02
13.27		-	5.719E-02
15.95		-	6.307E-02
19.17		-	6.912E-02
23.04		-	7.531E-02
27.69		-	8.162E-02
33.28		-	8.804E-02
40.00		-	9.456E-02



MO XL
1S2 2S(2S) - 1S2 2P(2P)

X.	SYMBOL	13 CALLAWAY E= 12.65	19 KIM E= 12.70
1.34		1.717E-01	-
1.90		1.757E-01	-
2.53		1.800E-01	-
3.95		1.889E-01	-
5.00		-	2.127E-01
5.93		2.000E-01	-
6.00		-	2.210E-01
7.00		-	2.281E-01
8.00		-	2.341E-01
9.00		-	2.394E-01
10.00		-	2.441E-01
15.00		-	2.619E-01
20.00		-	2.744E-01
40.00		-	3.043E-01
60.00		-	3.216E-01
80.00		-	3.338E-01
100.00		-	3.434E-01



5.4. Data Tables

DATA OF J. B. MANN — PLOT SYMBOLS 1,2,4,7

BE II
2S - 2P
ETH = 2.910E-01

X	MANN OWX
1.01	1.658E+01
1.34	1.923E+01
1.78	2.229E+01
2.37	2.573E+01
3.15	2.960E+01
4.19	3.383E+01
5.57	3.831E+01
7.41	4.295E+01
9.85	4.767E+01
13.09	5.240E+01
17.41	5.712E+01
23.14	6.178E+01
30.76	6.639E+01
40.89	7.091E+01
54.36	7.537E+01
72.26	7.977E+01
96.06	8.410E+01
127.70	8.838E+01
169.76	9.261E+01
225.67	9.679E+01
300.00	1.009E+02

B III
2S - 2P
ETH = 4.409E-01

X	MANN OWX
1.01	1.295E+01
1.34	1.385E+01
1.78	1.494E+01
2.37	1.621E+01
3.15	1.769E+01
4.19	1.934E+01
5.57	2.115E+01
7.41	2.309E+01
9.85	2.513E+01
13.09	2.724E+01
17.41	2.939E+01
23.14	3.156E+01
30.76	3.374E+01
40.89	3.590E+01
54.36	3.805E+01
72.26	4.017E+01
96.06	4.227E+01
127.70	4.434E+01
169.76	4.639E+01
225.67	4.842E+01
300.00	5.042E+01

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 9.327E-01

X	MANN OWXC
1.01	3.920E+00
1.37	4.626E+00
1.86	5.426E+00
2.53	6.318E+00
3.44	7.296E+00
4.67	8.346E+00
6.35	9.453E+00
8.62	1.060E+01
11.71	1.176E+01
15.91	1.292E+01
21.62	1.408E+01
29.36	1.523E+01
39.89	1.637E+01
54.19	1.750E+01
73.61	1.860E+01
100.00	1.970E+01
-	-
-	-
-	-
-	-
-	-

C III
1S2 2S2 - 1S2 2S 2P(3P)
ETH = 4.777E-01

X	MANN OWXC
1.01	1.178E+00
1.37	1.064E+00
1.86	9.349E-01
2.53	7.972E-01
3.44	6.573E-01
4.67	5.227E-01
6.35	3.939E-01
8.62	2.907E-01
11.71	2.017E-01
15.91	1.333E-01
21.62	8.443E-02
29.36	5.162E-02
39.89	3.074E-02
54.19	1.795E-02
73.61	1.032E-02
100.00	5.863E-03
-	-
-	-
-	-
-	-
-	-

C III
2S 2P(3P) - 2P2(3P)
ETH = 7.751E-01

X	MANN OWXC
1.01	2.010E+01
1.37	2.252E+01
1.86	2.543E+01
2.53	2.882E+01
3.44	3.266E+01
4.67	3.686E+01
6.35	4.134E+01
8.62	4.602E+01
11.71	5.080E+01
15.91	5.563E+01
21.62	6.046E+01
29.36	6.527E+01
39.89	7.003E+01
54.19	7.473E+01
73.61	7.936E+01
100.00	8.392E+01
-	-
-	-
-	-
-	-
-	-

C IV
1S2 2S - 1S2 2P
ETH = 5.883E-01

X	MANN OWX
1.01	9.307E+00
1.36	9.758E+00
1.84	1.031E+01
2.48	1.099E+01
3.34	1.176E+01
4.51	1.269E+01
6.08	1.371E+01
8.19	1.483E+01
11.05	1.603E+01
14.90	1.730E+01
20.10	1.861E+01
27.11	1.994E+01
36.56	2.128E+01
49.30	2.262E+01
66.49	2.395E+01
89.67	2.526E+01
120.92	2.656E+01
163.08	2.783E+01
219.93	2.910E+01
296.60	3.034E+01
400.00	3.157E+01

C IV
1S2 2S - 1S2 3S
ETH = 2.760E+00

X	MANN OWX
1.01	4.421E-01
1.27	4.522E-01
1.60	4.601E-01
2.01	4.666E-01
2.53	4.719E-01
3.19	4.759E-01
4.01	4.791E-01
5.04	4.815E-01
6.35	4.831E-01
7.99	4.841E-01
10.05	4.847E-01
12.65	4.850E-01
15.91	4.850E-01
20.02	4.849E-01
25.19	4.846E-01
31.70	4.842E-01
39.89	4.839E-01
50.19	4.835E-01
63.16	4.831E-01
79.47	4.829E-01
100.00	4.827E-01

C IV
1S2 2S - 1S2 3P
ETH = 2.917E+00

X	MANN OWX
1.01	1.152E-01
1.27	1.390E-01
1.60	1.747E-01
2.01	2.225E-01
2.53	2.818E-01
3.19	3.516E-01
4.01	4.307E-01
5.04	5.180E-01
6.35	6.122E-01
7.99	7.122E-01
10.05	8.174E-01
12.65	9.272E-01
15.91	1.041E+00
20.02	1.159E+00
25.19	1.279E+00
31.70	1.401E+00
39.89	1.524E+00
50.19	1.648E+00
63.16	1.773E+00
79.47	1.898E+00
100.00	2.022E+00

C IV
1S2 2S - 1S2 3D
ETH = 2.961E+00

X	MANN OWX
1.01	6.077E-01
1.27	6.458E-01
1.60	6.969E-01
2.01	7.596E-01
2.53	8.265E-01
3.19	8.956E-01
4.01	9.616E-01
5.04	1.021E+00
6.35	1.074E+00
7.99	1.117E+00
10.05	1.153E+00
12.65	1.183E+00
15.91	1.205E+00
20.02	1.222E+00
25.19	1.234E+00
31.70	1.241E+00
39.89	1.244E+00
50.19	1.241E+00
63.16	1.234E+00
79.47	1.224E+00
100.00	1.212E+00

C IV
1S2 2S - 1S 2S2
ETH = 2.147E+01

X	MANN DWXC
1.01	1.977E-02
1.17	2.037E-02
1.36	2.077E-02
1.58	2.109E-02
1.84	2.132E-02
2.13	2.151E-02
2.47	2.168E-02
2.87	2.183E-02
3.33	2.197E-02
3.87	2.210E-02
4.49	2.223E-02
5.22	2.235E-02
6.06	2.247E-02
7.03	2.258E-02
8.17	2.268E-02
9.48	2.278E-02
11.01	2.287E-02
12.78	2.295E-02
14.84	2.302E-02
17.23	2.309E-02
20.00	2.314E-02

C IV
1S2 2S - 1S 2S 2P(4P)
ETH = 2.152E+01

X	MANN DWX
1.01	6.171E-02
1.17	4.828E-02
1.36	3.723E-02
1.58	2.838E-02
1.84	2.142E-02
2.13	1.602E-02
2.47	1.189E-02
2.87	8.769E-03
3.33	6.435E-03
3.87	4.704E-03
4.49	3.429E-03
5.22	2.494E-03
6.06	1.812E-03
7.03	1.316E-03
8.17	9.555E-04
9.48	6.942E-04
11.01	5.047E-04
12.78	3.674E-04
14.84	2.677E-04
17.23	1.954E-04
20.00	1.427E-04

C IV
1S2 2S - 1S 2S(1S) 2P(2P)
ETH = 2.202E+01

X	MANN DWXC
1.01	5.106E-02
1.17	7.210E-02
1.36	9.534E-02
1.58	1.206E-01
1.84	1.473E-01
2.13	1.753E-01
2.47	2.041E-01
2.87	2.337E-01
3.33	2.638E-01
3.87	2.943E-01
4.49	3.251E-01
5.22	3.562E-01
6.06	3.874E-01
7.03	4.188E-01
8.17	4.503E-01
9.48	4.819E-01
11.01	5.136E-01
12.78	5.454E-01
14.84	5.772E-01
17.23	6.091E-01
20.00	6.410E-01

C IV
1S2 2S - 1S 2S(3S) 2P(2P)
ETH = 2.230E+01

X	MANN DWXC
1.01	3.209E-02
1.17	2.850E-02
1.36	2.622E-02
1.58	2.512E-02
1.84	2.503E-02
2.13	2.575E-02
2.47	2.712E-02
2.87	2.900E-02
3.33	3.129E-02
3.87	3.387E-02
4.49	3.669E-02
5.22	3.967E-02
6.06	4.279E-02
7.03	4.600E-02
8.17	4.928E-02
9.48	5.261E-02
11.01	5.598E-02
12.78	5.939E-02
14.84	6.282E-02
17.23	6.626E-02
20.00	6.972E-02

N V
1S2 2S - 1S2 2P
ETH = 7.348E-01

X	MANN DWX
1.01	6.869E+00
1.20	7.003E+00
1.42	7.156E+00
1.68	7.330E+00
1.99	7.526E+00
2.36	7.746E+00
2.79	7.988E+00
3.31	8.258E+00
3.92	8.554E+00
4.65	8.877E+00
5.50	9.225E+00
6.52	9.597E+00
7.73	9.993E+00
9.15	1.041E+01
10.85	1.085E+01
12.85	1.130E+01
15.23	1.177E+01
18.04	1.225E+01
21.37	1.274E+01
25.32	1.323E+01
30.00	1.373E+01

O III
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 5.477E-01

X	MANN DWXC
1.01	1.176E+00
1.49	1.076E+00
2.20	9.513E-01
3.26	8.071E-01
4.81	6.530E-01
7.11	5.002E-01
10.50	3.578E-01
15.51	2.353E-01
22.91	1.415E-01
33.85	7.972E-02
50.00	4.136E-02
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

O III
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 1.092E+00

X	MANN DWXC
1.01	9.013E+00
1.49	1.036E+01
2.20	1.186E+01
3.26	1.359E+01
4.81	1.552E+01
7.11	1.763E+01
10.50	1.987E+01
15.51	2.217E+01
22.91	2.450E+01
33.85	2.683E+01
50.00	2.913E+01

O III
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 1.296E+00

X	MANN DWXC
1.01	6.960E+00
1.49	9.451E+00
2.20	1.006E+01
3.26	1.182E+01
4.81	1.374E+01
7.11	1.578E+01
10.50	1.790E+01
15.51	2.004E+01
22.91	2.220E+01
33.85	2.434E+01
50.00	2.646E+01

O III
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 1.794E+00

X	MANN DWXC
1.01	4.976E+00
1.49	5.560E+00
2.20	7.127E+00
3.26	8.801E+00
4.81	1.056E+01
7.11	1.238E+01
10.50	1.422E+01
15.51	1.605E+01
22.91	1.798E+01
33.85	1.969E+01
50.00	2.148E+01

O III
2S2 2P2(3P) - 2S 2P3(1D)
ETH = 1.703E+00

X	MANN OWXC
1.01	5.701E-01
1.49	4.348E-01
2.20	3.163E-01
3.26	2.133E-01
4.81	1.404E-01
7.11	8.343E-02
10.50	4.643E-02
15.51	2.500E-02
22.91	1.361E-02
33.85	7.897E-03
50.00	5.170E-03

O III
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 1.916E+00

X	MANN OWXC
1.01	2.562E-01
1.49	1.884E-01
2.20	1.317E-01
3.26	8.703E-02
4.81	5.353E-02
7.11	3.059E-02
10.50	1.662E-02
15.51	8.953E-03
22.91	5.056E-03
33.85	3.185E-03
50.00	2.341E-03

O III
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 1.828E-01

X	MANN OWXC
1.01	4.083E+00
1.49	4.005E+00
2.20	3.891E+00
3.26	3.719E+00
4.81	3.469E+00
7.11	3.117E+00
10.50	2.651E+00
15.51	2.091E+00
22.91	1.504E+00
33.85	9.765E-01
50.00	5.749E-01

O III
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 3.916E-01

X	MANN OWXC
1.01	6.879E-01
1.49	6.545E-01
2.20	6.068E-01
3.26	5.407E-01
4.81	4.536E-01
7.11	3.496E-01
10.50	2.418E-01
15.51	1.491E-01
22.91	8.075E-02
33.85	4.018E-02
50.00	1.996E-02
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

O III
2S2 2P2(1D) - 2S2 2P2(1S)
ETH = 2.088E-01

X	MANN OWXC
1.01	3.673E-01
1.49	3.669E-01
2.20	3.661E-01
3.26	3.651E-01
4.81	3.657E-01
7.11	3.708E-01
10.50	3.841E-01
15.51	4.091E-01
22.91	4.456E-01
33.85	4.936E-01
50.00	5.443E-01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

O IV
2S2 2P - 2S 2P2(4P)
ETH = 6.505E-01

X	MANN OWXC
1.01	1.217E+00
1.27	1.167E+00
1.60	1.110E+00
2.01	1.044E+00
2.53	9.707E-01
3.19	8.898E-01
4.01	8.029E-01
5.04	7.110E-01
6.35	6.152E-01
7.99	5.208E-01
10.05	4.283E-01
12.65	3.418E-01
15.91	2.645E-01
20.02	1.988E-01
25.19	1.453E-01
31.70	1.037E-01
39.89	7.249E-02
50.19	4.984E-02
63.16	3.380E-02
79.47	2.266E-02
100.00	1.505E-02

O IV
2S2 2P - 2S 2P2(2D)
ETH = 1.154E+00

X	MANN OWXC
1.01	6.363E+00
1.27	6.626E+00
1.60	6.937E+00
2.01	7.299E+00
2.53	7.716E+00
3.19	8.187E+00
4.01	8.709E+00
5.04	9.280E+00
6.35	9.895E+00
7.99	1.055E+01
10.05	1.123E+01
12.65	1.194E+01
15.91	1.267E+01
20.02	1.342E+01
25.19	1.417E+01
31.70	1.492E+01
39.89	1.568E+01
50.19	1.643E+01
63.16	1.718E+01
79.47	1.792E+01
100.00	1.866E+01

O IV
2S2 2P - 2S 2P2(2S)
ETH = 1.496E+00

X	MANN OWXC
1.01	2.094E+00
1.27	2.229E+00
1.60	2.383E+00
2.01	2.558E+00
2.53	2.753E+00
3.19	2.967E+00
4.01	3.198E+00
5.04	3.445E+00
6.35	3.705E+00
7.99	3.976E+00
10.05	4.256E+00
12.65	4.542E+00
15.91	4.832E+00
20.02	5.126E+00
25.19	5.421E+00
31.70	5.717E+00
39.89	6.012E+00
50.19	6.305E+00
63.16	6.597E+00
79.47	6.886E+00
100.00	7.174E+00

O IV
2S2 2P - 2S 2P2(2P)
ETH = 1.644E+00

X	MANN OWXC
1.01	7.730E+00
1.27	8.404E+00
1.60	9.179E+00
2.01	1.006E+01
2.53	1.103E+01
3.19	1.209E+01
4.01	1.324E+01
5.04	1.445E+01
6.35	1.572E+01
7.99	1.703E+01
10.05	1.837E+01
12.65	1.973E+01
15.91	2.111E+01
20.02	2.248E+01
25.19	2.385E+01
31.70	2.522E+01
39.89	2.657E+01
50.19	2.792E+01
63.16	2.925E+01
79.47	3.057E+01
100.00	3.187E+01

O IV
2S 2P2(4P) - 2S 2P2(2D)
ETH = 5.040E-01

X	MANN OWX
1.01	3.427E+00
1.28	3.291E+00
1.63	3.128E+00
2.07	2.937E+00
2.63	2.718E+00
3.33	2.470E+00
4.23	2.199E+00
5.38	1.911E+00
6.83	1.618E+00
8.67	1.331E+00
11.01	1.061E+00
13.98	8.205E-01
17.75	6.146E-01
22.54	4.467E-01
28.62	3.155E-01
36.35	2.170E-01
46.15	1.457E-01
58.61	9.581E-02
74.42	6.186E-02
94.50	3.934E-02
120.00	2.472E-02

O IV
2S 2P2(2D) - 2S 2P2(2P)
ETH = 4.894E-01

X	MANN OWX
1.01	1.718E+00
1.28	1.651E+00
1.63	1.572E+00
2.07	1.478E+00
2.63	1.371E+00
3.33	1.249E+00
4.23	1.115E+00
5.38	9.721E-01
6.83	8.258E-01
8.67	6.818E-01
11.01	5.460E-01
13.98	4.237E-01
17.75	3.187E-01
22.54	2.325E-01
28.62	1.648E-01
36.35	1.137E-01
46.15	7.659E-02
58.61	5.048E-02
74.42	3.266E-02
94.50	2.081E-02
120.00	1.309E-02

O IV
2S 2P2(4P) - 2S 2P2(2P)
ETH = 9.934E-01

X	MANN OWX
1.01	4.820E-01
1.24	4.500E-01
1.52	4.146E-01
1.86	3.762E-01
2.29	3.355E-01
2.80	2.936E-01
3.44	2.516E-01
4.22	2.110E-01
5.17	1.729E-01
6.35	1.384E-01
7.78	1.084E-01
9.55	8.305E-02
11.71	6.237E-02
14.37	4.598E-02
17.62	3.333E-02
21.61	2.380E-02
26.51	1.676E-02
32.51	1.166E-02
39.88	8.030E-03
48.92	5.480E-03
60.00	3.711E-03

O IV
2S 2P2(2D) - 2S 2P2(2S)
ETH = 3.411E-01

X	MANN OWX
1.01	6.327E-01
1.31	6.414E-01
1.70	6.516E-01
2.20	6.640E-01
2.85	6.786E-01
3.69	6.958E-01
4.78	7.163E-01
6.20	7.404E-01
8.03	7.693E-01
10.41	8.030E-01
13.48	8.418E-01
17.47	8.852E-01
22.64	9.318E-01
29.34	9.799E-01
38.02	1.027E+00
49.26	1.071E+00
63.84	1.111E+00
82.72	1.144E+00
107.20	1.170E+00
138.91	1.190E+00
180.00	1.205E+00

O IV
2S 2P2(4P) - 2S 2P2(2S)
ETH = 8.451E-01

X	MANN OWX
1.01	5.091E-01
1.25	4.772E-01
1.55	4.412E-01
1.93	4.011E-01
2.39	3.575E-01
2.96	3.117E-01
3.68	2.650E-01
4.56	2.192E-01
5.66	1.759E-01
7.02	1.368E-01
8.70	1.030E-01
10.80	7.500E-02
13.39	5.292E-02
16.61	3.621E-02
20.60	2.405E-02
25.55	1.554E-02
31.69	9.789E-03
39.31	6.021E-03
48.75	3.625E-03
60.47	2.141E-03
75.00	1.243E-03

O V
2S2 - 2S 2P(1P)
ETH = 1.447E+00

X	MANN OWXC
1.01	2.853E+00
1.27	3.000E+00
1.60	3.171E+00
2.01	3.368E+00
2.53	3.591E+00
3.19	3.841E+00
4.01	4.117E+00
5.04	4.416E+00
6.35	4.736E+00
7.99	5.074E+00
10.05	5.426E+00
12.65	5.789E+00
15.91	6.159E+00
20.02	6.534E+00
25.19	6.912E+00
31.70	7.290E+00
39.89	7.667E+00
50.19	8.042E+00
63.16	8.414E+00
79.47	8.782E+00
100.00	9.147E+00

O V
2S2 - 2S 2P(3P)
ETH = 7.494E-01

X	MANN OWXC
1.01	3.219E-01
1.27	3.103E-01
1.60	2.967E-01
2.01	2.810E-01
2.53	2.629E-01
3.19	2.425E-01
4.01	2.202E-01
5.04	1.960E-01
6.35	1.707E-01
7.99	1.450E-01
10.05	1.199E-01
12.65	9.625E-02
15.91	7.507E-02
20.02	5.691E-02
25.19	4.203E-02
31.70	3.031E-02
39.89	2.142E-02
50.19	1.487E-02
63.16	1.017E-02
79.47	6.873E-03
100.00	4.595E-03

O V
2S 2P(3P) - 2P2(3P)
ETH = 1.199E+00

X	MANN OWX
1.01	1.381E+01
1.27	1.437E+01
1.60	1.502E+01
2.01	1.578E+01
2.53	1.666E+01
3.19	1.765E+01
4.01	1.875E+01
5.04	1.996E+01
6.35	2.126E+01
7.99	2.266E+01
10.05	2.412E+01
12.65	2.565E+01
15.91	2.721E+01
20.02	2.881E+01
25.19	3.043E+01
31.70	3.206E+01
39.89	3.369E+01
50.19	3.531E+01
63.16	3.691E+01
79.47	3.851E+01
100.00	4.009E+01

O VI
2S - 2P
ETH = 8.815E-01

X	MANN OWX
1.01	5.222E+00
1.34	5.371E+00
1.78	5.558E+00
2.37	5.786E+00
3.15	6.064E+00
4.19	6.393E+00
5.57	6.777E+00
7.41	7.211E+00
9.85	7.694E+00
13.09	8.217E+00
17.41	8.774E+00
23.14	9.354E+00
30.76	9.949E+00
40.89	1.055E+01
54.36	1.116E+01
72.26	1.176E+01
96.06	1.235E+01
127.70	1.294E+01
169.76	1.351E+01
225.67	1.408E+01
300.00	1.464E+01

O VI
2S - 3S
ETH = 5.833E+00

X	MANN OWX
1.01	2.101E-01
1.17	2.132E-01
1.36	2.161E-01
1.58	2.189E-01
1.84	2.214E-01
2.13	2.238E-01
2.47	2.259E-01
2.87	2.278E-01
3.33	2.294E-01
3.87	2.308E-01
4.49	2.320E-01
5.22	2.329E-01
6.06	2.337E-01
7.03	2.343E-01
8.17	2.348E-01
9.48	2.351E-01
11.01	2.354E-01
12.78	2.356E-01
14.84	2.357E-01
17.23	2.358E-01
20.00	2.358E-01

O VI
2S - 3P
ETH = 5.071E+00

X	MANN OWX
1.01	8.120E-02
1.17	9.235E-02
1.36	1.065E-01
1.58	1.238E-01
1.84	1.441E-01
2.13	1.673E-01
2.47	1.934E-01
2.87	2.221E-01
3.33	2.533E-01
3.87	2.867E-01
4.49	3.223E-01
5.22	3.598E-01
6.06	3.990E-01
7.03	4.398E-01
8.17	4.819E-01
9.48	5.253E-01
11.01	5.699E-01
12.78	6.157E-01
14.84	6.624E-01
17.23	7.100E-01
20.00	7.584E-01

O VI
2S - 3D
ETH = 6.148E+00

X	MANN OWX
1.01	3.291E-01
1.17	3.397E-01
1.36	3.535E-01
1.58	3.701E-01
1.84	3.892E-01
2.13	4.099E-01
2.47	4.318E-01
2.87	4.541E-01
3.33	4.762E-01
3.87	4.975E-01
4.49	5.178E-01
5.22	5.367E-01
6.06	5.540E-01
7.03	5.695E-01
8.17	5.834E-01
9.48	5.956E-01
11.01	6.061E-01
12.78	6.152E-01
14.84	6.230E-01
17.23	6.294E-01
20.00	6.347E-01

NE VIII
2S - 2P
ETH = 1.189E+00

X	MANN OWX
1.01	3.333E+00
1.17	3.369E+00
1.36	3.409E+00
1.58	3.455E+00
1.84	3.507E+00
2.13	3.563E+00
2.47	3.628E+00
2.87	3.701E+00
3.33	3.781E+00
3.87	3.870E+00
4.49	3.967E+00
5.22	4.073E+00
6.06	4.187E+00
7.03	4.310E+00
8.17	4.442E+00
9.48	4.582E+00
11.01	4.729E+00
12.78	4.884E+00
14.84	5.045E+00
17.23	5.211E+00
20.00	5.383E+00

MG II
3S - 3P
ETH = 3.256E-01

X	MANN OWX
1.01	1.987E+01
1.27	2.326E+01
1.60	2.716E+01
2.01	3.153E+01
2.53	3.634E+01
3.19	4.151E+01
4.01	4.701E+01
5.04	5.277E+01
6.35	5.874E+01
7.99	6.487E+01
10.05	7.108E+01
12.65	7.732E+01
15.91	8.354E+01
20.02	8.971E+01
25.19	9.582E+01
31.70	1.019E+02
39.89	1.079E+02
50.19	1.138E+02
63.16	1.197E+02
79.47	1.255E+02
100.00	1.313E+02

MG II
3S - 4P
ETH = 7.349E-01

X	MANN OWX
1.01	1.103E+00
1.27	1.225E+00
1.60	1.121E+00
2.01	1.068E+00
2.53	1.048E+00
3.19	1.046E+00
4.01	1.052E+00
5.04	1.061E+00
6.35	1.070E+00
7.99	1.079E+00
10.05	1.086E+00
12.65	1.093E+00
15.91	1.100E+00
20.02	1.106E+00
25.19	1.111E+00
31.70	1.116E+00
39.89	1.121E+00
50.19	1.125E+00
63.16	1.130E+00
79.47	1.134E+00
100.00	1.138E+00

AL II
3S2 - 3S 3P(1P)
ETH = 5.454E-01

X	MANN OWXC
1.01	7.756E+00
1.27	9.649E+00
1.60	1.180E+01
2.01	1.419E+01
2.53	1.686E+01
3.19	1.979E+01
4.01	2.296E+01
5.04	2.633E+01
6.35	2.984E+01
7.99	3.343E+01
10.05	3.707E+01
12.65	4.072E+01
15.91	4.435E+01
20.02	4.795E+01
25.19	5.152E+01
31.70	5.505E+01
39.89	5.853E+01
50.19	6.199E+01
63.16	6.541E+01
79.47	6.880E+01
100.00	7.216E+01

AL II
3S 3P(3P) - 3P2(3P)
ETH = 5.166E-01

X	MANN OWX
1.01	3.286E+01
1.27	3.849E+01
1.60	4.584E+01
2.01	5.466E+01
2.53	6.473E+01
3.19	7.580E+01
4.01	8.771E+01
5.04	1.003E+02
6.35	1.133E+02
7.99	1.267E+02
10.05	1.401E+02
12.65	1.535E+02
15.91	1.668E+02
20.02	1.800E+02
25.19	1.930E+02
31.70	2.058E+02
39.89	2.185E+02
50.19	2.310E+02
63.16	2.435E+02
79.47	2.558E+02
100.00	2.681E+02

AL II
3S 3P(1P) - 3P2(1D)
ETH = 2.336E-01

X	MANN OWXC
1.01	2.946E+00
1.27	2.678E+00
1.60	2.492E+00
2.01	2.303E+00
2.53	2.145E+00
3.19	2.054E+00
4.01	2.045E+00
5.04	2.114E+00
6.35	2.248E+00
7.99	2.426E+00
10.05	2.633E+00
12.65	2.858E+00
15.91	3.091E+00
20.02	3.327E+00
25.19	3.558E+00
31.70	3.782E+00
39.89	3.993E+00
50.19	4.189E+00
63.16	4.369E+00
79.47	4.533E+00
100.00	4.682E+00

AL II
3S 3P(3P) - 3S 30(30)
ETH = 5.288E-01

X	MANN OWX
1.01	4.306E+01
1.27	4.698E+01
1.60	5.333E+01
2.01	6.204E+01
2.53	7.288E+01
3.19	8.550E+01
4.01	9.955E+01
5.04	1.147E+02
6.35	1.308E+02
7.99	1.475E+02
10.05	1.646E+02
12.65	1.820E+02
15.91	1.996E+02
20.02	2.173E+02
25.19	2.351E+02
31.70	2.529E+02
39.89	2.707E+02
50.19	2.884E+02
63.16	3.060E+02
79.47	3.234E+02
100.00	3.407E+02

AL II
3S2 - 3S 4P(1P)
ETH = 9.743E-01

X	MANN OWXC
1.01	6.072E-01
1.27	6.650E-01
1.60	7.334E-01
2.01	8.015E-01
2.53	8.637E-01
3.19	9.184E-01
4.01	9.658E-01
5.04	1.007E+00
6.35	1.043E+00
7.99	1.074E+00
10.05	1.101E+00
12.65	1.126E+00
15.91	1.148E+00
20.02	1.167E+00
25.19	1.184E+00
31.70	1.199E+00
39.89	1.212E+00
50.19	1.225E+00
63.16	1.236E+00
79.47	1.247E+00
100.00	1.257E+00

AL III
3S - 3P
ETH = 4.906E-01

X	MANN OWX
1.01	1.965E+01
1.27	2.125E+01
1.60	2.310E+01
2.01	2.520E+01
2.53	2.755E+01
3.19	3.016E+01
4.01	3.301E+01
5.04	3.606E+01
6.35	3.929E+01
7.99	4.265E+01
10.05	4.609E+01
12.65	4.959E+01
15.91	5.313E+01
20.02	5.668E+01
25.19	6.025E+01
31.70	6.380E+01
39.89	6.735E+01
50.19	7.088E+01
63.16	7.441E+01
79.47	7.793E+01
100.00	8.145E+01

AL III
3S - 4P
ETH = 1.309E+00

X	MANN DWX
1.01	5.803E-01
1.27	5.081E-01
1.60	4.646E-01
2.01	4.422E-01
2.53	4.333E-01
3.19	4.323E-01
4.01	4.361E-01
5.04	4.430E-01
6.35	4.524E-01
7.99	4.637E-01
10.05	4.766E-01
12.65	4.908E-01
15.91	5.061E-01
20.02	5.222E-01
25.19	5.387E-01
31.70	5.556E-01
39.89	5.726E-01
50.19	5.895E-01
63.16	6.067E-01
79.47	6.230E-01
100.00	6.391E-01

AL III
3S - 5P
ETH = 1.626E+00

X	MANN OWX
1.01	1.612E-01
1.27	1.307E-01
1.60	1.149E-01
2.01	1.083E-01
2.53	1.068E-01
3.19	1.081E-01
4.01	1.110E-01
5.04	1.150E-01
6.35	1.198E-01
7.99	1.253E-01
10.05	1.313E-01
12.65	1.378E-01
15.91	1.449E-01
20.02	1.524E-01
25.19	1.603E-01
31.70	1.683E-01
39.89	1.763E-01
50.19	1.843E-01
63.16	1.926E-01
79.47	2.015E-01
100.00	2.110E-01

AL IV
2P6 - 2P5 3S(3P)
ETH = 5.628E+00

X	MANN DWXC
1.01	4.755E-02
1.26	3.723E-02
1.56	2.904E-02
1.95	2.386E-02
2.42	2.136E-02
3.01	2.074E-02
3.75	2.133E-02
4.67	2.269E-02
5.81	2.457E-02
7.22	2.685E-02
8.99	2.946E-02
11.19	3.231E-02
13.92	3.536E-02
17.32	3.856E-02
21.55	4.187E-02
26.82	4.525E-02
33.37	4.870E-02
41.52	5.217E-02
51.67	5.567E-02
64.29	5.918E-02
80.00	6.270E-02

AL IV
2P6 - 2P5 3S(1P)
ETH = 5.693E+00

X	MANN DWXC
1.01	2.371E-02
1.26	3.809E-02
1.56	5.121E-02
1.95	6.779E-02
2.42	8.731E-02
3.01	1.091E-01
3.75	1.327E-01
4.67	1.577E-01
5.81	1.837E-01
7.22	2.105E-01
8.99	2.380E-01
11.19	2.660E-01
13.92	2.945E-01
17.32	3.234E-01
21.55	3.527E-01
26.82	3.823E-01
33.37	4.120E-01
41.52	4.420E-01
51.67	4.719E-01
64.29	5.019E-01
80.00	5.319E-01

AL IV
2P6 - 2P5 30(3P)
ETH = 6.929E+00

X	MANN OWXC
1.01	7.284E-02
1.26	5.665E-02
1.56	4.078E-02
1.95	2.821E-02
2.42	1.927E-02
3.01	1.331E-02
3.75	9.528E-03
4.67	7.237E-03
5.81	5.929E-03
7.22	5.260E-03
8.99	4.997E-03
11.19	4.995E-03
13.92	5.158E-03
17.32	5.426E-03
21.55	5.762E-03
26.82	6.140E-03
33.37	6.545E-03
41.52	6.966E-03
51.67	7.397E-03
64.29	7.834E-03
80.00	8.273E-03

AL IV
2P6 - 2P5 30(3O)
ETH = 7.000E+00

X	MANN OWXC
1.01	5.398E-02
1.26	5.118E-02
1.56	5.150E-02
1.95	5.540E-02
2.42	6.233E-02
3.01	7.146E-02
3.75	8.208E-02
4.67	9.368E-02
5.81	1.059E-01
7.22	1.187E-01
8.99	1.318E-01
11.19	1.453E-01
13.92	1.590E-01
17.32	1.730E-01
21.55	1.872E-01
26.82	2.015E-01
33.37	2.160E-01
41.52	2.305E-01
51.67	2.449E-01
64.29	2.594E-01
80.00	2.738E-01

AL IV
2P6 - 2P5 3D(1P)
ETH = 6.990E+00

X	MANN OWXC
1.01	1.253E-01
1.26	1.361E-01
1.56	2.552E-01
1.95	3.322E-01
2.42	4.157E-01
3.01	5.045E-01
3.75	5.975E-01
4.67	6.939E-01
5.81	7.930E-01
7.22	8.948E-01
8.99	9.988E-01
11.19	1.105E+00
13.92	1.214E+00
17.32	1.324E+00
21.55	1.437E+00
26.82	1.550E+00
33.37	1.665E+00
41.52	1.780E+00
51.67	1.895E+00
64.29	2.010E+00
80.00	2.125E+00

AL V
2S2 2P5(2P) - 2S1 2P6(2S)
ETH = 3.259E+00

X	MANN OWX
1.01	1.758E+00
1.27	1.858E+00
1.60	1.970E+00
2.01	2.096E+00
2.53	2.236E+00
3.19	2.390E+00
4.01	2.558E+00
5.04	2.738E+00
6.35	2.929E+00
7.99	3.130E+00
10.05	3.338E+00
12.65	3.553E+00
15.91	3.773E+00
20.02	3.995E+00
25.19	4.220E+00
31.70	4.445E+00
39.89	4.670E+00
50.19	4.894E+00
63.16	5.117E+00
79.47	5.338E+00
100.00	5.557E+00

AL VI
2S2 2P4(3P) - 2S1 2P5(3P)
ETH = 2.937E+00

X	MANN OWX
1.01	5.593E+00
1.27	5.807E+00
1.60	6.062E+00
2.01	6.359E+00
2.53	6.700E+00
3.19	7.086E+00
4.01	7.514E+00
5.04	7.984E+00
6.35	8.490E+00
7.99	9.029E+00
10.05	9.596E+00
12.65	1.018E+01
15.91	1.079E+01
20.02	1.141E+01
25.19	1.204E+01
31.70	1.267E+01
39.89	1.330E+01
50.19	1.392E+01
63.16	1.455E+01
79.47	1.517E+01
100.00	1.579E+01

AL VI
2S2 2P4(3P) - 2S1 2P5(1P)
ETH = 4.099E+00

X	MANN OWX
1.01	1.203E-01
1.27	1.110E-01
1.60	1.009E-01
2.01	9.024E-02
2.53	7.909E-02
3.19	6.766E-02
4.01	5.632E-02
5.04	4.547E-02
6.35	3.555E-02
7.99	2.694E-02
10.05	1.982E-02
12.65	1.420E-02
15.91	9.959E-03
20.02	6.858E-03
25.19	4.654E-03
31.70	3.122E-03
39.89	2.074E-03
50.19	1.366E-03
63.16	8.941E-04
79.47	5.816E-04
100.00	3.764E-04

SI III
3S2 - 3S 3P(3P)
ETH = 4.820E-01

X	MANN OWXC
1.01	2.172E+00
1.27	1.875E+00
1.60	1.568E+00
2.01	1.263E+00
2.53	9.919E-01
3.19	7.529E-01
4.01	5.591E-01
5.04	4.100E-01
6.35	2.991E-01
7.99	2.172E-01
10.05	1.562E-01
12.65	1.105E-01
15.91	7.669E-02
20.02	5.226E-02
25.19	3.515E-02
31.70	2.349E-02
39.89	1.572E-02
50.19	1.061E-02
63.16	7.294E-03
79.47	5.135E-03
100.00	3.758E-03

SI III
3S2 - 3S 3P(1P)
ETH = 7.553E-01

X	MANN OWXC
1.01	8.698E+00
1.27	9.759E+00
1.60	1.100E+01
2.01	1.244E+01
2.53	1.405E+01
3.19	1.584E+01
4.01	1.778E+01
5.04	1.983E+01
6.35	2.197E+01
7.99	2.418E+01
10.05	2.643E+01
12.65	2.871E+01
15.91	3.099E+01
20.02	3.328E+01
25.19	3.555E+01
31.70	3.782E+01
39.89	4.008E+01
50.19	4.232E+01
63.16	4.456E+01
79.47	4.678E+01
100.00	4.898E+01

SI III
3S 3P(3P) - 3P2(3P)
ETH = 7.016E-01

X	MANN OWXC
1.01	3.063E+01
1.27	3.420E+01
1.60	3.838E+01
2.01	4.315E+01
2.53	4.850E+01
3.19	5.440E+01
4.01	6.077E+01
5.04	6.753E+01
6.35	7.460E+01
7.99	8.188E+01
10.05	8.929E+01
12.65	9.675E+01
15.91	1.043E+02
20.02	1.117E+02
25.19	1.192E+02
31.70	1.266E+02
39.89	1.340E+02
50.19	1.413E+02
63.16	1.486E+02
79.47	1.558E+02
100.00	1.631E+02

SI IV
3S - 3P
ETH = 6.525E-01

X	MANN OWX
1.01	1.668E+01
1.27	1.762E+01
1.60	1.871E+01
2.01	1.997E+01
2.53	2.140E+01
3.19	2.300E+01
4.01	2.476E+01
5.04	2.666E+01
6.35	2.869E+01
7.99	3.083E+01
10.05	3.305E+01
12.65	3.533E+01
15.91	3.766E+01
20.02	4.003E+01
25.19	4.242E+01
31.70	4.482E+01
39.89	4.724E+01
50.19	4.965E+01
63.16	5.207E+01
79.47	5.449E+01
100.00	5.690E+01

SI IV
3S - 4P
ETH = 1.990E+00

X	MANN OWX
1.01	2.854E-01
1.27	2.546E-01
1.60	2.377E-01
2.01	2.310E-01
2.53	2.314E-01
3.19	2.370E-01
4.01	2.469E-01
5.04	2.604E-01
6.35	2.771E-01
7.99	2.964E-01
10.05	3.178E-01
12.65	3.410E-01
15.91	3.656E-01
20.02	3.913E-01
25.19	4.181E-01
31.70	4.454E-01
39.89	4.730E-01
50.19	5.008E-01
63.16	5.288E-01
79.47	5.571E-01
100.00	5.840E-01

SI XII
2S - 2P
ETH • 1.800E+00

X	MANN OWX
1.01	1.629E+00
1.34	1.658E+00
1.78	1.694E+00
2.37	1.741E+00
3.15	1.800E+00
4.19	1.872E+00
5.57	1.959E+00
7.41	2.061E+00
9.85	2.177E+00
13.09	2.303E+00
17.41	2.452E+00
23.14	2.605E+00
30.76	2.766E+00
40.89	2.931E+00
54.36	3.099E+00
72.26	3.266E+00
96.06	3.432E+00
127.70	3.596E+00
169.76	3.757E+00
225.67	3.914E+00
300.00	4.067E+00

S IV
3S2 3P - 3S 3P2(4P)
ETH • 6.540E-01

X	MANN DWXC
1.01	2.046E+00
1.36	1.761E+00
1.84	1.463E+00
2.47	1.176E+00
3.33	9.197E-01
4.49	7.067E-01
6.06	5.341E-01
8.17	3.930E-01
11.01	2.775E-01
14.84	1.871E-01
20.00	1.216E-01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

S IV
3S2 3P - 3S 3P2(2D)
ETH • 9.520E-01

X	MANN DWXC
1.01	5.603E+00
1.36	5.490E+00
1.84	5.463E+00
2.47	5.547E+00
3.33	5.746E+00
4.49	6.044E+00
6.06	6.419E+00
8.17	6.853E+00
11.01	7.336E+00
14.84	7.859E+00
20.00	8.413E+00
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

S IV
3S2 3P - 3S 3P2(2S)
ETH • 1.120E+00

X	MANN OWXC
1.01	2.978E+00
1.36	3.288E+00
1.84	3.652E+00
2.47	4.068E+00
3.33	4.533E+00
4.49	5.039E+00
6.06	5.579E+00
8.17	6.142E+00
11.01	6.727E+00
14.84	7.324E+00
20.00	7.933E+00
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

S IV
3S2 3P - 3S 3P2(2P)
ETH • 1.216E+00

X	MANN DWXC
1.01	1.657E+01
1.36	1.904E+01
1.84	2.198E+01
2.47	2.539E+01
3.33	2.925E+01
4.49	3.348E+01
6.06	3.802E+01
8.17	4.277E+01
11.01	4.766E+01
14.84	5.261E+01
20.00	5.761E+01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

AR VIII
3S - 3P
ETH • 1.293E+00

X	MANN OWX
1.01	8.803E+00
1.27	9.031E+00
1.60	9.302E+00
2.01	9.623E+00
2.53	9.997E+00
3.19	1.042E+01
4.01	1.091E+01
5.04	1.146E+01
6.35	1.207E+01
7.99	1.273E+01
10.05	1.344E+01
12.65	1.420E+01
15.91	1.500E+01
20.02	1.583E+01
25.19	1.669E+01
31.70	1.755E+01
39.89	1.844E+01
50.19	1.934E+01
63.16	2.024E+01
79.47	2.115E+01
100.00	2.205E+01

AR VIII
3S - 4P
ETH • 5.731E+00

X	MANN OWX
1.01	5.426E-02
1.27	5.441E-02
1.60	5.772E-02
2.01	6.450E-02
2.53	7.498E-02
3.19	8.917E-02
4.01	1.069E-01
5.04	1.277E-01
6.35	1.513E-01
7.99	1.772E-01
10.05	2.050E-01
12.65	2.344E-01
15.91	2.652E-01
20.02	2.973E-01
25.19	3.303E-01
31.70	3.641E-01
39.89	3.986E-01
50.19	4.335E-01
63.16	4.686E-01
79.47	5.039E-01
100.00	5.391E-01

AR XV
2S2 - 2S 2P(1P)
ETH • 3.787E+00

X	MANN OWXC
1.01	6.679E-01
1.27	6.790E-01
1.60	6.925E-01
2.01	7.088E-01
2.53	7.284E-01
3.19	7.516E-01
4.01	7.786E-01
5.04	8.100E-01
6.35	8.458E-01
7.99	8.860E-01
10.05	9.304E-01
12.65	9.786E-01
15.91	1.030E+00
20.02	1.084E+00
25.19	1.141E+00
31.70	1.199E+00
39.89	1.257E+00
50.19	1.316E+00
63.16	1.375E+00
79.47	1.434E+00
100.00	1.492E+00

AR XV
2S2 - 2S 2P(3P)
ETH • 2.173E+00

X	MANN OWXC
1.01	2.939E-02
1.27	2.908E-02
1.60	2.866E-02
2.01	2.818E-02
2.53	2.758E-02
3.19	2.685E-02
4.01	2.595E-02
5.04	2.497E-02
6.35	2.356E-02
7.99	2.205E-02
10.05	2.031E-02
12.65	1.837E-02
15.91	1.627E-02
20.02	1.407E-02
25.19	1.196E-02
31.70	9.738E-03
39.89	7.789E-03
50.19	6.077E-03
63.16	4.635E-03
79.47	3.470E-03
100.00	2.561E-03

AR XV
2S 2P(3P) - 2P2(3P)
ETH = 3.391E+00

X	MANN OWXC
1.01	2.751E+00
1.27	2.803E+00
1.60	2.853E+00
2.01	2.914E+00
2.53	2.987E+00
3.19	3.075E+00
4.01	3.177E+00
5.04	3.295E+00
6.35	3.432E+00
7.99	3.585E+00
10.05	3.755E+00
12.65	3.940E+00
15.91	4.139E+00
20.02	4.350E+00
25.19	4.570E+00
31.70	4.797E+00
39.89	5.028E+00
50.19	5.262E+00
63.16	5.496E+00
79.47	5.728E+00
100.00	5.959E+00

A XVI
2S - 2P
ETH = 2.480E+00

X	MANN DWX
1.01	9.680E-01
1.34	9.824E-01
1.78	1.002E+00
2.37	1.027E+00
3.15	1.059E+00
4.19	1.098E+00
5.57	1.145E+00
7.41	1.201E+00
9.85	1.266E+00
13.09	1.340E+00
17.41	1.421E+00
23.14	1.509E+00
30.76	1.602E+00
40.89	1.698E+00
54.36	1.795E+00
72.26	1.893E+00
96.06	1.991E+00
127.70	2.087E+00
169.76	2.181E+00
225.67	2.273E+00
300.00	2.362E+00

FE XV
3S2 - 3S 3P(3P)
ETH = 2.250E+00

X	MANN OWXC
1.01	6.060E-02
1.27	5.977E-02
1.60	5.877E-02
2.01	5.749E-02
2.53	5.605E-02
3.19	5.436E-02
4.01	5.246E-02
5.04	5.038E-02
6.35	4.820E-02
7.99	4.602E-02
10.05	4.400E-02
12.65	4.226E-02
15.91	4.092E-02
20.02	4.004E-02
25.19	3.964E-02
31.70	3.969E-02
39.89	4.014E-02
50.19	4.091E-02
63.16	4.194E-02
79.47	4.318E-02
100.00	4.455E-02

FE XV
3S2 - 3S 3P(1P)
ETH = 3.207E+00

X	MANN OWXC
1.01	2.784E+00
1.27	2.835E+00
1.60	2.893E+00
2.01	2.965E+00
2.53	3.053E+00
3.19	3.155E+00
4.01	3.274E+00
5.04	3.410E+00
6.35	3.563E+00
7.99	3.735E+00
10.05	3.922E+00
12.65	4.126E+00
15.91	4.343E+00
20.02	4.572E+00
25.19	4.811E+00
31.70	5.057E+00
39.89	5.309E+00
50.19	5.564E+00
63.16	5.822E+00
79.47	6.080E+00
100.00	6.338E+00

FE XV
3S2 - 3S 3D(3D)
ETH = 6.200E+00

X	MANN OWXC
1.01	4.806E-02
1.25	4.458E-02
1.54	4.078E-02
1.91	3.674E-02
2.36	3.252E-02
2.91	2.821E-02
3.60	2.395E-02
4.45	1.987E-02
5.50	1.609E-02
6.80	1.270E-02
8.41	9.787E-03
10.39	7.365E-03
12.85	5.422E-03
15.88	3.918E-03
19.63	2.787E-03
24.26	1.958E-03
29.99	1.364E-03
37.07	9.467E-04
45.82	6.576E-04
56.63	4.598E-04
70.00	3.259E-04

FE XV
3S2 - 3S 3D(1D)
ETH = 6.945E+00

X	MANN OWXC
1.01	1.821E-01
1.25	1.876E-01
1.54	1.937E-01
1.91	2.004E-01
2.36	2.074E-01
2.91	2.147E-01
3.60	2.221E-01
4.45	2.293E-01
5.50	2.363E-01
6.80	2.428E-01
8.41	2.486E-01
10.39	2.538E-01
12.85	2.583E-01
15.88	2.620E-01
19.63	2.650E-01
24.26	2.673E-01
29.99	2.690E-01
37.07	2.700E-01
45.82	2.707E-01
56.63	2.706E-01
70.00	2.702E-01

FE XV
3S2 - 3S 4S(3S)
ETH = 1.607E+01

X	MANN OWXC
1.01	3.422E-03
1.21	2.795E-03
1.46	2.263E-03
1.75	1.818E-03
2.11	1.449E-03
2.53	1.142E-03
3.05	8.896E-04
3.66	6.831E-04
4.40	5.167E-04
5.29	3.854E-04
6.36	2.840E-04
7.64	2.071E-04
9.18	1.499E-04
11.04	1.078E-04
13.27	7.715E-05
15.95	5.503E-05
19.17	3.915E-05
23.04	2.777E-05
27.69	1.965E-05
33.28	1.387E-05
40.00	9.757E-06

FE XV
3S2 - 3S 4S(1S)
ETH = 1.632E+01

X	MANN OWXC
1.01	9.855E-02
1.21	1.012E-01
1.46	1.038E-01
1.75	1.061E-01
2.11	1.083E-01
2.53	1.101E-01
3.05	1.117E-01
3.66	1.130E-01
4.40	1.140E-01
5.29	1.149E-01
6.36	1.154E-01
7.64	1.159E-01
9.18	1.161E-01
11.04	1.163E-01
13.27	1.164E-01
15.95	1.164E-01
19.17	1.163E-01
23.04	1.162E-01
27.69	1.161E-01
33.28	1.160E-01
40.00	1.159E-01

FE XV
3S2 - 3S 4P(1P)
ETH = 1.719E+01

X	MANN DWXC
1.01	1.132E-02
1.27	1.611E-02
1.60	2.266E-02
2.01	3.111E-02
2.53	4.152E-02
3.19	5.383E-02
4.01	6.797E-02
5.04	8.376E-02
6.35	1.010E-01
7.99	1.197E-01
10.05	1.395E-01
12.65	1.604E-01
15.91	1.822E-01
20.02	2.047E-01
25.19	2.279E-01
31.70	2.516E-01
39.89	2.757E-01
50.19	3.001E-01
63.16	3.247E-01
79.47	3.495E-01
100.00	3.742E-01

FE XV
3S2 - 3S 4P(3P)
ETH = 1.719E+01

X	MANN OWXC
1.01	9.689E-03
1.27	8.932E-03
1.60	8.590E-03
2.01	8.798E-03
2.53	9.616E-03
3.19	1.103E-02
4.01	1.298E-02
5.04	1.539E-02
6.35	1.818E-02
7.99	2.128E-02
10.05	2.465E-02
12.65	2.824E-02
15.91	3.201E-02
20.02	3.594E-02
25.19	3.999E-02
31.70	4.413E-02
39.89	4.834E-02
50.19	5.261E-02
63.16	5.693E-02
79.47	6.127E-02
100.00	6.561E-02

FE XV
3S2 - 3S 4F(3F)
ETH = 1.922E+01

X	MANN OWX
1.01	2.930E-02
1.21	2.343E-02
1.46	1.833E-02
1.75	1.404E-02
2.11	1.055E-02
2.53	7.789E-03
3.05	5.671E-03
3.66	4.079E-03
4.40	2.907E-03
5.29	2.056E-03
6.36	1.446E-03
7.64	1.013E-03
9.18	7.076E-04
11.04	4.934E-04
13.27	3.436E-04
15.95	2.392E-04
19.17	1.665E-04
23.04	1.158E-04
27.69	8.047E-05
33.28	5.591E-05
40.00	3.884E-05

FE XV
3S2 - 3S 4F(1F)
ETH = 1.935E+01

X	MANN OWX
1.01	4.989E-02
1.21	5.560E-02
1.46	6.108E-02
1.75	6.617E-02
2.11	7.074E-02
2.53	7.471E-02
3.05	7.806E-02
3.66	8.082E-02
4.40	8.305E-02
5.29	8.484E-02
6.36	8.627E-02
7.64	8.742E-02
9.18	8.835E-02
11.04	8.913E-02
13.27	8.979E-02
15.95	9.039E-02
19.17	9.090E-02
23.04	9.136E-02
27.69	9.178E-02
33.28	9.217E-02
40.00	9.253E-02

FE XVI
2P6 3S - 2P6 3P
ETH = 2.653E+00

X	MANN OWX
1.01	3.541E+00
1.30	3.595E+00
1.67	3.661E+00
2.14	3.744E+00
2.75	3.846E+00
3.53	3.968E+00
4.53	4.113E+00
5.81	4.282E+00
7.46	4.475E+00
9.59	4.695E+00
12.31	4.937E+00
15.81	5.202E+00
20.29	5.485E+00
26.06	5.785E+00
33.46	6.096E+00
42.97	6.415E+00
55.17	6.740E+00
70.85	7.068E+00
90.97	7.397E+00
116.82	7.726E+00
150.00	8.052E+00

FE XVI
2P6 3S - 2P6 3D
ETH = 6.172E+00

X	MANN OWX
1.01	3.013E-01
1.30	3.047E-01
1.67	3.087E-01
2.14	3.132E-01
2.75	3.179E-01
3.53	3.231E-01
4.53	3.284E-01
5.81	3.337E-01
7.46	3.388E-01
9.59	3.436E-01
12.31	3.480E-01
15.81	3.518E-01
20.29	3.550E-01
26.06	3.574E-01
33.46	3.589E-01
42.97	3.597E-01
55.17	3.599E-01
70.85	3.592E-01
90.97	3.580E-01
116.82	3.565E-01
150.00	3.545E-01

FE XVI
2P6 3S - 2P6 4S
ETH = 1.702E+01

X	MANN OWX
1.01	1.011E-01
1.23	1.031E-01
1.49	1.051E-01
1.81	1.070E-01
2.20	1.087E-01
2.68	1.103E-01
3.26	1.115E-01
3.96	1.126E-01
4.81	1.133E-01
5.85	1.139E-01
7.11	1.144E-01
8.64	1.146E-01
10.50	1.148E-01
12.76	1.149E-01
15.51	1.149E-01
18.85	1.148E-01
22.91	1.147E-01
27.85	1.146E-01
33.85	1.145E-01
41.14	1.144E-01
50.00	1.143E-01

FE XVI
2P6 3S - 2P6 4P
ETH = 1.907E+01

X	MANN OWX
1.01	1.721E-02
1.23	1.948E-02
1.49	2.289E-02
1.81	2.760E-02
2.20	3.366E-02
2.68	4.111E-02
3.26	4.989E-02
3.96	5.993E-02
4.81	7.111E-02
5.85	8.333E-02
7.11	9.648E-02
8.64	1.105E-01
10.50	1.252E-01
12.76	1.407E-01
15.51	1.567E-01
18.85	1.732E-01
22.91	1.902E-01
27.85	2.075E-01
33.85	2.251E-01
41.14	2.430E-01
50.00	2.611E-01

FE XVI
2P6 3S - 2P5 3S2
ETH = 5.239E+01

X	MANN OWX
1.01	4.600E-03
1.19	4.727E-03
1.39	5.024E-03
1.63	5.485E-03
1.92	6.103E-03
2.25	6.872E-03
2.64	7.782E-03
3.11	8.825E-03
3.65	9.988E-03
4.28	1.126E-02
5.02	1.262E-02
5.90	1.407E-02
6.93	1.559E-02
8.13	1.717E-02
9.55	1.879E-02
11.21	2.046E-02
13.16	2.217E-02
15.45	2.391E-02
18.14	2.567E-02
21.29	2.746E-02
25.00	2.927E-02

FE XVI
2P6 3S - 2P5 3S 3P(TOTAL)
ETH = 5.531E+01

X	MANN OWX
1.01	1.582E-01
1.23	1.541E-01
1.49	1.506E-01
1.81	1.479E-01
2.20	1.460E-01
2.68	1.447E-01
3.26	1.440E-01
3.96	1.437E-01
4.81	1.436E-01
5.85	1.437E-01
7.11	1.439E-01
8.64	1.441E-01
10.50	1.443E-01
12.76	1.445E-01
15.51	1.447E-01
18.85	1.448E-01
22.91	1.449E-01
27.85	1.450E-01
33.85	1.449E-01
41.14	1.448E-01
50.00	1.446E-01

FE XVI
2P6 3S - 2P5 3S 3D(TOTAL)
ETH = 5.900E+01

X	MANN OWX
1.01	3.167E-01
1.19	3.291E-01
1.39	3.486E-01
1.63	3.748E-01
1.92	4.069E-01
2.25	4.443E-01
2.64	4.862E-01
3.11	5.320E-01
3.65	5.811E-01
4.28	6.331E-01
5.02	6.877E-01
5.90	7.442E-01
6.93	8.025E-01
8.13	8.623E-01
9.55	9.234E-01
11.21	9.857E-01
13.16	1.049E+00
15.45	1.113E+00
18.14	1.178E+00
21.29	1.244E+00
25.00	1.310E+00

FE XVI
2P6 3S - 2P5 3S 4P(TOTAL)
ETH = 7.145E+01

X	MANN OWX
1.01	3.720E-02
1.39	3.343E-02
1.92	3.103E-02
2.64	2.971E-02
3.65	2.909E-02
5.02	2.886E-02
6.93	2.882E-02
9.55	2.885E-02
13.16	2.890E-02
18.14	2.895E-02
25.00	2.896E-02
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

FE XVI
2P6 3S - 2P5 3S 4D(TOTAL)
ETH = 7.274E+01

X	MANN OWX
1.01	8.587E-02
1.39	8.818E-02
1.92	9.894E-02
2.64	1.152E-01
3.65	1.349E-01
5.02	1.566E-01
6.93	1.796E-01
9.55	2.036E-01
13.16	2.284E-01
18.14	2.538E-01
25.00	2.796E-01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

FE XVI
2S2 2P6 3S - 2S 2P6 3S2
ETH = 6.286E+01

X	MANN OWX
1.01	1.614E-02
1.23	1.656E-02
1.49	1.697E-02
1.81	1.736E-02
2.20	1.771E-02
2.68	1.803E-02
3.26	1.830E-02
3.96	1.853E-02
4.81	1.871E-02
5.85	1.885E-02
7.11	1.896E-02
8.64	1.905E-02
10.50	1.911E-02
12.76	1.915E-02
15.51	1.919E-02
18.85	1.920E-02
22.91	1.921E-02
27.85	1.922E-02
33.85	1.922E-02
41.14	1.921E-02
50.00	1.921E-02

FE XVI
2S2 2P6 3S-2S 2P6 3S 3P(TOT)
ETH = 6.500E+01

X	MANN OWX
1.01	1.451E-02
1.23	1.696E-02
1.49	2.065E-02
1.81	2.547E-02
2.20	3.132E-02
2.68	3.810E-02
3.26	4.571E-02
3.96	5.403E-02
4.81	6.298E-02
5.85	7.246E-02
7.11	8.238E-02
8.64	9.270E-02
10.50	1.034E-01
12.76	1.143E-01
15.51	1.255E-01
18.85	1.370E-01
22.91	1.486E-01
27.85	1.604E-01
33.85	1.722E-01
41.14	1.842E-01
50.00	1.962E-01

FE XVI
2S2 2P6 3S-2S 2P6 3S 3D(TOT)
ETH = 6.353E+01

X	MANN DWX
1.01	4.586E-02
1.23	4.717E-02
1.49	4.967E-02
1.81	5.309E-02
2.20	5.710E-02
2.68	6.140E-02
3.26	6.575E-02
3.96	6.994E-02
4.81	7.383E-02
5.85	7.733E-02
7.11	8.041E-02
8.64	8.305E-02
10.50	8.527E-02
12.76	8.710E-02
15.51	8.857E-02
18.85	8.978E-02
22.91	9.068E-02
27.85	9.129E-02
33.85	9.163E-02
41.14	9.171E-02
50.00	9.154E-02

FE XVII
2S2 2P6 - 2S2 2P5 3S(1P)
ETH = 5.370E+01

X	MANN OWXC
1.01	1.646E-03
1.27	2.246E-03
1.60	3.032E-03
2.01	3.999E-03
2.53	5.135E-03
3.19	6.424E-03
4.01	7.846E-03
5.04	9.382E-03
6.35	1.101E-02
7.99	1.272E-02
10.05	1.449E-02
12.65	1.631E-02
15.91	1.819E-02
20.02	2.008E-02
25.19	2.202E-02
31.70	2.397E-02
39.89	2.595E-02
50.19	2.793E-02
63.16	2.992E-02
79.47	3.192E-02
100.00	3.393E-02

FE XVII
2S2 2P6 - 2S2 2P5 3S(3P)
ETH = 5.370E+01

X	MANN DWXC
1.01	3.456E-03
1.27	3.628E-03
1.60	3.967E-03
2.01	4.477E-03
2.53	5.161E-03
3.19	6.014E-03
4.01	7.023E-03
5.04	8.171E-03
6.35	9.434E-03
7.99	1.079E-02
10.05	1.222E-02
12.65	1.371E-02
15.91	1.525E-02
20.02	1.683E-02
25.19	1.843E-02
31.70	2.006E-02
39.89	2.170E-02
50.19	2.336E-02
63.16	2.502E-02
79.47	2.669E-02
100.00	2.836E-02

FE XVII
2S2 2P6 - 2S2 2P5 3P(3D)
ETH = 5.628E+01

X	MANN DWXC
1.01	1.134E-02
1.27	9.221E-03
1.60	7.484E-03
2.01	6.135E-03
2.53	5.144E-03
3.19	4.457E-03
4.01	4.010E-03
5.04	3.739E-03
6.35	3.592E-03
7.99	3.527E-03
10.05	3.512E-03
12.65	3.525E-03
15.91	3.552E-03
20.02	3.585E-03
25.19	3.612E-03
31.70	3.631E-03
39.89	3.638E-03
50.19	3.632E-03
63.16	3.611E-03
79.47	3.577E-03
100.00	3.538E-03

FE XVII
2S2 2P6 - 2S2 2P5 3P(3P)
ETH = 5.628E+01

X	MANN DWXC
1.01	9.219E-03
1.27	8.608E-03
1.60	8.128E-03
2.01	7.791E-03
2.53	7.588E-03
3.19	7.497E-03
4.01	7.489E-03
5.04	7.534E-03
6.35	7.610E-03
7.99	7.697E-03
10.05	7.784E-03
12.65	7.865E-03
15.91	7.935E-03
20.02	7.994E-03
25.19	8.037E-03
31.70	8.063E-03
39.89	8.073E-03
50.19	8.066E-03
63.16	8.041E-03
79.47	8.002E-03
100.00	7.957E-03

FE XVII
2S2 2P6 - 2S2 2P5 3P(3S)
ETH = 5.628E+01

X	MANN DWXC
1.01	4.082E-03
1.27	3.308E-03
1.60	2.693E-03
2.01	1.973E-03
2.53	1.462E-03
3.19	1.060E-03
4.01	7.542E-04
5.04	5.277E-04
6.35	3.641E-04
7.99	2.480E-04
10.05	1.671E-04
12.65	1.115E-04
15.91	7.380E-05
20.02	4.847E-05
25.19	3.162E-05
31.70	2.052E-05
39.89	1.325E-05
50.19	8.526E-06
63.16	5.465E-06
79.47	3.492E-06
100.00	2.222E-06

FE XVII
2S2 2P6 - 2S2 2P5 3P(1D)
ETH = 5.628E+01

X	MANN DWXC
1.01	3.825E-03
1.27	3.557E-03
1.60	3.395E-03
2.01	3.335E-03
2.53	3.361E-03
3.19	3.449E-03
4.01	3.578E-03
5.04	3.726E-03
6.35	3.878E-03
7.99	4.023E-03
10.05	4.154E-03
12.65	4.269E-03
15.91	4.366E-03
20.02	4.448E-03
25.19	4.508E-03
31.70	4.547E-03
39.89	4.567E-03
50.19	4.565E-03
63.16	4.543E-03
79.47	4.502E-03
100.00	4.454E-03

FE XVII
2S2 2P6 - 2S2 2P5 3P(1P)
ETH = 5.628E+01

X	MANN DWXC
1.01	1.901E-03
1.27	1.475E-03
1.60	1.109E-03
2.01	8.049E-04
2.53	5.676E-04
3.19	3.898E-04
4.01	2.614E-04
5.04	1.713E-04
6.35	1.110E-04
7.99	7.053E-05
10.05	4.444E-05
12.65	2.772E-05
15.91	1.717E-05
20.02	1.060E-05
25.19	6.527E-06
31.70	4.018E-06
39.89	2.475E-06
50.19	1.527E-06
63.16	9.443E-07
79.47	5.850E-07
100.00	3.627E-07

FE XVII
2S2 2P6 - 2S2 2P5 3P(1S)
ETH = 5.628E+01

X	MANN DWXC
1.01	4.889E-02
1.27	5.075E-02
1.60	5.239E-02
2.01	5.375E-02
2.53	5.484E-02
3.19	5.566E-02
4.01	5.625E-02
5.04	5.664E-02
6.35	5.688E-02
7.99	5.702E-02
10.05	5.707E-02
12.65	5.706E-02
15.91	5.702E-02
20.02	5.696E-02
25.19	5.689E-02
31.70	5.682E-02
39.89	5.675E-02
50.19	5.667E-02
63.16	5.660E-02
79.47	5.655E-02
100.00	5.650E-02

FE XVII
2S2 2P6 - 2S2 2P5 3D(3F)
ETH = 5.959E+01

X	MANN DWXC
1.01	1.728E-02
1.27	1.295E-02
1.60	9.490E-03
2.01	7.079E-03
2.53	5.432E-03
3.19	4.359E-03
4.01	3.692E-03
5.04	3.297E-03
6.35	3.076E-03
7.99	2.954E-03
10.05	2.916E-03
12.65	2.907E-03
15.91	2.919E-03
20.02	2.943E-03
25.19	2.971E-03
31.70	3.000E-03
39.89	3.029E-03
50.19	3.053E-03
63.16	3.076E-03
79.47	3.096E-03
100.00	3.111E-03

FE XVII
2S2 2P6 - 2S2 2P5 3D(3D)
ETH = 5.959E+01

X	MANN DWXC
1.01	3.424E-02
1.27	3.712E-02
1.60	4.145E-02
2.01	4.705E-02
2.53	5.371E-02
3.19	6.124E-02
4.01	6.945E-02
5.04	7.825E-02
6.35	8.749E-02
7.99	9.709E-02
10.05	1.070E-01
12.65	1.171E-01
15.91	1.275E-01
20.02	1.380E-01
25.19	1.486E-01
31.70	1.593E-01
39.89	1.701E-01
50.19	1.809E-01
63.16	1.917E-01
79.47	2.025E-01
100.00	2.133E-01

FE XVII
2S2 2P6 - 2S2 2P5 3D(3P)
ETH = 5.959E+01

X	MANN DWXC
1.01	1.819E-02
1.27	1.348E-02
1.60	9.798E-03
2.01	7.046E-03
2.53	5.074E-03
3.19	3.720E-03
4.01	2.835E-03
5.04	2.288E-03
6.35	1.978E-03
7.99	1.829E-03
10.05	1.788E-03
12.65	1.816E-03
15.91	1.890E-03
20.02	1.993E-03
25.19	2.115E-03
31.70	2.248E-03
39.89	2.389E-03
50.19	2.534E-03
63.16	2.682E-03
79.47	2.832E-03
100.00	2.982E-03

FE XVII
2S2 2P6 - 2S2 2P5 3D(1F)
ETH = 5.959E+01

X	MANN DWXC
1.01	4.568E-03
1.27	3.854E-03
1.60	3.404E-03
2.01	3.163E-03
2.53	3.071E-03
3.19	3.075E-03
4.01	3.131E-03
5.04	3.213E-03
6.35	3.303E-03
7.99	3.392E-03
10.05	3.476E-03
12.65	3.554E-03
15.91	3.625E-03
20.02	3.690E-03
25.19	3.747E-03
31.70	3.798E-03
39.89	3.842E-03
50.19	3.880E-03
63.16	3.911E-03
79.47	3.939E-03
100.00	3.959E-03

FE XVII
2S2 2P6 - 2S2 2P5 3D(1D)
ETH = 5.959E+01

X	MANN OWXC
1.01	3.307E-03
1.27	2.303E-03
1.60	1.546E-03
2.01	1.005E-03
2.53	6.345E-04
3.19	3.912E-04
4.01	2.369E-04
5.04	1.416E-04
6.35	8.413E-05
7.99	4.988E-05
10.05	2.964E-05
12.65	1.771E-05
15.91	1.066E-05
20.02	6.467E-06
25.19	3.954E-06
31.70	2.434E-06
39.89	1.507E-06
50.19	9.380E-07
63.16	5.859E-07
79.47	3.671E-07
100.00	2.305E-07

FE XVII
2S2 2P6 - 2S2 2P5 3D(1P)
ETH = 5.959E+01

X	MANN OWXC
1.01	8.844E-02
1.27	1.084E-01
1.60	1.310E-01
2.01	1.562E-01
2.53	1.836E-01
3.19	2.129E-01
4.01	2.441E-01
5.04	2.768E-01
6.35	3.108E-01
7.99	3.461E-01
10.05	3.823E-01
12.65	4.194E-01
15.91	4.572E-01
20.02	4.956E-01
25.19	5.344E-01
31.70	5.736E-01
39.89	6.130E-01
50.19	6.525E-01
63.16	6.921E-01
79.47	7.317E-01
100.00	7.713E-01

FE XVII
2S2 2P6 - 2S1 2P6 3S(3S)
ETH = 6.326E+01

X	MANN OWXC
1.01	1.321E-03
1.27	9.745E-04
1.60	6.970E-04
2.01	4.877E-04
2.53	3.367E-04
3.19	2.305E-04
4.01	1.569E-04
5.04	1.061E-04
6.35	7.138E-05
7.99	4.769E-05
10.05	3.166E-05
12.65	2.089E-05
15.91	1.371E-05
20.02	8.954E-06
25.19	5.824E-06
31.70	3.775E-06
39.89	2.439E-06
50.19	1.571E-06
63.16	1.009E-06
79.47	6.452E-07
100.00	4.098E-07

FE XVII
2S2 2P6 - 2S1 2P6 3S(1S)
ETH = 6.371E+01

X	MANN OWX
1.01	1.456E-02
1.27	1.549E-02
1.60	1.632E-02
2.01	1.704E-02
2.53	1.763E-02
3.19	1.810E-02
4.01	1.847E-02
5.04	1.875E-02
6.35	1.895E-02
7.99	1.910E-02
10.05	1.920E-02
12.65	1.927E-02
15.91	1.931E-02
20.02	1.934E-02
25.19	1.936E-02
31.70	1.937E-02
39.89	1.937E-02
50.19	1.937E-02
63.16	1.936E-02
79.47	1.936E-02
100.00	1.936E-02

FE XVII
2S2 2P6 - 2S1 2P6 3P(1P)
ETH = 6.585E+01

X	MANN OWXC
1.01	2.291E-03
1.27	3.652E-03
1.60	5.430E-03
2.01	7.603E-03
2.53	1.014E-02
3.19	1.300E-02
4.01	1.614E-02
5.04	1.952E-02
6.35	2.310E-02
7.99	2.686E-02
10.05	3.076E-02
12.65	3.478E-02
15.91	3.892E-02
20.02	4.315E-02
25.19	4.744E-02
31.70	5.180E-02
39.89	5.620E-02
50.19	6.063E-02
63.16	6.508E-02
79.47	6.955E-02
100.00	7.401E-02

FE XVII
2S2 2P6 - 2S1 2P6 3P(3P)
ETH = 6.585E+01

X	MANN OWXC
1.01	2.719E-03
1.27	2.338E-03
1.60	2.097E-03
2.01	1.982E-03
2.53	1.986E-03
3.19	2.099E-03
4.01	2.306E-03
5.04	2.594E-03
6.35	2.943E-03
7.99	3.342E-03
10.05	3.777E-03
12.65	4.241E-03
15.91	4.727E-03
20.02	5.230E-03
25.19	5.745E-03
31.70	6.269E-03
39.89	6.800E-03
50.19	7.336E-03
63.16	7.875E-03
79.47	8.417E-03
100.00	8.958E-03

FE XVII
2S2 2P6 - 2S1 2P6 3D(1D)
ETH = 6.911E+01

X	MANN OWXC
1.01	1.324E-02
1.27	1.706E-02
1.60	2.099E-02
2.01	2.485E-02
2.53	2.853E-02
3.19	3.193E-02
4.01	3.497E-02
5.04	3.761E-02
6.35	3.986E-02
7.99	4.172E-02
10.05	4.322E-02
12.65	4.440E-02
15.91	4.533E-02
20.02	4.602E-02
25.19	4.650E-02
31.70	4.679E-02
39.89	4.687E-02
50.19	4.679E-02
63.16	4.657E-02
79.47	4.619E-02
100.00	4.575E-02

FE XVII
2S2 2P6 - 2S1 2P6 3D(3D)
ETH = 6.911E+01

X	MANN OWXC
1.01	1.042E-02
1.27	7.551E-03
1.60	5.332E-03
2.01	3.689E-03
2.53	2.517E-03
3.19	1.704E-03
4.01	1.155E-03
5.04	7.908E-04
6.35	5.527E-04
7.99	3.989E-04
10.05	3.006E-04
12.65	2.383E-04
15.91	1.990E-04
20.02	1.745E-04
25.19	1.591E-04
31.70	1.493E-04
39.89	1.429E-04
50.19	1.385E-04
63.16	1.353E-04
79.47	1.326E-04
100.00	1.303E-04

FE XVIII
2P5 - 2P4 3S(4P)
ETH = 5.742E+01

X	MANN OWXC
1.01	7.926E-03
1.27	7.184E-03
1.60	6.724E-03
2.01	6.557E-03
2.53	6.693E-03
3.19	7.128E-03
4.01	7.936E-03
5.04	8.783E-03
6.35	9.922E-03
7.99	1.121E-02
10.05	1.262E-02
12.65	1.412E-02
15.91	1.569E-02
20.02	1.729E-02
25.19	1.895E-02
31.70	2.062E-02
39.89	2.232E-02
50.19	2.403E-02
63.16	2.575E-02
79.47	2.748E-02
100.00	2.921E-02

FE XVIII
2P5 - 2P4 3S(2P)
ETH = 5.742E+01

X	MANN DWXC
1.01	4.709E-03
1.27	5.915E-03
1.60	7.661E-03
2.01	9.932E-03
2.53	1.269E-02
3.19	1.589E-02
4.01	1.946E-02
5.04	2.335E-02
6.35	2.750E-02
7.99	3.185E-02
10.05	3.637E-02
12.65	4.102E-02
15.91	4.579E-02
20.02	5.064E-02
25.19	5.557E-02
31.70	6.055E-02
39.89	6.557E-02
50.19	7.062E-02
63.16	7.569E-02
79.47	8.077E-02
100.00	8.586E-02

FE XVIII
2P5 - 2P4 3S(2D)
ETH = 5.742E+01

X	MANN DWXC
1.01	7.069E-03
1.27	7.432E-03
1.60	8.278E-03
2.01	9.605E-03
2.53	1.139E-02
3.19	1.361E-02
4.01	1.620E-02
5.04	1.912E-02
6.35	2.229E-02
7.99	2.567E-02
10.05	2.922E-02
12.65	3.290E-02
15.91	3.668E-02
20.02	4.054E-02
25.19	4.447E-02
31.70	4.844E-02
39.89	5.245E-02
50.19	5.649E-02
63.16	6.054E-02
79.47	6.461E-02
100.00	6.867E-02

FE XVIII
2P5 - 2P4 3S(2S)
ETH = 5.742E+01

X	MANN DWXC
1.01	1.413E-03
1.27	1.485E-03
1.60	1.654E-03
2.01	1.918E-03
2.53	2.274E-03
3.19	2.716E-03
4.01	3.233E-03
5.04	3.815E-03
6.35	4.448E-03
7.99	5.123E-03
10.05	5.830E-03
12.65	6.564E-03
15.91	7.319E-03
20.02	8.090E-03
25.19	8.873E-03
31.70	9.666E-03
39.89	1.047E-02
50.19	1.127E-02
63.16	1.208E-02
79.47	1.289E-02
100.00	1.370E-02

FE XVIII
2P5 - 2P4(3P)3D(4F)
ETH = 6.301E+01

X	MANN DWXC
1.01	4.907E-02
1.27	3.697E-02
1.60	2.801E-02
2.01	2.177E-02
2.53	1.772E-02
3.19	1.534E-02
4.01	1.416E-02
5.04	1.380E-02
6.35	1.398E-02
7.99	1.452E-02
10.05	1.529E-02
12.65	1.620E-02
15.91	1.721E-02
20.02	1.827E-02
25.19	1.936E-02
31.70	2.047E-02
39.89	2.159E-02
50.19	2.271E-02
63.16	2.382E-02
79.47	2.490E-02
100.00	2.594E-02

FE XVIII
2P5 - 2P4(3P)3D(2F)
ETH = 6.301E+01

X	MANN DWXC
1.01	5.023E-02
1.27	5.320E-02
1.60	5.821E-02
2.01	6.497E-02
2.53	7.316E-02
3.19	8.250E-02
4.01	9.271E-02
5.04	1.036E-01
6.35	1.151E-01
7.99	1.270E-01
10.05	1.392E-01
12.65	1.518E-01
15.91	1.645E-01
20.02	1.775E-01
25.19	1.906E-01
31.70	2.037E-01
39.89	2.169E-01
50.19	2.302E-01
63.16	2.434E-01
79.47	2.565E-01
100.00	2.695E-01

FE XVIII
2P5 - 2P4(3P)3D(4D)
ETH = 6.301E+01

X	MANN DWXC
1.01	5.203E-02
1.27	3.807E-02
1.60	2.722E-02
2.01	1.912E-02
2.53	1.332E-02
3.19	9.312E-03
4.01	6.636E-03
5.04	4.910E-03
6.35	3.838E-03
7.99	3.202E-03
10.05	2.850E-03
12.65	2.682E-03
15.91	2.629E-03
20.02	2.650E-03
25.19	2.715E-03
31.70	2.807E-03
39.89	2.916E-03
50.19	3.035E-03
63.16	3.156E-03
79.47	3.278E-03
100.00	3.392E-03

FE XVIII
2P5 - 2P4(3P)3D(2D)
ETH = 6.301E+01

X	MANN DWXC
1.01	6.955E-02
1.27	7.617E-02
1.60	8.533E-02
2.01	9.678E-02
2.53	1.102E-01
3.19	1.252E-01
4.01	1.417E-01
5.04	1.592E-01
6.35	1.777E-01
7.99	1.970E-01
10.05	2.168E-01
12.65	2.372E-01
15.91	2.580E-01
20.02	2.792E-01
25.19	3.006E-01
31.70	3.222E-01
39.89	3.439E-01
50.19	3.656E-01
63.16	3.874E-01
79.47	4.091E-01
100.00	4.308E-01

FE XVIII
2P5 - 2P4(3P)3D(4P)
ETH = 6.301E+01

X	MANN DWXC
1.01	4.978E-02
1.27	5.041E-02
1.60	5.319E-02
2.01	5.785E-02
2.53	6.409E-02
3.19	7.160E-02
4.01	8.011E-02
5.04	8.942E-02
6.35	9.935E-02
7.99	1.098E-01
10.05	1.205E-01
12.65	1.316E-01
15.91	1.430E-01
20.02	1.545E-01
25.19	1.661E-01
31.70	1.779E-01
39.89	1.897E-01
50.19	2.015E-01
63.16	2.134E-01
79.47	2.252E-01
100.00	2.369E-01

FE XVIII
2P5 - 2P4(3P)3D(2P)
ETH = 6.301E+01

X	MANN DWXC
1.01	2.079E-02
1.27	1.939E-02
1.60	1.794E-02
2.01	1.664E-02
2.53	1.701E-02
3.19	1.801E-02
4.01	1.949E-02
5.04	2.133E-02
6.35	2.349E-02
7.99	2.574E-02
10.05	2.819E-02
12.65	3.075E-02
15.91	3.336E-02
20.02	3.608E-02
25.19	3.881E-02
31.70	4.157E-02
39.89	4.436E-02
50.19	4.715E-02
63.16	4.994E-02
79.47	5.273E-02
100.00	5.551E-02

FE XVIII
2P5 - 2P4(1D)3D(2P)
ETH = 6.301E+01

X	MANN OWXC
1.01	2.828E-02
1.27	2.222E-02
1.60	1.794E-02
2.01	1.488E-02
2.53	1.300E-02
3.19	1.191E-02
4.01	1.135E-02
5.04	1.112E-02
6.35	1.109E-02
7.99	1.117E-02
10.05	1.132E-02
12.65	1.149E-02
15.91	1.166E-02
20.02	1.184E-02
25.19	1.201E-02
31.70	1.216E-02
39.89	1.229E-02
50.19	1.241E-02
63.16	1.251E-02
79.47	1.260E-02
100.00	1.266E-02

FE XVIII
2P5 - 2P4(1D)3D(2F)
ETH = 6.301E+01

X	MANN OWXC
1.01	2.493E-02
1.27	2.114E-02
1.60	1.886E-02
2.01	1.784E-02
2.53	1.781E-02
3.19	1.853E-02
4.01	1.977E-02
5.04	2.137E-02
6.35	2.321E-02
7.99	2.522E-02
10.05	2.734E-02
12.65	2.953E-02
15.91	3.178E-02
20.02	3.407E-02
25.19	3.638E-02
31.70	3.869E-02
39.89	4.102E-02
50.19	4.333E-02
63.16	4.564E-02
79.47	4.790E-02
100.00	5.011E-02

FE XVIII
2P5 - 2P4(1D)3D(2D)
ETH = 6.301E+01

X	MANN OWXC
1.01	2.142E-01
1.27	2.555E-01
1.60	3.032E-01
2.01	3.569E-01
2.53	4.158E-01
3.19	4.795E-01
4.01	5.473E-01
5.04	6.188E-01
6.35	6.934E-01
7.99	7.707E-01
10.05	8.502E-01
12.65	9.318E-01
15.91	1.015E+00
20.02	1.099E+00
25.19	1.185E+00
31.70	1.271E+00
39.89	1.358E+00
50.19	1.445E+00
63.16	1.532E+00
79.47	1.619E+00
100.00	1.706E+00

FE XVIII
2P5 - 2P4(1D)3D(2P)
ETH = 6.301E+01

X	MANN OWXC
1.01	1.562E-01
1.27	1.852E-01
1.60	2.188E-01
2.01	2.569E-01
2.53	2.988E-01
3.19	3.442E-01
4.01	3.925E-01
5.04	4.439E-01
6.35	4.972E-01
7.99	5.526E-01
10.05	6.097E-01
12.65	6.682E-01
15.91	7.279E-01
20.02	7.886E-01
25.19	8.499E-01
31.70	9.117E-01
39.89	9.740E-01
50.19	1.036E+00
63.16	1.099E+00
79.47	1.162E+00
100.00	1.224E+00

FE XVIII
2P5 - 2P4(1D)3D(2S)
ETH = 6.301E+01

X	MANN OWXC
1.01	3.981E-02
1.27	4.537E-02
1.60	5.221E-02
2.01	6.025E-02
2.53	6.934E-02
3.19	7.937E-02
4.01	9.020E-02
5.04	1.017E-01
6.35	1.138E-01
7.99	1.264E-01
10.05	1.394E-01
12.65	1.528E-01
15.91	1.664E-01
20.02	1.802E-01
25.19	1.943E-01
31.70	2.084E-01
39.89	2.226E-01
50.19	2.369E-01
63.16	2.512E-01
79.47	2.655E-01
100.00	2.798E-01

FE XVIII
2P5 - 2P4(1S)3D(2D)
ETH = 6.301E+01

X	MANN OWXC
1.01	8.047E-02
1.27	9.053E-02
1.60	1.034E-01
2.01	1.189E-01
2.53	1.365E-01
3.19	1.561E-01
4.01	1.773E-01
5.04	1.998E-01
6.35	2.235E-01
7.99	2.481E-01
10.05	2.735E-01
12.65	2.995E-01
15.91	3.261E-01
20.02	3.531E-01
25.19	3.805E-01
31.70	4.080E-01
39.89	4.357E-01
50.19	4.635E-01
63.16	4.914E-01
79.47	5.192E-01
100.00	5.470E-01

FE XVIII
2S2 2P5 - 2S 2P6
ETH = 9.390E+00

X	MANN OWX
1.01	4.469E-01
1.27	4.555E-01
1.60	4.659E-01
2.01	4.782E-01
2.53	4.929E-01
3.19	5.102E-01
4.01	5.301E-01
5.04	5.529E-01
6.35	5.783E-01
7.99	6.066E-01
10.05	6.375E-01
12.65	6.703E-01
15.91	7.061E-01
20.02	7.430E-01
25.19	7.812E-01
31.70	8.204E-01
39.89	8.600E-01
50.19	8.998E-01
63.16	9.396E-01
79.47	9.792E-01
100.00	1.018E+00

FE XVIII
2S2 2P5 - 2S 2P5(3P)3P(4D)
ETH = 6.851E+01

X	MANN OWXC
1.01	9.874E-03
1.27	1.023E-02
1.60	1.134E-02
2.01	1.314E-02
2.53	1.557E-02
3.19	1.856E-02
4.01	2.202E-02
5.04	2.589E-02
6.35	3.008E-02
7.99	3.454E-02
10.05	3.922E-02
12.65	4.408E-02
15.91	4.909E-02
20.02	5.423E-02
25.19	5.946E-02
31.70	6.476E-02
39.89	7.012E-02
50.19	7.553E-02
63.16	8.096E-02
79.47	8.641E-02
100.00	9.185E-02

FE XVIII
2S2 2P5 - 2S 2P5(3P)3P(2D)
ETH = 6.851E+01

X	MANN OWXC
1.01	9.521E-03
1.27	1.116E-02
1.60	1.474E-02
2.01	1.914E-02
2.53	2.433E-02
3.19	3.021E-02
4.01	3.670E-02
5.04	4.370E-02
6.35	5.115E-02
7.99	5.898E-02
10.05	6.712E-02
12.65	7.554E-02
15.91	8.419E-02
20.02	9.304E-02
25.19	1.020E-01
31.70	1.112E-01
39.89	1.204E-01
50.19	1.297E-01
63.16	1.390E-01
79.47	1.483E-01
100.00	1.577E-01

FE XVIII
2S2 2P5 - 2S 2P5(3P)3P(4P)
ETH = 6.851E+01

X	MANN OWXC
1.01	8.125E-03
1.27	9.861E-03
1.60	1.237E-02
2.01	1.561E-02
2.53	1.950E-02
3.19	2.399E-02
4.01	2.899E-02
5.04	3.442E-02
6.35	4.023E-02
7.99	4.634E-02
10.05	5.271E-02
12.65	5.930E-02
15.91	6.609E-02
20.02	7.302E-02
25.19	8.008E-02
31.70	8.723E-02
39.89	9.446E-02
50.19	1.017E-01
63.16	1.091E-01
79.47	1.164E-01
100.00	1.239E-01

FE XVIII
2S2 2P5 - 2S 2P5(3P)3P(2P)
ETH = 6.851E+01

X	MANN OWXC
1.01	5.560E-03
1.27	9.156E-03
1.60	1.250E-02
2.01	1.655E-02
2.53	2.128E-02
3.19	2.659E-02
4.01	3.239E-02
5.04	3.864E-02
6.35	4.528E-02
7.99	5.223E-02
10.05	5.946E-02
12.65	6.693E-02
15.91	7.460E-02
20.02	8.244E-02
25.19	9.042E-02
31.70	9.850E-02
39.89	1.067E-01
50.19	1.149E-01
63.16	1.232E-01
79.47	1.315E-01
100.00	1.397E-01

FE XVIII
2S2 2P5 - 2S 2P5(3P)3P(4S)
ETH = 6.851E+01

X	MANN OWXC
1.01	1.403E-03
1.27	1.077E-03
1.60	8.195E-04
2.01	6.208E-04
2.53	4.739E-04
3.19	3.711E-04
4.01	3.048E-04
5.04	2.670E-04
6.35	2.504E-04
7.99	2.491E-04
10.05	2.584E-04
12.65	2.751E-04
15.91	2.967E-04
20.02	3.218E-04
25.19	3.491E-04
31.70	3.779E-04
39.89	4.077E-04
50.19	4.383E-04
63.16	4.692E-04
79.47	5.005E-04
100.00	5.318E-04

FE XVIII
2S2 2P5 - 2S 2P5(3P)3P(2S)
ETH = 6.851E+01

X	MANN OWXC
1.01	2.843E-03
1.27	4.163E-03
1.60	5.829E-03
2.01	7.825E-03
2.53	1.012E-02
3.19	1.269E-02
4.01	1.550E-02
5.04	1.852E-02
6.35	2.171E-02
7.99	2.505E-02
10.05	2.852E-02
12.65	3.211E-02
15.91	3.579E-02
20.02	3.956E-02
25.19	4.338E-02
31.70	4.726E-02
39.89	5.118E-02
50.19	5.513E-02
63.16	5.910E-02
79.47	6.309E-02
100.00	6.706E-02

FE XVIII
2S2 2P5 - 2S 2P5(1P)3P(2D)
ETH = 6.851E+01

X	MANN OWXC
1.01	6.597E-03
1.27	7.923E-03
1.60	9.870E-03
2.01	1.240E-02
2.53	1.545E-02
3.19	1.898E-02
4.01	2.291E-02
5.04	2.719E-02
6.35	3.177E-02
7.99	3.659E-02
10.05	4.162E-02
12.65	4.683E-02
15.91	5.218E-02
20.02	5.765E-02
25.19	6.323E-02
31.70	6.887E-02
39.89	7.458E-02
50.19	8.033E-02
63.16	8.611E-02
79.47	9.191E-02
100.00	9.771E-02

FE XVIII
2S2 2P5 - 2S 2P5(1P)3P(2P)
ETH = 6.851E+01

X	MANN OWXC
1.01	4.721E-03
1.27	6.044E-03
1.60	7.851E-03
2.01	1.011E-02
2.53	1.279E-02
3.19	1.584E-02
4.01	1.921E-02
5.04	2.286E-02
6.35	2.674E-02
7.99	3.083E-02
10.05	3.508E-02
12.65	3.947E-02
15.91	4.399E-02
20.02	4.861E-02
25.19	5.331E-02
31.70	5.808E-02
39.89	6.289E-02
50.19	6.774E-02
63.16	7.262E-02
79.47	7.751E-02
100.00	8.240E-02

FE XVIII
2S2 2P5 - 2S 2P5(1P)3P(2S)
ETH = 6.851E+01

X	MANN OWXC
1.01	7.334E-04
1.27	5.928E-04
1.60	4.910E-04
2.01	4.230E-04
2.53	3.850E-04
3.19	3.729E-04
4.01	3.824E-04
5.04	4.089E-04
6.35	4.486E-04
7.99	4.980E-04
10.05	5.546E-04
12.65	6.165E-04
15.91	6.824E-04
20.02	7.511E-04
25.19	8.219E-04
31.70	8.942E-04
39.89	9.676E-04
50.19	1.042E-03
63.16	1.116E-03
79.47	1.191E-03
100.00	1.266E-03

FE XIX
2P4(3P) - 2P4(1D)
ETH = 1.228E+00

X	MANN OWXC
1.01	1.255E-01
1.38	1.247E-01
1.88	1.236E-01
2.56	1.221E-01
3.49	1.202E-01
4.76	1.176E-01
6.50	1.142E-01
8.86	1.099E-01
12.08	1.045E-01
16.48	9.762E-02
22.47	8.957E-02
30.65	8.037E-02
41.79	7.035E-02
57.00	6.003E-02
77.73	5.017E-02
106.00	4.138E-02
144.56	3.416E-02
197.14	2.870E-02
268.85	2.487E-02
366.64	2.238E-02
500.00	2.084E-02

FE XIX
2P4(3P) - 2P4(1S)
ETH = 2.653E+00

X	MANN OWXC
1.01	1.683E-02
1.38	1.656E-02
1.88	1.619E-02
2.56	1.571E-02
3.49	1.509E-02
4.76	1.430E-02
6.50	1.330E-02
8.86	1.209E-02
12.08	1.069E-02
16.48	9.124E-03
22.47	7.473E-03
30.65	5.841E-03
41.79	4.346E-03
57.00	3.077E-03
77.73	2.086E-03
106.00	1.369E-03
144.56	8.879E-04
197.14	5.647E-04
268.85	4.037E-04
366.64	2.999E-04
500.00	2.420E-04

FE XIX
2S2 2P4(3P) - 2S 2P5(3P)
ETH = 8.336E+00

X	MANN DWXC
1.01	1.280E+00
1.27	1.303E+00
1.60	1.330E+00
2.01	1.362E+00
2.53	1.401E+00
3.19	1.447E+00
4.01	1.501E+00
5.04	1.562E+00
6.35	1.631E+00
7.99	1.709E+00
10.05	1.794E+00
12.65	1.886E+00
15.91	1.984E+00
20.02	2.086E+00
25.19	2.193E+00
31.70	2.303E+00
39.89	2.414E+00
50.19	2.526E+00
63.16	2.638E+00
79.47	2.749E+00
100.00	2.859E+00

FE XIX
2S2 2P4(3P) - 2S 2P5(1P)
ETH = 1.124E+01

X	MANN DWXC
1.01	5.752E-02
1.27	5.816E-02
1.60	5.889E-02
2.01	5.980E-02
2.53	6.086E-02
3.19	6.212E-02
4.01	6.358E-02
5.04	6.528E-02
6.35	6.722E-02
7.99	6.944E-02
10.05	7.195E-02
12.65	7.477E-02
15.91	7.788E-02
20.02	8.126E-02
25.19	8.489E-02
31.70	8.871E-02
39.89	9.267E-02
50.19	9.673E-02
63.16	1.008E-01
79.47	1.050E-01
100.00	1.091E-01

FE XX
2S2 2P3(4S) - 2S 2P4(4P)
ETH = 7.189E+00

X	MANN DWXC
1.01	8.405E-01
1.23	8.515E-01
1.49	8.646E-01
1.81	8.799E-01
2.20	8.979E-01
2.68	9.193E-01
3.26	9.423E-01
3.96	9.697E-01
4.81	1.001E+00
5.85	1.036E+00
7.11	1.074E+00
8.64	1.116E+00
10.50	1.162E+00
12.76	1.211E+00
15.51	1.263E+00
18.85	1.318E+00
22.91	1.375E+00
27.85	1.433E+00
33.85	1.493E+00
41.14	1.553E+00
50.00	1.614E+00

FE XX
2S2 2P3(4S) - 2S 2P4(2D)
ETH = 9.440E+00

X	MANN DWXC
1.01	1.820E-02
1.23	1.842E-02
1.49	1.868E-02
1.81	1.898E-02
2.20	1.933E-02
2.68	1.974E-02
3.26	2.021E-02
3.96	2.075E-02
4.81	2.135E-02
5.85	2.202E-02
7.11	2.276E-02
8.64	2.357E-02
10.50	2.446E-02
12.76	2.541E-02
15.51	2.642E-02
18.85	2.748E-02
22.91	2.860E-02
27.85	2.975E-02
33.85	3.094E-02
41.14	3.215E-02
50.00	3.337E-02

FE XX
2S2 2P3(4S) - 2S 2P4(2S)
ETH = 1.060E+01

X	MANN DWXC
1.01	6.102E-03
1.23	6.144E-03
1.49	6.193E-03
1.81	6.246E-03
2.20	6.312E-03
2.68	6.389E-03
3.26	6.477E-03
3.96	6.578E-03
4.81	6.693E-03
5.85	6.824E-03
7.11	6.972E-03
8.64	7.141E-03
10.50	7.330E-03
12.76	7.541E-03
15.51	7.775E-03
18.85	8.031E-03
22.91	8.307E-03
27.85	8.602E-03
33.85	8.911E-03
41.14	9.233E-03
50.00	9.564E-03

FE XX
2S2 2P3(4S) - 2S 2P4(2P)
ETH = 1.134E+01

X	MANN DWXC
1.01	2.815E-02
1.23	2.832E-02
1.49	2.850E-02
1.81	2.872E-02
2.20	2.896E-02
2.68	2.928E-02
3.26	2.963E-02
3.96	3.003E-02
4.81	3.049E-02
5.85	3.102E-02
7.11	3.163E-02
8.64	3.233E-02
10.50	3.314E-02
12.76	3.404E-02
15.51	3.506E-02
18.85	3.618E-02
22.91	3.740E-02
27.85	3.870E-02
33.85	4.008E-02
41.14	4.152E-02
50.00	4.300E-02

FE XXI
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 3.956E+00

X	MANN DWXC
1.01	4.019E-02
1.23	4.013E-02
1.49	4.012E-02
1.81	4.011E-02
2.20	4.010E-02
2.68	4.008E-02
3.26	4.004E-02
3.96	3.999E-02
4.81	3.990E-02
5.85	3.980E-02
7.11	3.967E-02
8.64	3.950E-02
10.50	3.930E-02
12.76	3.906E-02
15.51	3.880E-02
18.85	3.853E-02
22.91	3.829E-02
27.85	3.807E-02
33.85	3.794E-02
41.14	3.792E-02
50.00	3.802E-02

FE XXI
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 6.456E+00

X	MANN DWXC
1.01	8.776E-01
1.23	8.876E-01
1.49	8.996E-01
1.81	9.137E-01
2.20	9.302E-01
2.68	9.491E-01
3.26	9.714E-01
3.96	9.970E-01
4.81	1.026E+00
5.85	1.059E+00
7.11	1.095E+00
8.64	1.135E+00
10.50	1.179E+00
12.76	1.226E+00
15.51	1.277E+00
18.85	1.330E+00
22.91	1.385E+00
27.85	1.442E+00
33.85	1.501E+00
41.14	1.561E+00
50.00	1.621E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 7.681E+00

X	MANN DWXC
1.01	7.507E-01
1.23	7.607E-01
1.49	7.725E-01
1.81	7.865E-01
2.20	8.024E-01
2.68	8.214E-01
3.26	8.433E-01
3.96	8.693E-01
4.81	8.966E-01
5.85	9.284E-01
7.11	9.636E-01
8.64	1.002E+00
10.50	1.044E+00
12.76	1.089E+00
15.51	1.136E+00
18.85	1.186E+00
22.91	1.238E+00
27.85	1.291E+00
33.85	1.346E+00
41.14	1.401E+00
50.00	1.456E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 9.069E+00

X	MANN OWXC
1.01	5.256E-01
1.23	5.349E-01
1.49	6.459E-01
1.81	6.588E-01
2.20	6.735E-01
2.68	6.909E-01
3.26	7.109E-01
3.96	7.337E-01
4.81	7.594E-01
5.85	7.881E-01
7.11	8.198E-01
8.64	8.543E-01
10.50	8.915E-01
12.76	9.313E-01
15.51	9.732E-01
18.85	1.017E+00
22.91	1.062E+00
27.85	1.108E+00
33.85	1.156E+00
41.14	1.203E+00
50.00	1.251E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(1D)
ETH = 9.389E+00

X	MANN OWXC
1.01	1.090E-01
1.23	1.103E-01
1.49	1.120E-01
1.81	1.138E-01
2.20	1.160E-01
2.68	1.186E-01
3.26	1.215E-01
3.96	1.249E-01
4.81	1.287E-01
5.85	1.329E-01
7.11	1.376E-01
8.64	1.427E-01
10.50	1.483E-01
12.76	1.543E-01
15.51	1.606E-01
18.85	1.673E-01
22.91	1.742E-01
27.85	1.814E-01
33.85	1.888E-01
41.14	1.963E-01
50.00	2.038E-01

FE XXI
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 1.051E+01

X	MANN OWXC
1.01	2.434E-02
1.23	2.460E-02
1.49	2.490E-02
1.81	2.524E-02
2.20	2.566E-02
2.68	2.614E-02
3.26	2.669E-02
3.96	2.732E-02
4.81	2.803E-02
5.85	2.883E-02
7.11	2.971E-02
8.64	3.069E-02
10.50	3.177E-02
12.76	3.293E-02
15.51	3.418E-02
18.85	3.550E-02
22.91	3.690E-02
27.85	3.835E-02
33.85	3.985E-02
41.14	4.139E-02
50.00	4.295E-02

FE XXI
2S2 2P2(3P) - 2P1 3D1(3F)
ETH = 7.426E+01

X	MANN OWXC
1.01	9.577E-02
1.17	9.303E-02
1.36	9.202E-02
1.58	9.253E-02
1.84	9.476E-02
2.13	9.824E-02
2.47	1.029E-01
2.87	1.096E-01
3.33	1.151E-01
3.87	1.225E-01
4.49	1.304E-01
5.22	1.388E-01
6.06	1.477E-01
7.03	1.569E-01
8.17	1.664E-01
9.48	1.762E-01
11.01	1.862E-01
12.79	1.964E-01
14.84	2.068E-01
17.23	2.172E-01
20.00	2.278E-01

FE XXI
2S2 2P2(3P) - 2P1 3D1(3D)
ETH = 7.426E+01

X	MANN OWXC
1.01	2.172E-01
1.17	2.345E-01
1.36	2.545E-01
1.58	2.771E-01
1.84	3.021E-01
2.13	3.295E-01
2.47	3.591E-01
2.87	3.906E-01
3.33	4.239E-01
3.87	4.590E-01
4.49	4.955E-01
5.22	5.334E-01
6.06	5.725E-01
7.03	6.127E-01
8.17	6.540E-01
9.48	6.961E-01
11.01	7.390E-01
12.78	7.825E-01
14.84	8.268E-01
17.23	8.715E-01
20.00	9.167E-01

FE XXI
2S2 2P2(3P) - 2P1 3D1(3P)
ETH = 7.426E+01

X	MANN OWXC
1.01	1.193E-01
1.17	1.266E-01
1.36	1.354E-01
1.58	1.458E-01
1.84	1.576E-01
2.13	1.708E-01
2.47	1.853E-01
2.87	2.009E-01
3.33	2.175E-01
3.87	2.352E-01
4.49	2.536E-01
5.22	2.728E-01
6.06	2.927E-01
7.03	3.132E-01
8.17	3.342E-01
9.48	3.557E-01
11.01	3.777E-01
12.78	3.999E-01
14.84	4.226E-01
17.23	4.455E-01
20.00	4.686E-01

FE XXI
2S2 2P2(3P) - 2P1 3D1(1F)
ETH = 7.426E+01

X	MANN OWXC
1.01	2.154E-02
1.17	2.070E-02
1.36	2.027E-02
1.58	2.023E-02
1.84	2.055E-02
2.13	2.119E-02
2.47	2.213E-02
2.87	2.332E-02
3.33	2.474E-02
3.87	2.633E-02
4.49	2.809E-02
5.22	2.998E-02
6.06	3.197E-02
7.03	3.407E-02
8.17	3.623E-02
9.48	3.847E-02
11.01	4.076E-02
12.78	4.310E-02
14.84	4.548E-02
17.23	4.788E-02
20.00	5.032E-02

FE XXI
2S2 2P2(3P) - 2P1 3D1(1D)
ETH = 7.426E+01

X	MANN OWXC
1.01	4.363E-02
1.17	4.576E-02
1.36	4.849E-02
1.58	5.180E-02
1.84	5.566E-02
2.13	6.004E-02
2.47	6.490E-02
2.87	7.019E-02
3.33	7.588E-02
3.87	8.193E-02
4.49	8.829E-02
5.22	9.493E-02
6.06	1.018E-01
7.03	1.090E-01
8.17	1.163E-01
9.48	1.238E-01
11.01	1.314E-01
12.78	1.392E-01
14.84	1.471E-01
17.23	1.551E-01
20.00	1.631E-01

FE XXI
2S2 2P2(3P) - 2P1 3D1(1P)
ETH = 7.426E+01

X	MANN OWXC
1.01	6.761E-03
1.17	5.831E-03
1.36	5.160E-03
1.58	4.598E-03
1.84	4.154E-03
2.13	3.844E-03
2.47	3.642E-03
2.87	3.532E-03
3.33	3.498E-03
3.87	3.527E-03
4.49	3.606E-03
5.22	3.726E-03
6.06	3.878E-03
7.03	4.056E-03
8.17	4.253E-03
9.48	4.466E-03
11.01	4.691E-03
12.78	4.925E-03
14.84	5.167E-03
17.23	5.415E-03
20.00	5.667E-03

FE XXII
2S2 2P - 2S 2P2(4P)
ETH = 3.536E+00

X	MANN OWXC
1.01	7.447E-02
1.27	7.463E-02
1.60	7.482E-02
2.01	7.477E-02
2.53	7.496E-02
3.19	7.516E-02
4.01	7.539E-02
5.04	7.558E-02
6.35	7.582E-02
7.99	7.604E-02
10.05	7.625E-02
12.65	7.643E-02
15.91	7.659E-02
20.02	7.676E-02
25.19	7.699E-02
31.70	7.735E-02
39.89	7.799E-02
50.19	7.869E-02
63.16	7.979E-02
79.47	8.121E-02
100.00	8.293E-02

FE XXII
2S2 2P - 2S 2P2(2P)
ETH = 7.959E+00

X	MANN OWXC
1.01	8.897E-01
1.27	9.039E-01
1.60	9.212E-01
2.01	9.422E-01
2.53	9.668E-01
3.19	9.967E-01
4.01	1.032E+00
5.04	1.072E+00
6.35	1.119E+00
7.99	1.171E+00
10.05	1.228E+00
12.65	1.291E+00
15.91	1.359E+00
20.02	1.430E+00
25.19	1.504E+00
31.70	1.580E+00
39.89	1.657E+00
50.19	1.735E+00
63.16	1.813E+00
79.47	1.890E+00
100.00	1.967E+00

FE XXII
2S2 2P - 2S 2P2(2D)
ETH = 5.935E+00

X	MANN OWXC
1.01	6.169E-01
1.27	6.248E-01
1.60	6.346E-01
2.01	6.465E-01
2.53	6.608E-01
3.19	6.776E-01
4.01	6.979E-01
5.04	7.215E-01
6.35	7.497E-01
7.99	7.795E-01
10.05	8.140E-01
12.65	8.517E-01
15.91	8.927E-01
20.02	9.364E-01
25.19	9.824E-01
31.70	1.030E+00
39.89	1.079E+00
50.19	1.129E+00
63.16	1.179E+00
79.47	1.229E+00
100.00	1.278E+00

FE XXII
2S2 2P - 2S 2P2(2S)
ETH = 6.727E+00

X	MANN OWXC
1.01	2.820E-01
1.27	2.861E-01
1.60	2.912E-01
2.01	2.973E-01
2.53	3.045E-01
3.19	3.133E-01
4.01	3.236E-01
5.04	3.356E-01
6.35	3.495E-01
7.99	3.651E-01
10.05	3.824E-01
12.65	4.014E-01
15.91	4.219E-01
20.02	4.436E-01
25.19	4.663E-01
31.70	4.897E-01
39.89	5.136E-01
50.19	5.378E-01
63.16	5.619E-01
79.47	5.859E-01
100.00	6.097E-01

FE XXII
2S2 2P - 2S2 3S
ETH = 7.338E+01

X	MANN OWXC
1.01	3.495E-03
1.27	3.570E-03
1.60	3.851E-03
2.01	4.353E-03
2.53	5.073E-03
3.19	5.997E-03
4.01	7.101E-03
5.04	8.356E-03
6.35	9.734E-03
7.99	1.121E-02
10.05	1.277E-02
12.65	1.438E-02
15.91	1.605E-02
20.02	1.775E-02
25.19	1.949E-02
31.70	2.124E-02
39.89	2.302E-02
50.19	2.480E-02
63.16	2.660E-02
79.47	2.840E-02
100.00	3.020E-02

FE XXII
2S2 2P - 2S2 3P
ETH = 7.685E+01

X	MANN DWXC
1.01	1.747E-01
1.27	1.886E-01
1.60	2.079E-01
2.01	2.324E-01
2.53	2.614E-01
3.19	2.943E-01
4.01	3.306E-01
5.04	3.698E-01
6.35	4.114E-01
7.99	4.549E-01
10.05	5.001E-01
12.65	5.466E-01
15.91	5.942E-01
20.02	6.427E-01
25.19	6.917E-01
31.70	7.413E-01
39.89	7.911E-01
50.19	8.412E-01
63.16	8.913E-01
79.47	9.414E-01
100.00	9.914E-01

FE XXII
2S2 2P - 2S2 3D
ETH = 7.685E+01

X	MANN OWXC
1.01	1.736E-01
1.27	1.871E-01
1.60	2.059E-01
2.01	2.297E-01
2.53	2.580E-01
3.19	2.902E-01
4.01	3.258E-01
5.04	3.641E-01
6.35	4.048E-01
7.99	4.474E-01
10.05	4.916E-01
12.65	5.371E-01
15.91	5.837E-01
20.02	6.310E-01
25.19	6.790E-01
31.70	7.275E-01
39.89	7.762E-01
50.19	8.252E-01
63.16	8.742E-01
79.47	9.231E-01
100.00	9.720E-01

FE XXII
2S2 2P - 2S2 4S
ETH = 7.948E+01

X	MANN OWX
1.01	1.287E-03
1.27	1.195E-03
1.60	1.162E-03
2.01	1.184E-03
2.53	1.257E-03
3.19	1.374E-03
4.01	1.527E-03
5.04	1.709E-03
6.35	1.910E-03
7.99	2.127E-03
10.05	2.354E-03
12.65	2.589E-03
15.91	2.829E-03
20.02	3.073E-03
25.19	3.320E-03
31.70	3.567E-03
39.89	3.815E-03
50.19	4.062E-03
63.16	4.310E-03
79.47	4.560E-03
100.00	4.817E-03

FE XXIII
2S2 - 2S 2P(1P)
ETH = 6.478E+00

X	MANN OWXC
1.01	3.183E-01
1.27	3.228E-01
1.60	3.284E-01
2.01	3.351E-01
2.53	3.432E-01
3.19	3.528E-01
4.01	3.643E-01
5.04	3.777E-01
6.35	3.931E-01
7.99	4.106E-01
10.05	4.301E-01
12.65	4.515E-01
15.91	4.747E-01
20.02	4.993E-01
25.19	5.250E-01
31.70	5.516E-01
39.89	5.788E-01
50.19	6.062E-01
63.16	6.337E-01
79.47	6.610E-01
100.00	6.880E-01

FE XXIII
2S2 - 2S 2P(3P)
ETH = 3.703E+00

X	MANN OWXC
1.01	2.124E-02
1.27	2.120E-02
1.60	2.117E-02
2.01	2.115E-02
2.53	2.111E-02
3.19	2.106E-02
4.01	2.099E-02
5.04	2.089E-02
6.35	2.077E-02
7.99	2.062E-02
10.05	2.043E-02
12.65	2.021E-02
15.91	1.996E-02
20.02	1.968E-02
25.19	1.940E-02
31.70	1.915E-02
39.89	1.895E-02
50.19	1.884E-02
63.16	1.882E-02
79.47	1.891E-02
100.00	1.911E-02

FE XXIII
2S 2P(3P) - 2P2(3P)
ETH = 5.547E+00

X	MANN OWXC
1.01	1.175E+00
1.27	1.190E+00
1.60	1.208E+00
2.01	1.231E+00
2.53	1.258E+00
3.19	1.290E+00
4.01	1.329E+00
5.04	1.374E+00
6.35	1.426E+00
7.99	1.486E+00
10.05	1.553E+00
12.65	1.626E+00
15.91	1.706E+00
20.02	1.792E+00
25.19	1.881E+00
31.70	1.975E+00
39.89	2.070E+00
50.19	2.168E+00
63.16	2.265E+00
79.47	2.363E+00
100.00	2.459E+00

FE XXIII
2S2 - 2S 3S(1S)
ETH = 8.166E+01

X	MANN OWXC
1.01	1.353E-02
1.27	1.424E-02
1.60	1.489E-02
2.01	1.546E-02
2.53	1.594E-02
3.19	1.633E-02
4.01	1.664E-02
5.04	1.689E-02
6.35	1.707E-02
7.99	1.721E-02
10.05	1.731E-02
12.65	1.737E-02
15.91	1.742E-02
20.02	1.745E-02
25.19	1.747E-02
31.70	1.749E-02
39.89	1.749E-02
50.19	1.749E-02
63.16	1.750E-02
79.47	1.750E-02
100.00	1.750E-02

FE XXIII
2S2 - 2S 3S(3S)
ETH = 8.108E+01

X	MANN DWXC
1.01	1.230E-03
1.27	9.255E-04
1.60	6.830E-04
2.01	4.956E-04
2.53	3.544E-04
3.19	2.501E-04
4.01	1.744E-04
5.04	1.202E-04
6.35	8.196E-05
7.99	5.535E-05
10.05	3.705E-05
12.65	2.461E-05
15.91	1.624E-05
20.02	1.065E-05
25.19	6.945E-06
31.70	4.511E-06
39.89	2.918E-06
50.19	1.880E-06
63.16	1.208E-06
79.47	7.719E-07
100.00	4.897E-07

FE XXIII
2S2 - 2S 3P(1P)
ETH = 8.289E+01

X	MANN OWXC
1.01	5.615E-03
1.27	7.526E-03
1.60	9.854E-03
2.01	1.259E-02
2.53	1.572E-02
3.19	1.921E-02
4.01	2.303E-02
5.04	2.713E-02
6.35	3.149E-02
7.99	3.608E-02
10.05	4.085E-02
12.65	4.579E-02
15.91	5.089E-02
20.02	5.609E-02
25.19	6.139E-02
31.70	6.677E-02
39.89	7.220E-02
50.19	7.769E-02
63.16	8.319E-02
79.47	8.872E-02
100.00	9.426E-02

FE XXIII
2S2 - 2S 3P(3P)
ETH = 8.299E+01

X	MANN OWXC
1.01	4.508E-03
1.27	4.720E-03
1.60	5.170E-03
2.01	5.861E-03
2.53	6.783E-03
3.19	7.914E-03
4.01	9.231E-03
5.04	1.071E-02
6.35	1.231E-02
7.99	1.403E-02
10.05	1.584E-02
12.65	1.773E-02
15.91	1.968E-02
20.02	2.168E-02
25.19	2.372E-02
31.70	2.579E-02
39.89	2.789E-02
50.19	2.999E-02
63.16	3.212E-02
79.47	3.425E-02
100.00	3.639E-02

FE XXIII
2S2 - 2S 3D(1D)
ETH = 8.433E+01

X	MANN DWXC
1.01	1.729E-02
1.27	2.064E-02
1.60	2.412E-02
2.01	2.762E-02
2.53	3.101E-02
3.19	3.420E-02
4.01	3.712E-02
5.04	3.969E-02
6.35	4.190E-02
7.99	4.374E-02
10.05	4.523E-02
12.65	4.641E-02
15.91	4.734E-02
20.02	4.802E-02
25.19	4.850E-02
31.70	4.879E-02
39.89	4.889E-02
50.19	4.881E-02
63.16	4.863E-02
79.47	4.827E-02
100.00	4.785E-02

FE XXIII
2S2 - 2S 3D(3D)
ETH = 8.438E+01

X	MANN OWXC
1.01	8.600E-03
1.27	6.536E-03
1.60	4.854E-03
2.01	3.539E-03
2.53	2.549E-03
3.19	1.829E-03
4.01	1.313E-03
5.04	9.668E-04
6.35	7.294E-04
7.99	5.721E-04
10.05	4.697E-04
12.65	4.039E-04
15.91	3.623E-04
20.02	3.360E-04
25.19	3.195E-04
31.70	3.089E-04
39.89	3.017E-04
50.19	2.963E-04
63.16	2.922E-04
79.47	2.881E-04
100.00	2.844E-04

FE XXIV
1S2 2S - 1S2 2P
ETH = 4.239E+00

X	MANN OWX
1.01	4.482E-01
1.34	4.546E-01
1.78	4.628E-01
2.37	4.734E-01
3.15	4.869E-01
4.19	5.033E-01
5.57	5.237E-01
7.41	5.482E-01
9.85	5.768E-01
13.09	6.095E-01
17.41	6.459E-01
23.14	6.855E-01
30.76	7.276E-01
40.89	7.714E-01
54.36	8.162E-01
72.26	8.614E-01
96.06	9.064E-01
127.70	9.508E-01
169.76	9.942E-01
225.67	1.037E+00
300.00	1.078E+00

FE XXIV
1S2 2S - 1S2 3S
ETH = 8.450E+01

X	MANN OWX
1.01	1.426E-02
1.21	1.459E-02
1.46	1.492E-02
1.75	1.524E-02
2.11	1.554E-02
2.53	1.582E-02
3.05	1.606E-02
3.66	1.626E-02
4.40	1.644E-02
5.29	1.659E-02
6.36	1.671E-02
7.64	1.680E-02
9.18	1.687E-02
11.04	1.693E-02
13.27	1.698E-02
15.95	1.701E-02
19.17	1.704E-02
23.04	1.705E-02
27.69	1.707E-02
33.28	1.708E-02
40.00	1.708E-02

FE XXIV
1S2 2S - 1S2 3P
ETH = 8.570E+01

X	MANN OWX
1.01	1.094E-02
1.21	1.269E-02
1.46	1.487E-02
1.75	1.748E-02
2.11	2.052E-02
2.53	2.396E-02
3.05	2.778E-02
3.66	3.195E-02
4.40	3.644E-02
5.29	4.122E-02
6.36	4.624E-02
7.64	5.150E-02
9.18	5.695E-02
11.04	6.257E-02
13.27	6.836E-02
15.95	7.427E-02
19.17	8.030E-02
23.04	8.643E-02
27.69	9.264E-02
33.28	9.892E-02
40.00	1.052E-01

FE XXIV
1S2 2S - 1S2 3D
ETH = 8.627E+01

X	MANN OWX
1.01	2.710E-02
1.21	2.813E-02
1.46	2.949E-02
1.75	3.112E-02
2.11	3.296E-02
2.53	3.493E-02
3.05	3.694E-02
3.66	3.892E-02
4.40	4.082E-02
5.29	4.257E-02
6.36	4.416E-02
7.64	4.556E-02
9.18	4.677E-02
11.04	4.779E-02
13.27	4.865E-02
15.95	4.934E-02
19.17	4.990E-02
23.04	5.032E-02
27.69	5.063E-02
33.28	5.081E-02
40.00	5.087E-02

FE XXIV
1S2 2S - 1S 2S2
ETH = 4.861E+02

X	MANN OWX
1.01	1.116E-03
1.19	1.131E-03
1.39	1.146E-03
1.63	1.161E-03
1.92	1.175E-03
2.25	1.189E-03
2.64	1.203E-03
3.11	1.216E-03
3.65	1.228E-03
4.28	1.240E-03
5.02	1.251E-03
5.90	1.262E-03
6.93	1.271E-03
8.13	1.280E-03
9.55	1.288E-03
11.21	1.295E-03
13.16	1.302E-03
15.45	1.307E-03
18.14	1.312E-03
21.29	1.317E-03
25.00	1.320E-03

FE XXIV
1S2 2S - 1S 2S 2P(4P)
ETH = 4.870E+02

X	MANN OWXC
1.01	2.831E-03
1.19	2.268E-03
1.39	1.821E-03
1.63	1.474E-03
1.92	1.213E-03
2.25	1.024E-03
2.64	8.922E-04
3.11	8.069E-04
3.65	7.573E-04
4.28	7.352E-04
5.02	7.339E-04
5.90	7.481E-04
6.93	7.733E-04
8.13	8.077E-04
9.55	8.479E-04
11.21	8.924E-04
13.16	9.400E-04
15.45	9.899E-04
18.14	1.041E-03
21.29	1.094E-03
25.00	1.149E-03

FE XXIV
1S2 2S - 1S 2S(1S)2P(2P)
ETH = 4.902E+02

X	MANN OWXC
1.01	1.959E-03
1.19	1.999E-03
1.39	2.109E-03
1.63	2.280E-03
1.92	2.503E-03
2.25	2.767E-03
2.64	3.066E-03
3.11	3.391E-03
3.65	3.738E-03
4.28	4.102E-03
5.02	4.478E-03
5.90	4.864E-03
6.93	5.258E-03
8.13	5.657E-03
9.55	6.061E-03
11.21	6.468E-03
13.16	6.877E-03
15.45	7.287E-03
18.14	7.699E-03
21.29	8.112E-03
25.00	8.525E-03

FE XXIV
1S2 2S - 1S 2S(3S)2P(2P)
ETH = 4.902E+02

X	MANN OWXC
1.01	3.708E-03
1.19	4.761E-03
1.39	5.925E-03
1.63	7.184E-03
1.92	8.520E-03
2.25	9.919E-03
2.64	1.137E-02
3.11	1.286E-02
3.65	1.438E-02
4.28	1.593E-02
5.02	1.750E-02
5.90	1.908E-02
6.93	2.068E-02
8.13	2.229E-02
9.55	2.391E-02
11.21	2.553E-02
13.16	2.716E-02
15.45	2.879E-02
18.14	3.043E-02
21.29	3.206E-02
25.00	3.370E-02

MO XXXI
3S2 - 3S 3P(3P)
ETH = 5.541E+00

X	MANN OWXC
1.01	1.091E-01
1.27	1.097E-01
1.60	1.108E-01
2.01	1.121E-01
2.53	1.137E-01
3.19	1.156E-01
4.01	1.180E-01
5.04	1.207E-01
6.35	1.240E-01
7.99	1.278E-01
10.05	1.321E-01
12.65	1.371E-01
15.91	1.426E-01
20.02	1.486E-01
25.19	1.551E-01
31.70	1.621E-01
39.89	1.694E-01
50.19	1.770E-01
63.16	1.847E-01
79.47	1.926E-01
100.00	2.005E-01

MO XXXI
3S2 - 3S 3P(1P)
ETH = 7.722E+00

X	MANN OWXC
1.01	8.418E-01
1.27	8.525E-01
1.60	8.656E-01
2.01	8.815E-01
2.53	9.008E-01
3.19	9.233E-01
4.01	9.506E-01
5.04	9.826E-01
6.35	1.020E+00
7.99	1.062E+00
10.05	1.109E+00
12.65	1.161E+00
15.91	1.218E+00
20.02	1.279E+00
25.19	1.343E+00
31.70	1.410E+00
39.89	1.479E+00
50.19	1.550E+00
63.16	1.621E+00
79.47	1.692E+00
100.00	1.764E+00

MO XXXI
3S2 - 3S 3D(3D)
ETH = 1.423E+01

X	MANN DWXC
1.01	1.372E-02
1.25	1.325E-02
1.54	1.272E-02
1.91	1.211E-02
2.36	1.144E-02
2.91	1.071E-02
3.60	9.934E-03
4.45	9.122E-03
5.50	8.301E-03
6.80	7.496E-03
8.41	6.737E-03
10.39	6.046E-03
12.85	5.441E-03
15.88	4.929E-03
19.63	4.513E-03
24.26	4.184E-03
29.99	3.933E-03
37.07	3.744E-03
45.82	3.605E-03
56.63	3.502E-03
70.00	3.427E-03

MO XXXI
3S2 - 3S 3D(1D)
ETH = 1.560E+01

X	MANN DWXC
1.01	5.658E-02
1.25	5.724E-02
1.54	5.795E-02
1.91	5.877E-02
2.36	5.967E-02
2.91	6.064E-02
3.60	6.165E-02
4.45	6.270E-02
5.50	6.375E-02
6.80	6.477E-02
8.41	6.576E-02
10.39	6.668E-02
12.85	6.752E-02
15.88	6.825E-02
19.63	6.886E-02
24.26	6.936E-02
29.99	6.973E-02
37.07	6.997E-02
45.82	7.009E-02
56.63	7.010E-02
70.00	7.001E-02

MO XXXI
3S2 - 3S 4S(3S)
ETH = 5.369E+01

X	MANN DWXC
1.01	8.517E-04
1.17	7.396E-04
1.36	6.369E-04
1.58	5.435E-04
1.84	4.590E-04
2.13	3.836E-04
2.47	3.170E-04
2.87	2.590E-04
3.33	2.093E-04
3.87	1.674E-04
4.49	1.327E-04
5.22	1.043E-04
6.06	8.140E-05
7.03	6.318E-05
8.17	4.881E-05
9.48	3.756E-05
11.01	2.880E-05
12.78	2.203E-05
14.84	1.680E-05
17.23	1.279E-05
20.00	9.710E-06

MO XXXI
3S2 - 3S 4S(1S)
ETH = 5.916E+01

X	MANN DWXC
1.01	3.032E-02
1.17	3.093E-02
1.36	3.153E-02
1.58	3.209E-02
1.84	3.262E-02
2.13	3.311E-02
2.47	3.355E-02
2.87	3.395E-02
3.33	3.429E-02
3.87	3.459E-02
4.49	3.484E-02
5.22	3.504E-02
6.06	3.520E-02
7.03	3.532E-02
8.17	3.541E-02
9.48	3.548E-02
11.01	3.552E-02
12.78	3.554E-02
14.84	3.555E-02
17.23	3.555E-02
20.00	3.553E-02

MO XXXI
3S2 - 3S 4F(3F)
ETH = 6.625E+01

X	MANN DWXC
1.01	8.648E-03
1.17	7.369E-03
1.36	6.203E-03
1.58	5.164E-03
1.84	4.258E-03
2.13	3.482E-03
2.47	2.830E-03
2.87	2.290E-03
3.33	1.852E-03
3.87	1.500E-03
4.49	1.221E-03
5.22	1.002E-03
6.06	8.331E-04
7.03	7.029E-04
8.17	6.034E-04
9.48	5.279E-04
11.01	4.710E-04
12.78	4.283E-04
14.84	3.964E-04
17.23	3.727E-04
20.00	3.552E-04

MO XXXI
3S2 - 3S 4F(1F)
ETH = 6.658E+01

X	MANN DWXC
1.01	1.819E-02
1.17	1.939E-02
1.36	2.057E-02
1.58	2.169E-02
1.84	2.274E-02
2.13	2.371E-02
2.47	2.458E-02
2.87	2.535E-02
3.33	2.603E-02
3.87	2.661E-02
4.49	2.710E-02
5.22	2.752E-02
6.06	2.788E-02
7.03	2.818E-02
8.17	2.844E-02
9.48	2.867E-02
11.01	2.887E-02
12.78	2.905E-02
14.84	2.922E-02
17.23	2.937E-02
20.00	2.951E-02

MO XXXII
2P6 3S - 2P6 3P
ETH = 5.424E+00

X	MANN DWX
1.01	1.116E+00
1.32	1.130E+00
1.71	1.148E+00
2.23	1.171E+00
2.91	1.199E+00
3.79	1.233E+00
4.94	1.275E+00
6.43	1.325E+00
8.38	1.384E+00
10.91	1.452E+00
14.21	1.528E+00
18.51	1.612E+00
24.12	1.703E+00
31.42	1.799E+00
40.93	1.899E+00
53.32	2.002E+00
69.45	2.105E+00
90.47	2.211E+00
117.86	2.315E+00
153.53	2.418E+00
200.00	2.520E+00

MO XXXII
2P6 3S - 2P6 3D
ETH = 1.413E+01

X	MANN DWX
1.01	8.809E-02
1.27	8.842E-02
1.60	8.890E-02
2.01	8.912E-02
2.53	8.955E-02
3.19	9.000E-02
4.01	9.046E-02
5.04	9.094E-02
6.35	9.142E-02
7.99	9.187E-02
10.05	9.234E-02
12.65	9.280E-02
15.91	9.323E-02
20.02	9.361E-02
25.19	9.392E-02
31.70	9.415E-02
39.89	9.426E-02
50.19	9.426E-02
63.16	9.413E-02
79.47	9.391E-02
100.00	9.360E-02

MO XXXII
2P6 3S - 2P6 4S
ETH = 6.045E+01

X	MANN DWX
1.01	2.961E-02
1.21	3.020E-02
1.46	3.077E-02
1.75	3.131E-02
2.11	3.181E-02
2.53	3.227E-02
3.05	3.267E-02
3.66	3.301E-02
4.40	3.329E-02
5.29	3.352E-02
6.36	3.369E-02
7.64	3.382E-02
9.18	3.392E-02
11.04	3.398E-02
13.27	3.401E-02
15.95	3.403E-02
19.17	3.403E-02
23.04	3.402E-02
27.69	3.401E-02
33.28	3.399E-02
40.00	3.397E-02

MO XXXII
2P6 3S - 2P6 4P
ETH = 6.308E+01

X	MANN OWX
1.01	6.607E-03
1.21	7.720E-03
1.46	9.209E-03
1.75	1.111E-02
2.11	1.343E-02
2.53	1.619E-02
3.05	1.937E-02
3.66	2.295E-02
4.40	2.692E-02
5.29	3.124E-02
6.36	3.589E-02
7.64	4.084E-02
9.18	4.605E-02
11.04	5.151E-02
13.27	5.719E-02
15.95	6.307E-02
19.17	6.912E-02
23.04	7.531E-02
27.69	8.162E-02
33.28	8.804E-02
40.00	9.456E-02

MO XXXII
2P6 3S - 2P5 3S2
ETH = 1.762E+02

X	MANN OWXC
1.01	1.397E-03
1.17	1.406E-03
1.36	1.451E-03
1.58	1.534E-03
1.84	1.655E-03
2.13	1.813E-03
2.47	2.003E-03
2.87	2.238E-03
3.33	2.500E-03
3.87	2.790E-03
4.49	3.107E-03
5.22	3.447E-03
6.06	3.806E-03
7.03	4.183E-03
8.17	4.574E-03
9.48	4.978E-03
11.01	5.392E-03
12.78	5.815E-03
14.84	6.246E-03
17.23	6.684E-03
20.00	7.128E-03

MO XXXII
2P6 3S - 2P5 3S 3P(TOTAL)
ETH = 1.821E+02

X	MANN OWX
1.01	5.091E-02
1.17	4.987E-02
1.36	4.899E-02
1.58	4.828E-02
1.84	4.773E-02
2.13	4.731E-02
2.47	4.704E-02
2.87	4.687E-02
3.33	4.679E-02
3.87	4.679E-02
4.49	4.683E-02
5.22	4.691E-02
6.06	4.700E-02
7.03	4.711E-02
8.17	4.721E-02
9.48	4.732E-02
11.01	4.741E-02
12.78	4.750E-02
14.84	4.758E-02
17.23	4.764E-02
20.00	4.769E-02

MO XXXII
2P6 3S - 2P5 3S 3P(TOTAL)
ETH = 1.821E+02

X	MANN OWX
1.01	5.091E-02
1.17	4.987E-02
1.36	4.899E-02
1.58	4.828E-02
1.84	4.773E-02
2.13	4.731E-02
2.47	4.704E-02
2.87	4.687E-02
3.33	4.679E-02
3.87	4.679E-02
4.49	4.683E-02
5.22	4.691E-02
6.06	4.700E-02
7.03	4.711E-02
8.17	4.721E-02
9.48	4.732E-02
11.01	4.741E-02
12.78	4.750E-02
14.84	4.758E-02
17.23	4.764E-02
20.00	4.769E-02

MO XXXII
2S2 2P6 3S - 2S 2P6 3S2
ETH = 1.986E+02

X	MANN OWX
1.01	5.575E-03
1.17	5.677E-03
1.36	5.730E-03
1.58	5.883E-03
1.84	5.932E-03
2.13	6.075E-03
2.47	6.162E-03
2.87	6.240E-03
3.33	6.311E-03
3.87	6.373E-03
4.49	6.426E-03
5.22	6.472E-03
6.06	6.510E-03
7.03	6.542E-03
8.17	6.567E-03
9.48	6.589E-03
11.01	6.605E-03
12.78	6.619E-03
14.84	6.629E-03
17.23	6.637E-03
20.00	6.643E-03

BE II
2S - 2P
ETH • 3.330E-01

X	RO88 2CC
1.00	1.359E+01
1.33	1.619E+01
1.67	1.858E+01
2.00	2.085E+01
2.33	2.278E+01
2.67	2.468E+01
3.33	2.815E+01
6.67	3.919E+01
10.00	4.592E+01
13.33	5.067E+01
16.67	5.421E+01
20.00	5.753E+01
23.33	6.004E+01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH • 9.954E-01

X	RO88 5CCX
1.51	4.410E+00
2.01	5.150E+00
2.51	5.770E+00
4.02	7.400E+00
6.03	8.810E+00
12.06	1.114E+01
14.07	1.170E+01
16.07	1.218E+01
18.08	1.262E+01
20.09	1.300E+01
22.10	1.335E+01
24.11	1.366E+01
26.12	1.396E+01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

C III
1S2 2S2 - 1S2 2S 2P(3P)
ETH • 4.522E-01

X	RO88 5CCX
1.02	9.580E-01
1.33	7.720E-01
1.68	7.000E-01
3.32	6.140E-01
4.42	5.500E-01
5.53	4.740E-01
6.63	4.180E-01
8.84	3.190E-01
11.06	2.560E-01
13.27	2.100E-01
15.48	1.670E-01
17.69	1.340E-01
19.90	1.140E-01
22.11	9.800E-02
26.53	7.300E-02
30.96	5.670E-02
35.38	4.510E-02
39.80	3.672E-02
44.22	3.056E-02
48.65	2.585E-02
53.07	2.203E-02
57.49	1.901E-02

C III
1S2 2S2 - 1S2 2P2 (3P)
ETH • 1.263E+00

X	RO88 5CCX
1.19	1.160E-02
1.58	1.040E-02
1.98	9.300E-03
2.38	8.400E-03
3.17	6.700E-03
3.96	5.300E-03
4.75	4.200E-03
5.54	3.200E-03
6.34	2.500E-03
7.13	2.000E-03
7.92	1.600E-03
9.50	1.090E-03
11.09	7.839E-04
12.67	5.782E-04
14.26	4.379E-04
15.84	3.409E-04
17.42	2.737E-04
19.01	2.151E-04
20.59	1.721E-04

C III
1S2 2S2 - 1S2 2P2 (1D)
ETH • 1.350E+00

X	RO88 5CCX
1.11	4.250E-01
1.48	4.050E-01
1.85	3.880E-01
2.22	3.750E-01
2.96	3.534E-01
3.70	3.420E-01
4.45	3.344E-01
5.19	3.259E-01
5.93	3.192E-01
6.67	3.116E-01
7.41	3.054E-01
8.89	2.965E-01
10.37	2.905E-01
11.85	2.872E-01
13.33	2.843E-01
14.82	2.837E-01
16.30	2.832E-01
17.78	2.830E-01
19.26	2.830E-01

C III
2S 2P(3P) - 2S 2P(1P)
ETH • 5.431E-01

X	RO88 5CCX
1.93	1.699E+00
2.85	1.373E+00
3.77	1.101E+00
4.69	1.321E+00
6.53	6.119E-01
8.37	7.303E-01
10.21	3.136E-01
12.06	2.524E-01
13.90	1.929E-01
15.74	1.601E-01
17.58	1.320E-01
-	-
-	-
-	-
-	-
-	-
-	-
-	-

C III
2S 2P(3P) - 2P2(1D)
ETH • 8.977E-01

X	RO88 5CCX
1.17	1.330E+00
1.72	1.180E+00
2.28	1.019E+00
2.84	8.707E-01
3.95	6.528E-01
5.07	5.391E-01
6.18	4.630E-01
7.29	3.196E-01
8.41	2.553E-01
9.52	2.119E-01
10.64	1.785E-01

C III
2S 2P(1P) - 2P2(3P)
ETH • 2.673E-01

X	RO88 5CCX
1.89	8.398E-01
3.76	7.369E-01
5.63	6.250E-01
7.50	1.728E+00
11.24	4.418E-01
14.98	3.140E-01
18.72	2.425E-01
22.47	1.861E-01
26.21	1.458E-01
29.95	1.143E-01
33.69	9.776E-02

C III
2S 2P(3P) - 2P2(3P)
ETH • 9.104E-01

X	RO88 5CCX
1.29	1.997E+01
1.91	2.264E+01
2.53	2.577E+01
3.14	2.789E+01
4.38	3.312E+01
5.61	3.656E+01
6.85	3.930E+01
8.08	4.155E+01
9.31	4.347E+01
10.55	4.516E+01
11.78	4.666E+01

C III
2S 2P(1P) - 2P2(1D)
ETH = 3.546E-01

X	RDBB 5CCX
1.42	1.310E+01
2.83	1.596E+01
4.24	1.820E+01
5.65	2.006E+01
8.47	2.275E+01
11.29	2.474E+01
14.11	2.648E+01
16.93	2.784E+01
19.76	2.899E+01
22.58	3.001E+01
25.40	3.092E+01
-	-

C III
1S2 2P2(3P) - 1S2 2P2(1D)
ETH = 8.730E-02

X	RDBB 5CCX
2.72	3.879E+00
8.45	3.491E+00
14.17	3.012E+00
19.90	2.767E+00
31.36	1.793E+00
42.81	1.266E+00
54.27	1.001E+00
65.72	7.963E-01
77.18	6.113E-01
88.63	4.853E-01
100.09	3.989E-01
-	-

C IV
1S2 2S - 1S2 2P
ETH = 5.924E-01

X	RDBB 2CCX
1.01	8.950E+00
1.35	9.330E+00
1.69	9.810E+00
2.03	1.016E+01
2.36	1.054E+01
2.70	1.089E+01
3.04	1.121E+01
3.38	1.153E+01
6.75	1.417E+01
10.13	1.554E+01
13.50	1.668E+01
27.01	1.962E+01

O IV
1S2 2S2 2P - 1S2 2S 2P2(4P)
ETH = 5.981E-01

X	RDBB O IV
3.01	8.870E-01
4.01	8.240E-01
5.02	7.640E-01
6.02	7.060E-01
7.02	6.510E-01
8.03	6.010E-01
9.03	5.550E-01
10.03	5.110E-01
13.38	3.940E-01
16.72	3.090E-01
20.06	2.470E-01
23.41	2.010E-01
26.75	1.660E-01
33.44	1.190E-01
66.88	3.766E-02
100.32	1.827E-02

O IV
1S2 2S2 2P - 1S2 2S 2P2(2D)
ETH = 1.211E+00

X	RDBB O IV
1.49	5.987E+00
1.98	6.313E+00
2.48	6.712E+00
2.97	7.063E+00
3.47	7.383E+00
3.96	7.669E+00
4.46	7.929E+00
4.95	8.176E+00
5.60	8.880E+00
8.26	9.463E+00
9.91	9.962E+00
11.56	1.041E+01
13.21	1.079E+01
16.51	1.145E+01
33.02	1.356E+01
49.54	1.493E+01

O IV
1S2 2S2 2P - 1S2 2S 2P2(2S)
ETH = 1.552E+00

X	RDBB O IV
1.16	2.078E+00
1.55	2.279E+00
1.93	2.460E+00
2.32	2.628E+00
2.71	2.784E+00
3.09	2.930E+00
3.48	3.066E+00
3.87	3.193E+00
5.16	3.570E+00
6.44	3.879E+00
7.73	4.122E+00
9.02	4.360E+00
10.31	4.576E+00
12.89	4.867E+00
25.78	5.821E+00
38.66	6.367E+00

O IV
1S2 2S2 2P - 1S2 2S 2P2(2P)
ETH = 1.756E+00

X	RDBB 5CCX
1.02	6.804E+00
1.37	7.652E+00
1.71	8.414E+00
2.05	9.118E+00
2.39	9.760E+00
2.73	1.035E+01
3.07	1.088E+01
3.42	1.137E+01
4.56	1.282E+01
5.69	1.399E+01
6.83	1.494E+01
7.97	1.581E+01
9.11	1.654E+01
11.39	1.776E+01
22.78	2.153E+01
34.16	2.371E+01

O IV
2S 2P2(4P) - 2S 2P2(2D)
ETH = 6.131E-01

X	RDBB 5CCX
1.96	2.835E+00
2.94	2.572E+00
3.92	2.314E+00
4.90	2.075E+00
5.87	1.859E+00
6.85	1.667E+00
7.83	1.497E+00
9.81	1.347E+00
12.07	9.669E-01
15.33	7.168E-01
18.60	5.486E-01
21.86	4.313E-01
25.12	3.462E-01
31.64	2.346E-01
64.26	6.367E-02
96.88	2.841E-02

O IV
2S 2P2(4P) - 2S 2P2(2S)
ETH = 9.538E-01

X	RDBB 5CCX
1.26	3.878E-01
1.89	3.528E-01
2.52	3.151E-01
3.15	2.787E-01
3.78	2.454E-01
4.41	2.158E-01
5.03	1.898E-01
5.66	1.672E-01
7.76	1.114E-01
9.86	7.653E-02
11.95	5.446E-02
14.05	4.011E-02
16.15	3.039E-02
20.34	1.848E-02
41.31	3.440E-03
62.28	1.220E-03

O IV
2S 2P2(4P) - 2S 2P2(2P)
ETH = 1.158E+00

X	RDBB 5CCX
1.04	5.353E-01
1.56	4.774E-01
2.07	4.202E-01
2.59	3.679E-01
3.11	3.219E-01
3.63	2.821E-01
4.15	2.480E-01
4.66	2.188E-01
6.39	1.486E-01
8.12	1.057E-01
9.84	7.853E-02
11.57	6.061E-02
13.30	4.812E-02
16.75	3.213E-02
34.02	8.780E-03
51.29	4.030E-03

O IV
2S 2P2(2D) - 2S 2P2(2S)
ETH = 3.406E-01

X	RDBB 5CCX
1.73	6.667E-01
3.49	6.834E-01
5.25	6.960E-01
7.01	7.118E-01
8.77	7.287E-01
10.54	7.460E-01
12.30	7.633E-01
14.06	7.798E-01
19.93	8.283E-01
25.80	8.720E-01
31.67	9.169E-01
37.55	9.542E-01
43.42	9.864E-01
55.16	1.020E+00
113.88	1.101E+00
172.59	1.153E+00

O IV
2S 2P2(2D) - 2S 2P2(2P)
ETH = 5.450E-01

X	RDBB 5CCX
1.08	1.553E+00
2.18	1.432E+00
3.28	1.302E+00
4.38	1.175E+00
5.48	1.058E+00
6.58	9.523E-01
7.69	8.581E-01
8.79	7.748E-01
12.46	5.617E-01
16.13	4.209E-01
19.80	3.261E-01
23.46	2.602E-01
27.13	2.123E-01
34.47	1.492E-01
71.17	4.890E-02
107.86	2.560E-02

O IV
2S 2P2(2S) - 2S 2P2(2P)
ETH = 2.044E-01

X	RO88 SCCX
1.21	2.460E-01
4.15	2.333E-01
7.08	2.164E-01
10.02	1.983E-01
12.96	1.805E-01
15.89	1.639E-01
18.83	1.489E-01
21.76	1.355E-01
31.55	1.012E-01
41.33	7.860E-02
51.11	6.360E-02
60.90	5.336E-02
70.68	4.599E-02
90.25	3.614E-02
188.10	1.834E-02
285.94	1.234E-02
-	-
-	-
-	-
-	-

O VI
1S2 2S - 1S2 2P
ETH = 8.832E-01

X	RO88 O VI
1.02	5.124E+00
1.36	5.284E+00
1.70	5.446E+00
2.04	5.586E+00
2.38	5.698E+00
2.72	5.819E+00
3.40	6.070E+00
4.53	6.433E+00
5.66	6.751E+00
6.79	7.030E+00
7.93	7.308E+00
9.06	7.511E+00
10.19	7.720E+00
11.32	7.917E+00
22.65	9.291E+00
33.97	1.014E+01
45.29	1.076E+01
56.62	1.124E+01
67.94	1.163E+01
79.26	1.197E+01

NE VIII
2S - 2P
ETH = 1.168E+00

X	RO98 SCCX
1.20	3.280E+00
1.54	3.350E+00
1.88	3.430E+00
2.57	3.560E+00
5.14	3.990E+00
7.71	4.340E+00
10.28	4.620E+00
12.85	4.850E+00
15.42	5.050E+00
17.99	5.230E+00
20.56	5.390E+00
23.13	5.530E+00
25.70	5.660E+00
-	-
-	-
-	-
-	-
-	-
-	-

AL I
3S2 3P - 3S2 3D
ETH = 2.951E-01

X	RO88 PWB
1.10	1.922E+00
2.00	9.706E+00
5.00	2.317E+01
10.00	3.402E+01
20.00	4.513E+01
50.00	6.305E+01
100.00	7.124E+01

AL I
3S2 3P - 3S2 4S
ETH = 2.300E-01

X	RO88 PWB
1.10	1.165E+00
2.00	6.872E+00
5.00	1.614E+01
10.00	2.331E+01
20.00	4.013E+01
50.00	4.741E+01
100.00	-
-	-

AL V
2S2 2P5(2P) - 2S1 2P6(2S)
ETH = 3.259E+00

X	RO88 PWB
1.10	7.350E-01
2.00	1.919E+00
5.00	2.921E+00
10.00	3.569E+00
20.00	4.196E+00
50.00	5.011E+00
100.00	5.622E+00

AL VI
2S2 2P4(3P) - 2S1 2P5(3P)
ETH = 2.945E+00

X	RO88 PWB
1.10	2.169E+00
2.00	5.680E+00
5.00	8.471E+00
10.00	1.030E+01
50.00	1.429E+01
100.00	1.594E+01
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

FE XVIII
2S2 2P5(2P) - 2S 2P6(2S)
ETH = 8.736E+00

X	RO88 2CCX
1.14	4.580E-01
2.86	5.120E-01
4.58	5.630E-01
6.29	6.030E-01
9.01	6.350E-01
9.73	6.630E-01
11.44	6.890E-01
22.89	7.960E-01
34.33	8.620E-01
45.77	9.090E-01
57.22	9.470E-01
68.66	9.790E-01
80.10	1.000E+00
91.54	1.030E+00

FE XIX
2S2 2P4(3P) - 2S2 2P4(1D)
ETH = 9.351E-01

X	RO88
11.23	1.163E-01
14.97	1.115E-01
18.71	1.070E-01
22.46	1.029E-01
53.47	7.740E-02
160.41	4.440E-02
267.35	3.476E-02
374.29	3.070E-02
481.23	2.854E-02
588.17	2.719E-02
695.11	2.609E-02
802.05	2.550E-02
-	-
-	-

FE XIX
2S2 2P4(3P) - 2S2 2P4(1S)
ETH = 1.945E+00

X	RO88
5.40	2.255E-02
7.20	2.159E-02
9.00	2.075E-02
10.80	2.005E-02
25.71	1.565E-02
77.12	1.051E-02
128.53	9.261E-03
179.94	8.761E-03
231.35	8.504E-03
282.76	8.289E-03
334.17	8.082E-03
385.58	7.976E-03

FE XIX
2S2 2P4(3P) - 2S 2P5(3P)
ETH = 7.498E+00

X	RO88
1.40	1.310E+00
1.87	1.341E+00
2.33	1.365E+00
2.80	1.393E+00
6.67	1.592E+00
20.00	2.015E+00
33.34	2.247E+00
46.68	2.407E+00
60.01	2.532E+00
73.35	2.633E+00
86.69	2.715E+00
100.02	2.785E+00

FE XIX
2S2 2P4(3P) - 2S 2P5(1P)
ETH = 1.033E+01

X	RO88
1.02	9.009E-02
1.35	9.184E-02
1.69	9.356E-02
2.03	9.479E-02
4.84	9.924E-02
14.51	1.013E-01
24.19	1.032E-01
33.87	1.047E-01
43.54	1.064E-01
53.22	1.076E-01
62.89	1.088E-01
72.57	1.097E-01

FE XIX
2S2 2P4(1D) - 2S2 2P4(1S)
ETH = 1.010E+00

X	R088
10.40	1.570E-02
13.86	1.550E-02
17.33	1.540E-02
20.79	1.530E-02
49.50	1.510E-02
148.51	1.600E-02
247.52	1.660E-02
346.53	1.680E-02
445.54	1.680E-02
544.55	1.660E-02
643.56	1.640E-02
742.57	1.630E-02

FE XIX
2S2 2P4(1D) - 2S 2P5(3P)
ETH = 6.563E+00

X	R088
1.60	8.402E-02
2.13	8.498E-02
2.67	8.572E-02
3.20	8.670E-02
7.62	9.358E-02
22.85	1.051E-01
38.09	1.105E-01
53.33	1.159E-01
68.56	1.203E-01
83.80	1.231E-01
99.04	1.260E-01
114.27	1.288E-01

FE XIX
2S2 2P4(1D) - 2S 2P5(1P)
ETH = 9.400E+00

X	R088
1.12	6.490E-01
1.49	6.680E-01
1.86	6.850E-01
2.23	7.010E-01
5.32	8.060E-01
15.96	1.020E+00
26.60	1.150E+00
37.23	1.230E+00
47.87	1.300E+00
58.51	1.350E+00
69.15	1.390E+00
79.79	1.430E+00

FE XIX
2S2 2P4(1S) - 2S 2P5(3P)
ETH = 5.553E+00

X	R088
1.89	5.917E-02
2.52	6.063E-02
3.15	6.168E-02
3.78	6.273E-02
9.00	6.648E-02
27.01	6.453E-02
45.02	6.225E-02
63.03	6.094E-02
81.03	6.008E-02
99.04	5.938E-02
117.05	5.881E-02
135.05	5.827E-02

FE XIX
2S2 2P4(1S) - 2S 2P5(1P)
ETH = 8.390E+00

X	R088
1.25	3.960E-02
1.67	4.090E-02
2.09	4.220E-02
2.50	4.350E-02
5.96	5.550E-02
17.88	8.830E-02
29.80	1.070E-01
41.72	1.200E-01
53.64	1.300E-01
65.56	1.380E-01
77.48	1.440E-01
89.39	1.500E-01

FE XIX
2S 2P5(3P) - 2S 2P5(1P)
ETH = 2.837E+00

X	R088
3.70	5.052E-02
4.94	4.787E-02
6.17	4.556E-02
7.40	4.337E-02
17.63	3.328E-02
52.98	1.252E-02
88.14	7.519E-03
123.39	5.506E-03
158.65	4.455E-03
193.90	3.890E-03
229.16	3.447E-03
264.41	3.229E-03

FE XX
2S2 2P3(4S) - 2S2 2P3(2D)
ETH = 1.431E+00

X	R088
7.69	7.780E-02
10.48	7.360E-02
17.47	6.480E-02
34.94	4.880E-02
69.98	3.050E-02
209.64	1.030E-02
349.41	6.100E-03

FE XX
2S2 2P3(4S) - 2S2 2P3(2P)
ETH = 2.093E+00

X	R088
5.26	3.420E-02
7.17	3.239E-02
11.94	2.850E-02
23.89	2.173E-02
47.78	1.459E-02
143.33	7.220E-03
238.89	5.830E-03

FE XX
2S2 2P3(4S) - 2S 2P4(4P)
ETH = 6.209E+00

X	R088
1.77	9.740E-01
2.42	8.930E-01
4.03	9.400E-01
8.05	1.047E+00
16.11	1.216E+00
48.32	1.545E+00
80.53	1.709E+00

FE XX
2S2 2P3(4S) - 2S 2P4(2D)
ETH = 8.595E+00

X	R088
1.28	4.468E-02
1.75	4.576E-02
2.91	4.739E-02
5.82	4.763E-02
11.63	4.627E-02
34.90	4.372E-02
58.17	4.260E-02

FE XX
2S2 2P3(4S) - 2S 2P4(2S)
ETH = 1.003E+01

X	R088
1.10	1.080E-02
1.50	1.100E-02
2.49	1.160E-02
4.99	1.230E-02
9.98	1.250E-02
29.93	1.260E-02
49.88	1.260E-02

FE XX
2S2 2P3(4S) - 2S 2P4(2P)
ETH = 1.050E+01

X	R088
1.05	3.030E-02
1.43	3.020E-02
2.38	3.063E-02
4.76	3.059E-02
9.52	3.060E-02
28.56	3.350E-02
47.60	3.600E-02

FE XX
2S2 2P3(2D) - 2S2 2P3(2P)
ETH = 6.620E-01

X	R088
15.62	1.126E-01
22.66	1.099E-01
37.76	1.044E-01
75.53	9.680E-02
151.06	9.112E-02
453.17	8.894E-02
755.29	8.785E-02

FE XX
2S2 2P3(2D) - 2S 2P4(4P)
ETH = 4.778E+00

X	R088
2.30	9.649E-02
3.14	9.818E-02
5.23	1.039E-01
10.46	1.168E-01
20.93	1.344E-01
62.79	1.699E-01
104.65	1.896E-01

FE XX
2S2 2P3(2D) - 2S 2P4(2D)
ETH = 7.164E+00

X	R088
1.54	1.019E+00
2.09	1.049E+00
3.49	1.113E+00
6.98	1.244E+00
13.96	1.452E+00
41.88	1.896E+00
69.79	2.112E+00

FE XX
2S2 2P3(2D) - 2S 2P4(2S)
ETH = 8.594E+00

X	RO88
1.28	5.950E-04
1.75	6.550E-04
2.91	2.528E-03
5.82	1.843E-02
11.64	5.929E-02
34.91	1.570E-01
58.18	2.070E-01

FE XX
2S2 2P3(2D) - 2S 2P4(2P)
ETH = 9.073E+00

X	RO88
1.21	1.075E+00
1.65	1.109E+00
2.76	1.182E+00
5.51	1.333E+00
11.02	1.598E+00
33.07	2.235E+00
55.11	2.560E+00

FE XX
2S2 2P3(2P) - 2S 2P4(4P)
ETH = 4.116E+00

X	RO88
2.67	7.618E-02
3.64	7.690E-02
6.07	7.339E-02
12.15	7.869E-02
24.30	7.568E-02
72.89	7.307E-02
121.48	7.268E-02

FE XX
2S2 2P3(2P) - 2S 2P4(2D)
ETH = 6.502E+00

X	RO88
1.69	3.610E-01
2.31	3.711E-01
3.84	3.942E-01
7.69	4.293E-01
15.38	4.736E-01
46.14	5.556E-01
76.90	5.950E-01

FE XX
2S2 2P3(2P) - 2S 2P4(2S)
ETH = 7.932E+00

X	RO88
1.39	3.603E-01
1.89	3.713E-01
3.15	3.944E-01
6.30	4.230E-01
12.61	4.480E-01
37.82	4.930E-01
63.04	5.140E-01

FE XX
2S2 2P3(2P) - 2S 2P4(2P)
ETH = 8.411E+00

X	RO88
1.31	3.022E-01
1.78	3.122E-01
2.97	3.380E-01
5.94	4.072E-01
11.89	5.343E-01
35.67	8.215E-01
59.45	9.650E-01

FE XX
2S 2P4(4P) - 2S 2P4(2D)
ETH = 2.386E+00

X	RO88
4.61	1.413E-01
6.29	1.336E-01
10.48	1.172E-01
20.96	8.733E-02
41.91	5.426E-02
125.73	1.871E-02
209.56	1.162E-02

FE XX
2S 2P4(4P) - 2S 2P4(2S)
ETH = 3.816E+00

X	RO88
2.88	1.586E-02
3.93	1.485E-02
6.55	1.274E-02
13.10	8.990E-03
26.21	5.000E-03
78.62	1.111E-03
131.03	4.800E-04

FE XX
2S 2P4(4P) - 2S 2P4(2P)
ETH = 4.295E+00

X	RO88
2.56	3.254E-02
3.49	3.063E-02
5.82	2.657E-02
11.64	1.929E-02
23.28	1.152E-02
69.85	3.479E-03
116.41	1.950E-03

FE XX
2S 2P4(2D) - 2S 2P4(2S)
ETH = 1.430E+00

X	RO88
7.69	4.490E-02
10.49	4.440E-02
17.48	4.360E-02
34.97	4.320E-02
69.93	4.400E-02
209.79	4.710E-02
349.65	4.710E-02

FE XX
2S 2P4(2D) - 2S 2P4(2P)
ETH = 1.909E+00

X	RO88
5.75	7.858E-02
7.86	7.484E-02
13.10	6.677E-02
26.19	5.235E-02
52.38	3.687E-02
157.15	2.076E-02
261.92	1.745E-02

FE XX
2S 2P4(2S) - 2S 2P4(2P)
ETH = 4.790E-01

X	RO88
22.96	1.644E-02
31.32	1.549E-02
52.19	1.346E-02
104.38	9.930E-03
208.77	5.930E-03
626.30	1.938E-03
1043.84	1.179E-03

FE XXI
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 9.670E-01

X	RO88
8.79	9.806E-02
10.34	9.129E-02
15.51	8.646E-02
20.68	8.237E-02
51.71	6.410E-02
103.41	4.823E-02
206.83	3.553E-02
517.06	2.659E-02

FE XXI
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 1.948E+00

X	RO88
4.36	1.369E-02
5.13	1.348E-02
7.70	1.270E-02
10.27	1.197E-02
25.67	8.933E-03
51.33	6.421E-03
102.67	4.566E-03
256.67	3.436E-03

FE XXI
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 5.501E+00

X	RO88
1.55	9.737E-01
1.82	9.979E-01
2.73	9.056E-01
3.64	9.274E-01
9.09	1.057E+00
18.18	1.223E+00
36.36	1.418E+00
90.89	1.698E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 6.468E+00

X	RO88
1.31	6.592E-01
1.55	6.708E-01
2.32	6.886E-01
3.09	7.051E-01
7.73	7.986E-01
15.46	9.234E-01
30.92	1.081E+00
77.30	1.309E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 8.385E+00

X	RO88
1.01	5.672E-01
1.19	5.732E-01
1.79	5.932E-01
2.39	6.104E-01
5.96	6.957E-01
11.93	7.780E-01
23.85	9.050E-01
59.63	1.091E+00

FE XXI
2S2 2P2(1D) - 2S2 2P2(1S)
ETH = 9.910E-01

X	RO88
8.66	2.200E-02
10.19	2.140E-02
15.29	2.130E-02
20.39	2.110E-02
50.97	2.110E-02
101.94	2.170E-02
203.87	2.290E-02
509.68	2.360E-02

FE XXI
2S2 2P2(1D) - 2S 2P3(3D)
ETH = 4.534E+00

X	RO88
1.87	1.274E-01
2.21	1.292E-01
3.31	1.317E-01
4.41	1.351E-01
11.03	1.503E-01
22.06	1.662E-01
44.11	1.831E-01
110.28	2.096E-01

FE XXI
2S2 2P2(1D) - 2S 2P3(3P)
ETH = 5.501E+00

X	RO88
1.55	1.610E-01
1.82	1.637E-01
2.73	1.680E-01
3.64	1.720E-01
9.09	1.896E-01
18.18	2.047E-01
36.36	2.219E-01
90.89	2.496E-01

FE XXI
2S2 2P2(1D) - 2S 2P3(3S)
ETH = 7.418E+00

X	RO88
1.15	6.290E-02
1.35	6.350E-02
2.02	6.620E-02
2.70	6.890E-02
6.74	8.720E-02
13.48	1.110E-01
26.96	1.420E-01
67.40	1.840E-01

FE XXI
2S2 2P2(1S) - 2S 2P3(3D)
ETH = 3.553E+00

X	RO88
2.39	1.672E-02
2.81	1.731E-02
4.22	1.860E-02
5.63	1.988E-02
14.07	2.532E-02
28.15	3.004E-02
56.29	3.487E-02
140.73	4.152E-02

FE XXI
2S2 2P2(1S) - 2S 2P3(3P)
ETH = 4.520E+00

X	RO88
1.88	1.034E-02
2.21	1.024E-02
3.32	9.970E-03
4.42	9.760E-03
11.06	8.820E-03
22.12	7.830E-03
44.25	7.067E-03
110.62	7.290E-03

FE XXI
2S2 2P2(1S) - 2S 2P3(3S)
ETH = 5.437E+00

X	RO88
1.32	9.190E-03
1.55	9.300E-03
2.33	9.670E-03
3.11	1.000E-02
7.77	1.120E-02
15.54	1.200E-02
31.07	1.290E-02
77.68	1.370E-02

FE XXI
2S 2P3(3D) - 2S 2P3(3P)
ETH = 9.670E-01

X	RO88
8.79	1.745E-01
10.34	1.730E-01
15.51	1.689E-01
20.68	1.645E-01
51.71	1.507E-01
103.41	1.429E-01
206.83	1.402E-01
517.06	1.373E-01

FE XXI
2S 2P3(3D) - 2S 2P3(3S)
ETH = 2.884E+00

X	RO88
2.95	2.091E-02
3.47	2.051E-02
5.20	1.929E-02
6.93	1.818E-02
17.34	1.336E-02
34.67	9.090E-03
69.35	5.610E-03
173.37	3.226E-03

FE XXI
2S 2P3(3P) - 2S 2P3(3S)
ETH = 1.917E+00

X	RO88
4.43	9.610E-03
5.22	9.390E-03
7.82	9.750E-03
10.43	9.170E-03
26.08	5.726E-03
52.16	3.628E-03
104.33	1.979E-03
260.82	9.014E-04

FE XXII
2S2 2P(2P) - 2S 2P2(4P)
ETH = 2.843E+00

X	RO88
2.64	6.835E-02
3.52	6.949E-02
4.40	7.039E-02
5.28	7.097E-02
7.03	7.192E-02
14.07	7.348E-02
21.10	7.315E-02
28.14	7.259E-02
35.17	7.218E-02
70.35	7.157E-02
140.70	7.396E-02
211.04	7.654E-02
281.39	7.897E-02
351.74	8.086E-02

FE XXII
2S2 2P(2P) - 2S 2P2(2D)
ETH = 5.293E+00

X	RO88
1.42	5.897E-01
1.89	6.084E-01
2.36	6.190E-01
2.83	6.277E-01
3.78	6.490E-01
7.56	7.322E-01
11.34	7.879E-01
15.11	8.390E-01
18.89	8.783E-01
37.79	1.011E+00
75.57	1.155E+00
113.36	1.239E+00
151.14	1.299E+00
188.93	1.345E+00

FE XXII
2S2 2P(2P) - 2S 2P2(2S)
ETH = 6.781E+00

X	RO88
1.11	2.565E-01
1.47	2.617E-01
1.84	2.689E-01
2.21	2.741E-01
2.95	2.856E-01
5.90	3.244E-01
8.85	3.498E-01
11.80	3.698E-01
14.75	3.977E-01
29.49	4.467E-01
58.99	5.088E-01
88.48	5.467E-01
117.98	5.731E-01
147.47	5.931E-01

FE XXII
2S2 2P(2P) - 2S 2P2(2P)
ETH = 7.216E+00

X	RO88
1.04	8.780E-01
1.39	8.979E-01
1.73	9.171E-01
2.08	9.365E-01
2.77	9.717E-01
5.54	1.097E+00
8.31	1.186E+00
11.09	1.254E+00
13.86	1.317E+00
27.72	1.528E+00
55.43	1.760E+00
83.15	1.889E+00
110.86	1.984E+00
138.58	2.060E+00

FE XXIII
2S2(1S) - 2S 2P(3P)
ETH = 3.255E+00

X	RO88
3.69	2.257E-02
4.61	2.275E-02
6.14	2.289E-02
15.36	2.271E-02
30.72	2.159E-02
92.17	1.983E-02
153.61	1.966E-02
-	-
-	-
-	-
-	-
-	-
-	-
-	-

FE XXIII
2S2(1S) - 2S 2P(1P)
ETH = 6.170E+00

X	RO88
1.94	3.140E-01
2.43	3.200E-01
3.24	3.280E-01
8.10	3.770E-01
16.21	4.410E-01
48.62	5.660E-01
81.04	6.290E-01
-	-
-	-
-	-
-	-
-	-
-	-

FE XXIII
2S2(1S) - 2P2(3P)
ETH = 8.295E+00

X	RDBB
1.45	5.608E-03
1.81	5.540E-03
2.41	5.470E-03
6.03	5.160E-03
12.06	4.821E-03
36.17	4.336E-03
60.28	4.145E-03

FE XXIII
2S2(1S) - 2P2(1D)
ETH = 9.263E+00

X	RDBB
1.30	1.200E-03
1.62	1.190E-03
2.16	1.170E-03
5.40	1.130E-03
10.80	1.140E-03
32.39	1.220E-03
53.98	1.230E-03

FE XXIII
2S2(1S) - 2P2(1S)
ETH = 1.131E+01

X	RDBB
1.06	3.720E-04
1.33	3.700E-04
1.77	3.640E-04
4.42	3.440E-04
8.84	3.740E-04
26.53	7.470E-04
44.21	9.610E-04

FE XXIII
2S 2P(3P) - 2S 2P(1P)
ETH = 2.915E+00

X	RDBB
4.12	3.315E-02
5.15	3.092E-02
6.86	2.910E-02
17.15	2.097E-02
34.31	1.380E-02
102.92	5.199E-03
171.53	3.198E-03

FE XXIII
2S 2P(3P) - 2P2(3P)
ETH = 5.040E+00

X	RDBB
2.38	1.305E+00
2.98	1.339E+00
3.97	1.377E+00
9.92	1.581E+00
19.84	1.825E+00
59.52	2.274E+00
99.21	2.496E+00

FE XXIII
2S 2P(3P) - 2P2(1D)
ETH = 6.008E+00

X	RDBB
2.00	1.910E-01
2.50	1.932E-01
3.33	1.853E-01
8.32	2.031E-01
16.64	2.290E-01
49.93	2.813E-01
83.22	3.038E-01

FE XXIII
2S 2P(3P) - 2P2(1S)
ETH = 8.054E+00

X	RDBB
1.49	2.233E-03
1.86	2.147E-03
2.48	2.033E-03
6.21	1.553E-03
12.42	1.114E-03
37.25	6.840E-04
62.08	6.560E-04

FE XXIII
2S 2P(1P) - 2P2(3P)
ETH = 2.125E+00

X	RDBB
5.65	2.006E-01
7.06	2.084E-01
9.41	2.154E-01
23.53	2.501E-01
47.06	2.836E-01
141.18	3.455E-01
235.29	3.741E-01

FE XXIII
2S 2P(1P) - 2P2(1D)
ETH = 3.093E+00

X	RDBB
3.88	6.850E-01
4.85	7.050E-01
6.47	7.220E-01
16.17	8.350E-01
32.33	9.670E-01
96.99	1.210E+00
161.66	1.330E+00

FE XXIII
2S 2P(1P) - 2P2(1S)
ETH = 5.139E+00

X	RDBB
2.34	2.760E-01
2.92	2.840E-01
3.89	2.960E-01
9.73	3.360E-01
19.46	3.810E-01
58.38	4.750E-01
97.30	5.210E-01

FE XXIII
2P2(3P) - 2P2(1D)
ETH = 9.680E-01

X	RDBB
12.40	8.971E-02
15.50	8.578E-02
20.66	8.190E-02
51.65	6.509E-02
103.31	5.067E-02
309.92	3.350E-02
516.53	2.899E-02

FE XXIII
2P2(3P) - 2P2(1S)
ETH = 3.014E+00

X	RDBB
3.98	1.416E-02
4.98	1.385E-02
6.64	1.421E-02
16.59	1.094E-02
33.18	8.980E-03
99.54	6.950E-03
165.89	6.447E-03

FE XXIII
2P2(1D) - 2P2(1S)
ETH = 2.046E+00

X	RDBB
5.87	2.000E-02
7.33	1.990E-02
9.78	1.980E-02
24.44	1.980E-02
48.88	2.040E-02
146.63	2.160E-02
244.38	2.150E-02
-	-
-	-
-	-
-	-
-	-
-	-
-	-

FE XXIV
1S2 2S - 1S2 2P
ETH = 3.451E+00

X	RDBB CCX
1.01	4.673E-01
2.03	4.860E-01
2.90	4.934E-01
7.24	5.628E-01
11.59	6.146E-01
15.94	6.536E-01
20.28	6.858E-01
24.63	7.136E-01
28.98	7.377E-01
43.47	8.008E-01
57.95	8.479E-01
72.44	8.845E-01
86.93	9.143E-01
101.42	9.394E-01

MO XXXVIII
2S2 2P(2P) - 2S 2P2(4P)
ETH = 4.830E+00

X	RDBB
2.59	1.073E-01
3.88	1.123E-01
5.18	1.173E-01
6.47	1.202E-01
7.76	1.229E-01
12.94	1.346E-01
25.88	1.529E-01
38.82	1.644E-01
51.76	1.724E-01
103.52	1.953E-01
155.29	2.088E-01
207.05	2.191E-01
-	-
-	-

MO XXXVIII
2S2 2P(2P) - 2S 2P2(2D)
ETH = 8.895E+00

X	RO88
1.41	2.042E-01
2.11	2.064E-01
2.81	2.097E-01
3.51	2.072E-01
4.22	2.072E-01
7.03	2.129E-01
14.05	2.339E-01
21.08	2.556E-01
28.11	2.731E-01
56.21	3.258E-01
84.32	3.591E-01
112.42	3.829E-01

MO XXXVIII
2S2 2P(2P) - 2S 2P2(2S)
ETH = 1.140E+01

X	RO88
1.10	8.382E-02
1.65	8.491E-02
2.19	8.572E-02
2.74	8.612E-02
3.29	8.590E-02
5.48	8.678E-02
10.97	9.124E-02
16.45	9.772E-02
21.94	1.032E-01
43.87	1.202E-01
65.81	1.312E-01
87.74	1.392E-01

MO XXXVIII
2S2 2P(2P) - 2S 2P2(2P)
ETH = 1.202E+01

X	RO88
1.04	3.029E-01
1.56	3.088E-01
2.08	3.147E-01
2.60	3.194E-01
3.12	3.251E-01
5.20	3.474E-01
10.40	4.055E-01
15.60	4.619E-01
20.80	5.041E-01
41.59	6.286E-01
62.39	7.070E-01
83.19	7.633E-01

MO XXXVIII
2S 2P2(4P) - 2S 2P2(2D)
ETH = 4.065E+00

X	RO88
4.61	4.982E-02
6.15	4.850E-02
7.69	4.737E-02
9.22	4.639E-02
15.37	4.321E-02
30.75	3.712E-02
46.12	3.295E-02
61.50	2.995E-02
122.99	2.391E-02
184.49	2.148E-02
245.98	2.026E-02

MO XXXVIII
2S 2P2(4P) - 2S 2P2(2S)
ETH = 6.567E+00

X	RO88
2.85	5.979E-03
3.91	5.841E-03
4.76	5.729E-03
5.71	5.606E-03
8.52	5.224E-03
19.03	4.499E-03
28.55	4.005E-03
38.07	3.663E-03
76.14	2.981E-03
114.20	2.717E-03
152.27	2.584E-03

MO XXXVIII
2S 2P2(4P) - 2S 2P2(2P)
ETH = 7.191E+00

X	RO88
2.61	1.219E-02
3.48	1.177E-02
4.35	1.145E-02
5.21	1.114E-02
8.69	1.014E-02
17.38	8.171E-03
26.07	6.793E-03
34.76	5.779E-03
69.53	3.708E-03
104.29	2.847E-03
139.06	2.434E-03

MO XXXVIII
2S 2P2(2D) - 2S 2P2(2S)
ETH = 2.502E+00

X	RO88
7.49	1.130E-02
9.99	1.119E-02
12.49	1.110E-02
14.99	1.099E-02
24.98	1.068E-02
49.96	1.018E-02
74.94	9.910E-03
99.92	9.780E-03
199.85	9.660E-03
299.77	9.690E-03
399.70	9.670E-03

MO XXXVIII
2S 2P2(2D) - 2S 2P2(2P)
ETH = 3.126E+00

X	RO88
6.00	2.812E-02
8.00	2.751E-02
10.00	2.695E-02
12.00	2.641E-02
19.99	2.460E-02
39.99	2.116E-02
59.98	1.881E-02
79.98	1.714E-02
159.95	1.364E-02
239.93	1.217E-02
319.91	1.137E-02

MO XXXVIII
2S 2P2(2S) - 2S 2P2(2P)
ETH = 6.240E-01

X	RO88
30.05	7.390E-03
40.06	7.220E-03
50.08	7.090E-03
60.10	6.970E-03
100.16	6.580E-03
200.32	5.910E-03
300.48	5.458E-03
400.64	5.160E-03
801.28	4.622E-03
1201.92	4.429E-03
1602.56	4.325E-03

DATA OF S. NAKAZAKI AND T. HASHINO — PLOT SYMBOL 6

C III
2S2(1S) - 2S 2P(1P)
ETH = 9.540E-01
REF. 3

X	NAKAZAKI
1.00	6.310E+00
3.85	8.800E+00
7.70	1.071E+01
11.56	1.196E+01
15.40	1.288E+01
38.50	1.594E+01
77.00	1.823E+01
154.00	2.052E+01
308.00	2.277E+01

N IV
2S2(1S) - 2S 2P(1P)
ETH = 1.200E+00
REF. 3

X	NAKAZAKI
1.00	4.710E+00
3.07	5.820E+00
6.14	6.900E+00
9.22	7.670E+00
12.28	8.240E+00
30.70	1.022E+01
61.40	1.173E+01
122.80	1.323E+01
245.60	1.472E+01

O V
2S2(1S) - 2S 2P(1P)
ETH = 1.450E+00
REF. 3

X	NAKAZAKI
1.00	3.530E+00
2.54	5.080E+00
5.08	4.740E+00
7.61	5.230E+00
10.16	5.600E+00
25.40	6.950E+00
50.80	7.990E+00
101.60	9.050E+00
203.20	1.008E+01

NE VII
2S2(1S) - 2S 2P(1P)
ETH = 1.950E+00
REF. 3

X	NAKAZAKI
1.00	2.190E+00
1.88	2.360E+00
3.76	2.650E+00
5.65	2.880E+00
7.52	3.070E+00
18.80	3.790E+00
37.60	4.380E+00
75.20	4.980E+00
150.40	5.570E+00

DATA OF UCL (UNIVERSITY COLLEGE OF LONDON CODE) — PLOT SYMBOL 8

JACKSON,EISSNER,DERE,MASON,WILDING,BHATIA,STOREY,SEATON,HUMMER AND NORCROSS

BE II
2S - 2P
ETH = 3.330E-01
REF. 12

X	SEATON
1.00	1.260E+01
3.33	2.441E+01
4.00	2.715E+01
6.67	3.607E+01

C III
2S2 - 2S 2P(3P)
ETH = 4.860E-01
REF. 5

X	EISSNER
2.44	6.900E-01
3.06	6.140E-01
5.12	4.440E-01
-	-

C III
2S2 - 2S 2P(1P)
ETH = 1.033E+00
REF. 5

X	EISSNER
1.15	3.567E+00
1.44	3.669E+00
2.41	4.974E+00
-	-

C III
2S 2P(3P) - 2S 2P(1P)
ETH = 5.460E-01
REF. 5

X	EISSNER
2.17	2.199E+00
2.72	1.676E+00
4.55	1.100E+00

C III
2S 2P(3P) - 2P2(3P)
ETH = 7.840E-01
REF. 5

X	EISSNER
1.90	2.213E+01
3.17	2.975E+01
-	-

C III
2S 2P(1P) - 2P2(1D)
ETH = 4.280E-01
REF. 5

X	EISSNER
3.47	1.664E+01
5.81	2.[illegible]6E+01
-	-

O III
2S2 2P2(3P) - 2S 2P(5S)
ETH = 5.480E-01
REF. 4

X	JACKSON
1.00	1.360E+00
-	-
-	-

O III
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 1.997E-01
REF. 10

X	BHATIA
20.03	1.298E+00
30.05	8.400E-01
40.06	5.808E-01

O III
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 3.612E-01
REF. 10

X	BHATIA
11.07	1.910E-01
16.61	1.173E-01
22.15	7.619E-02

O III
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 4.541E-01
REF. 10

X	BHATIA
8.81	4.216E-01
13.21	3.044E-01
17.62	2.285E-01

O III
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 1.115E+00
REF. 10

X	BHATIA
3.59	1.289E+01
5.38	1.475E+01
7.17	1.506E+01

O III
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 1.315E+00
REF. 10

X	BHATIA
3.04	1.146E+01
4.56	1.352E+01
6.08	1.396E+01

O III
2S2 2P2(3P) - 2S 2P3(1D)
ETH = 1.838E+00
REF. 10

X	BHATIA
2.18	2.854E-01
3.26	1.970E-01
4.35	1.413E-01

O III
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 1.900E+00
REF. 10

X	BHATIA
2.10	5.690E+00
3.16	7.374E+00
4.21	8.012E+00

O III
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 2.038E+00
REF. 10

X	BHATIA
1.96	1.179E-01
2.94	7.927E-02
3.93	5.647E-02

O III
2S2 2P2(1D) - 2S2 2P2(1S)
ETH = 1.615E-01
REF. 10

X	BHATIA
24.77	3.815E-01
37.15	4.068E-01
49.53	4.221E-01

O III
2S2 2P2(1D) - 2S 2P3(3D)
ETH = 9.155E-01
REF. 10

X	BHATIA
4.37	7.229E-01
6.55	5.089E-01
8.74	3.744E-01

O III
2S2 2P2(1D) - 2S 2P3(3P)
ETH = 1.115E+00
REF. 10

X	BHATIA
3.59	1.802E-01
5.38	1.199E-01
7.17	8.592E-02

O III
2S2 2P2(1D) - 2S 2P3(1D)
ETH = 1.639E+00
REF. 10

X	BHATIA
2.44	8.391E+00
3.66	1.061E+01
4.88	1.130E+01

O III
2S2 2P2(1D) - 2S 2P3(3S)
ETH = 1.701E+00
REF. 10

X	BHATIA
2.35	1.360E-02
3.53	7.900E-03
4.70	4.526E-03

O III
2S2 2P2(1D) - 2S 2P3(1P)
ETH = 1.838E+00
REF. 10

X	BHATIA
2.18	4.261E+00
3.26	5.522E+00
4.35	5.977E+00

O III
2S2 2P2(1S) - 2S 2P3(3D)
ETH = 7.540E-01
REF. 10

X	BHATIA
5.31	4.300E-03
7.96	1.485E-03
10.61	6.510E-04

O III
2S2 2P2(1S) - 2S 2P3(3P)
ETH = 9.537E-01
REF. 10

X	BHATIA
4.19	2.190E-01
6.29	1.576E-01
8.39	1.166E-01

O III
2S2 2P2(1S) - 2S 2P3(1D)
ETH = 1.477E+00
REF. 10

X	BHATIA
2.71	1.200E-02
4.06	1.160E-02
5.42	1.073E-02

O III
2S2 2P2(1S) - 2S 2P3(3S)
ETH = 1.539E+00
REF. 10

X	BHATIA
2.60	7.000E-05
3.90	7.300E-05
5.20	6.900E-05

O III
2S2 2P2(1S) - 2S 2P3(1P)
ETH = 1.677E+00
REF. 10

X	BHATIA
2.39	1.548E+00
3.58	1.980E+00
4.77	2.113E+00

NE V
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 2.869E-01
REF. 11

X	BHATIA
17.43	9.101E-01
34.86	4.533E-01
52.29	2.832E-01

NE V
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 5.402E-01
REF. 11

X	BHATIA
9.26	1.216E-01
18.51	6.200E-02
27.77	3.554E-02

NE V
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 6.985E-01
REF. 11

X	BHATIA
7.16	2.438E-01
14.32	1.569E-01
21.47	1.073E-01

NE V
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 1.617E+00
REF. 11

X	BHATIA
3.09	7.176E+00
6.19	9.402E+00
9.28	9.380E+00

NE V
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 1.904E+00
REF. 11

X	BHATIA
2.63	6.440E+00
5.25	7.665E+00
7.88	8.644E+00

NE V
2S2 2P2(3P) - 2S 2P3(1D)
ETH = 2.593E+00
REF. 11

X	BHATIA
1.93	1.481E-01
3.86	9.180E-02
5.78	6.103E-02

NE V
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 2.651E+00
REF. 11

X	BHATIA
1.89	3.983E+00
3.77	4.963E+00
5.66	5.601E+00

NE V
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 2.880E+00
REF. 11

X	BHATIA
1.74	6.253E-02
3.47	3.825E-02
5.21	2.527E-02

NE V
2S2 2P2(1D) - 2S 2P3(1P)
ETH = 2.533E-01
REF. 11

X	BHATIA
19.74	1.969E-01
39.47	2.143E-01
59.21	2.239E-01

NE V
2S2 2P2(1D) - 2S 2P3(5S)
ETH = 4.117E-01
REF. 11

X	BHATIA
12.15	3.000E-05
24.29	2.000E-05
36.44	1.000E-05

NE V
2S2 2P2(1D) - 2S 2P3(3D)
ETH = 1.330E+00
REF. 11

X	BHATIA
3.76	3.997E-01
7.52	2.523E-01
11.28	1.702E-01

NE V
2S2 2P2(1D) - 2S 2P3(3P)
ETH = 1.617E+00
REF. 11

X	BHATIA
3.09	9.840E-02
6.19	5.928E-02
9.28	3.922E-02

NE V
2S2 2P2(1D) - 2S 2P3(1D)
ETH = 2.306E+00
REF. 11

X	BHATIA
2.17	5.374E+00
4.34	6.676E+00
6.50	7.541E+00

NE V
2S2 2P2(1D) - 2S 2P3(3S)
ETH = 2.364E+00
REF. 11

X	BHATIA
2.11	5.850E-03
4.23	2.550E-03
6.34	1.280E-03

NE V
2S2 2P2(1D) - 2S 2P3(1P)
ETH = 2.593E+00
REF. 11

X	BHATIA
1.93	2.758E+00
3.86	3.472E+00
5.78	3.991E+00

NE V
2S2 2P2(1S) - 2S 2P3(3D)
ETH = 1.076E+00
REF. 11

X	BHATIA
4.64	1.500E-03
9.29	4.100E-04
13.93	2.200E-04

NE V
2S2 2P2(1S) - 2S 2P3(3P)
ETH = 1.363E+00
REF. 11

X	BHATIA
3.67	1.220E-01
7.33	7.803E-02
11.00	5.276E-02

NE V
2S2 2P2(1S) - 2S 2P3(1D)
ETH = 2.053E+00
REF. 11

X	BHATIA
2.44	4.040E-03
4.87	3.340E-03
7.31	2.810E-03

NE V
2S2 2P2(1S) - 2S 2P3(3S)
ETH = 2.111E+00
REF. 11

X	BHATIA
2.37	1.900E-04
4.74	1.700E-04
7.11	1.500E-04

NE V
2S2 2P2(1S) - 2S 2P3(1P)
ETH = 2.340E+00
REF. 11

X	BHATIA
2.14	1.026E+00
4.27	1.281E+00
6.41	1.461E+00
-	-
-	-
-	-

NE VII
2S2 - 2S 2P(3P)
ETH = 1.014E+00
REF. 13

X	HUMMER
1.09	2.050E-01
1.45	1.800E-01
2.54	1.520E-01
3.62	1.300E-01
36.24	1.760E-02
72.49	6.340E-03

NE VII
2S2 - 2S 2P(1P)
ETH = 2.027E+00
REF. 13

X	HUMMER
1.27	1.910E+00
1.81	1.970E+00
18.13	3.550E+00
36.26	4.190E+00
-	-
-	-

NE VII
2S 2P(3P) - 2P2(3P)
ETH = 1.624E+00
REF. 13

X	HUMMER
2.26	9.390E+00
22.63	1.640E+01
45.26	1.920E+01

MG VI
2S2 2P3(4S) - 2S2 2P3(2D)
ETH = 5.303E-01
REF. 11

X	BHATIA
18.86	4.085E-01
28.29	2.826E-01
37.71	2.054E-01

MG VI
2S2 2P3(4S) - 2S2 2P3(2P)
ETH = 7.524E-01
REF. 11

X	BHATIA
13.29	1.593E-01
19.94	1.020E-01
26.58	6.880E-02

MG VI
2S2 2P3(4S) - 2S 2P4(4P)
ETH = 2.257E+00
REF. 11

X	BHATIA
4.43	5.969E+00
6.65	6.809E+00
8.86	7.306E+00

MG VI
2S2 2P3(4S) - 2S 2P4(2D)
ETH = 3.206E+00
REF. 11

X	BHATIA
3.12	3.600E-03
4.68	1.800E-03
6.24	1.100E-03

MG VI
2S2 2P3(4S) - 2S 2P4(2S)
ETH = 3.736E+00
REF. 11

X	BHATIA
2.68	3.000E-04
4.02	2.000E-04
5.35	2.000E-04

MG VI
2S2 2P3(4S) - 2S 2P4(2P)
ETH = 4.043E+00
REF. 11

X	BHATIA
2.47	9.260E-02
3.71	6.300E-02
4.95	4.700E-02

MG VI
2S2 2P3(2D) - 2S2 2P3(2P)
ETH = 2.221E-01
REF. 11

X	BHATIA
45.03	8.633E-01
67.54	8.203E-01
90.05	7.980E-01

MG VI
2S2 2P3(2D) - 2S 2P4(4P)
ETH = 1.726E+00
REF. 11

X	BHATIA
5.79	2.115E-01
8.69	1.585E-01
11.59	1.153E-01

MG VI
2S2 2P3(2D) - 2S 2P4(2D)
ETH = 2.675E+00
REF. 11

X	BHATIA
3.74	7.091E+00
5.61	7.845E+00
7.48	8.439E+00

MG VI
2S2 2P3(2D) - 2S 2P4(2S)
ETH = 3.206E+00
REF. 11

X	BHATIA
3.12	4.600E-03
4.68	3.200E-02
6.24	3.400E-02

MG VI
2S2 2P3(2D) - 2S 2P4(2P)
ETH = 3.513E+00
REF. 11

X	BHATIA
2.85	5.987E+00
4.27	6.730E+00
5.69	6.983E+00

MG VI
2S2 2P3(2P) - 2S 2P4(4P)
ETH = 1.534E+00
REF. 11

X	BHATIA
6.65	1.701E-01
9.97	1.225E-01
13.30	9.190E-02

MG VI
2S2 2P3(2P) - 2S 2P4(2D)
ETH = 2.453E+00
REF. 11

X	BHATIA
4.08	1.566E+00
6.11	1.695E+00
8.15	1.798E+00

MG VI
2S2 2P3(2P) - 2S 2P4(2S)
ETH = 2.984E+00
REF. 11

X	BHATIA
3.35	2.227E+00
5.03	2.446E+00
6.70	2.621E+00

MG VI
2S2 2P3(2P) - 2S 2P4(2P)
ETH = 3.291E+00
REF. 11

X	BHATIA
3.04	2.222E+00
4.56	2.515E+00
6.08	2.720E+00

S IV
3S2 3P(2P) - 3S 3P2(4P)
ETH = 5.413E-01
REF. 11

X	BHATIA
3.69	6.221E-01
7.39	3.532E-01
11.08	2.310E-01

S IV
3S2 3P(2P) - 3S 3P2(2D)
ETH = 8.233E-01
REF. 11

X	BHATIA
2.43	7.905E+00
4.86	8.827E+00
7.29	9.788E+00

S IV
3S2 3P(2P) - 3S 3P2(2S)
ETH = 1.098E+00
REF. 11

X	BHATIA
1.82	3.394E+00
3.64	4.283E+00
5.47	4.911E+00

S IV
3S2 3P(2P) - 3S 3P2(2P)
ETH = 1.265E+00
REF. 11

X	BHATIA
1.58	2.442E+01
3.16	3.364E+01
4.74	3.916E+01

S IV
3S2 3P(2P) - 3S2 3D(2D)
ETH = 1.601E+00
REF. 11

X	BHATIA
1.25	1.752E+01
2.50	2.644E+01
3.75	3.112E+01

S IV
3S 3P2(4P) - 3S 3P2(2D)
ETH = 2.820E-01
REF. 11

X	BHATIA
7.09	1.435E+00
14.18	6.730E-01
21.27	3.722E-01

S IV
3S 3P2(4P) - 3S 3P2(2S)
ETH = 5.565E-01
REF. 11

X	BHATIA
3.59	1.603E-01
7.19	6.820E-02
10.78	3.320E-02

S IV
3S 3P2(4P) - 3S 3P2(2P)
ETH = 7.241E-01
REF. 11

X	BHATIA
2.76	3.259E-01
5.52	1.479E-01
8.29	7.950E-02

S IV
3S 3P2(4P) - 3S2 3D(2D)
ETH = 1.060E+00
REF. 11

X	BHATIA
1.89	1.907E-01
3.78	9.323E-02
5.66	5.059E-02

S IV
3S 3P2(2D) - 3S 3P2(2S)
ETH = 2.744E-01
REF. 11

X	BHATIA
7.29	2.926E+00
14.58	2.996E+00
21.86	2.976E+00

S IV
3S 3P2(2D) - 3S 3P2(2P)
ETH = 4.421E-01
REF. 11

X	BHATIA
4.52	9.120E-01
9.05	4.565E-01
13.57	2.808E-01

S IV
3S 3P2(2D) - 3S2 3D(2D)
ETH = 7.776E-01
REF. 11

X	BHATIA
2.57	1.836E+00
5.14	1.047E+00
7.72	7.239E-01

S IV
3S 3P2(2S) - 3S 3P2(2P)
ETH = 1.677E-01
REF. 11

X	BHATIA
11.93	2.255E-01
23.86	1.323E-01
35.79	9.080E-02

S IV
3S 3P2(2S) - 3S2 3D(2D)
ETH = 5.032E-01
REF. 11

X	BHATIA
3.97	3.442E-01
7.95	3.547E-01
11.92	3.569E-01

S IV
3S 3P2(2P) - 3S2 3D(2D)
ETH = 3.355E-01
REF. 11

X	BHATIA
5.96	4.157E-01
11.92	3.511E-01
17.88	3.000E-01

AR XIII
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 6.537E-01
REF. 10

X	BHATIA
22.95	1.681E-01
45.89	1.151E-01
68.84	8.390E-02

AR XIII
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 1.294E+00
REF. 10

X	BHATIA
11.59	2.360E-02
23.18	1.510E-02
34.77	1.020E-02

AR XIII
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 1.824E+00
REF. 10

X	BHATIA
8.22	4.860E-02
16.45	3.590E-02
24.67	2.730E-02

AR XIII
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 3.732E+00
REF. 10

X	BHATIA
4.02	2.236E+00
8.04	2.547E+00
12.06	2.778E+00

AR XIII
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 4.384E+00
REF. 10

X	BHATIA
3.42	1.965E+00
6.84	2.242E+00
10.26	2.442E+00

AR XIII
2S2 2P2(3P) - 2S 2P3(1D)
ETH = 5.689E+00
REF. 10

X	BHATIA
2.64	4.880E-02
5.27	4.600E-02
7.91	4.400E-02

AR XIII
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 5.695E+00
REF. 10

X	BHATIA
2.63	1.472E+00
5.27	1.690E+00
7.90	1.868E+00

AR XIII
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 6.334E+00
REF. 10

X	BHATIA
2.37	2.010E-02
4.74	1.960E-02
7.10	1.760E-02

AR XIII
2S2 2P2(1D) - 2S2 2P2(1S)
ETH = 6.405E-01
REF. 10

X	BHATIA
23.42	4.840E-02
46.84	4.990E-02
70.26	5.110E-02

AR XIII
2S2 2P2(1D) - 2S 2P3(5S)
ETH = 1.170E+00
REF. 10

X	BHATIA
12.82	4.000E-04
25.64	3.000E-04
38.45	2.000E-04

AR XIII
2S2 2P2(1D) - 2S 2P3(3D)
ETH = 3.079E+00
REF. 10

X	BHATIA
4.87	9.940E-02
9.74	9.340E-02
14.62	7.310E-02

AR XIII
2S2 2P2(1D) - 2S 2P3(3P)
ETH = 3.730E+00
REF. 10

X	BHATIA
4.02	2.660E-02
8.04	2.200E-02
12.06	1.910E-02

AR XIII
2S2 2P2(1D) - 2S 2P3(1D)
ETH = 5.035E+00
REF. 10

X	BHATIA
2.98	1.927E+00
5.96	2.215E+00
8.94	2.433E+00

AR XIII
2S2 2P2(1D) - 2S 2P3(3S)
ETH = 5.041E+00
REF. 10

X	BHATIA
2.98	1.000E-03
5.95	7.000E-04
8.93	6.000E-04

AR XIII
2S2 2P2(1D) - 2S 2P3(1P)
ETH = 5.681E+00
REF. 10

X	BHATIA
2.64	9.785E-01
5.28	1.123E+00
7.92	1.233E+00

AR XIII
2S2 2P2(1S) - 2S 2P3(3D)
ETH = 2.438E+00
REF. 10

X	BHATIA
6.15	1.300E-03
12.30	1.000E-03
18.46	9.000E-04

AR XIII
2S2 2P2(1S) - 2S 2P3(3P)
ETH = 3.090E+00
REF. 10

X	BHATIA
4.85	2.960E-02
9.71	2.040E-02
14.56	1.700E-02

AR XIII
2S2 2P2(1S) - 2S 2P3(3S)
ETH = 4.401E+00
REF. 10

X	BHATIA
3.41	3.200E-03
6.82	3.700E-03
10.23	4.000E-03

AR XIII
2S2 2P2(1S) - 2S 2P3(1P)
ETH = 5.040E+00
REF. 10

X	BHATIA
2.98	3.887E-01
5.95	4.465E-01
8.93	4.903E-01

AR XIV
2S2 2P(2P) - 2S 2P2(4P)
ETH = 2.016E+00
REF. 6

X	OERE
4.96	8.140E-02
19.84	4.640E-02
39.69	2.570E-02

AR XIV
2S2 2P(2P) - 2S 2P2(2D)
ETH = 3.651E+00
REF. 6

X	OERE
2.74	1.330E+00
10.96	1.696E+00
21.91	1.959E+00

AR XIV
2S2 2P(2P) - 2S 2P2(2S)
ETH = 4.586E+00
REF. 6

X	OERE
2.18	5.177E-01
8.72	6.592E-01
17.45	7.710E-01

AR XIV
2S2 2P(2P) - 2S 2P2(2P)
ETH = 4.988E+00
REF. 6

X	OERE
2.00	2.040E+00
8.02	2.631E+00
16.04	3.098E+00

CA XIV
2S2 2P3(4S) - 2S2 2P3(2D)
ETH = 1.035E+00
REF. 11

X	BHATIA
14.50	1.428E-01
29.00	1.025E-01
43.50	7.700E-02

CA XIV
2S2 2P3(4S) - 2S2 2P3(2P)
ETH = 1.624E+00
REF. 11

X	BHATIA
9.24	5.960E-02
18.48	3.980E-02
27.71	2.790E-02

CA XIV
2S2 2P3(4S) - 2S 2P4(4P)
ETH = 4.785E+00
REF. 11

X	BHATIA
3.14	1.834E+00
6.27	2.051E+00
9.41	2.221E+00

CA XIV
2S2 2P3(4S) - 2S 2P4(2D)
ETH = 6.568E+00
REF. 11

X	BHATIA
2.28	1.800E-03
4.57	1.300E-03
6.85	1.000E-03

CA XIV
2S2 2P3(4S) - 2S 2P4(2S)
ETH = 7.578E+00
REF. 11

X	BHATIA
1.98	2.600E-03
3.96	2.100E-03
5.94	1.700E-03

CA XIV
2S2 2P3(4S) - 2S 2P4(2P)
ETH = 8.049E+00
REF. 11

X	BHATIA
1.86	2.990E-02
3.73	2.450E-02
5.59	2.080E-02

CA XIV
2S2 2P3(2D) - 2S2 2P3(2P)
ETH = 5.891E-01
REF. 11

X	BHATIA
25.46	2.450E-01
50.92	2.210E-01
76.38	2.080E-01

CA XIV
2S2 2P3(2D) - 2S 2P4(4P)
ETH = 3.750E+00
REF. 11

X	BHATIA
4.00	7.470E-02
8.00	5.730E-02
12.00	4.530E-02

CA XIV
2S2 2P3(2D) - 2S 2P4(2D)
ETH = 5.533E+00
REF. 11

X	BHATIA
2.71	2.166E+00
5.42	2.410E+00
8.13	2.605E+00

CA XIV
2S2 2P3(2D) - 2S 2P4(2S)
ETH = 6.544E+00
REF. 11

X	BHATIA
2.29	1.736E-01
4.58	1.918E-01
6.89	2.077E-01

CA XIV
2S2 2P3(2D) - 2S 2P4(2P)
ETH = 7.014E+00
REF. 11

X	BHATIA
2.14	1.822E+00
4.28	2.029E+00
6.42	2.196E+00

CA XIV
2S2 2P3(2P) - 2S 2P4(4P)
ETH = 3.161E+00
REF. 11

X	BHATIA
4.75	5.700E-02
9.49	4.330E-02
14.24	3.380E-02

CA XIV
2S2 2P3(2P) - 2S 2P4(2D)
ETH = 4.944E+00
REF. 11

X	BHATIA
3.03	5.515E-01
6.07	6.029E-01
9.10	6.434E-01

CA XIV
2S2 2P3(2P) - 2S 2P4(2S)
ETH = 5.954E+00
REF. 11

X	BHATIA
2.52	5.550E-01
5.04	6.077E-01
7.56	6.500E-01

CA XIV
2S2 2P3(2P) - 2S 2P4(2P)
ETH = 6.425E+00
REF. 11

X	BHATIA
2.33	9.504E-01
4.67	1.063E+00
7.00	1.144E+00

CA XV
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 7.730E-01
REF. 10

X	BHATIA
19.41	1.406E-01
38.81	1.044E-01
58.22	8.090E-02

CA XV
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 1.521E+00
REF. 10

X	BHATIA
9.86	1.980E-02
19.73	1.380E-02
29.59	4.530E-03

CA XV
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 2.169E+00
REF. 10

X	BHATIA
6.92	4.050E-02
13.83	3.180E-02
20.75	2.560E-02

CA XV
2S2 2P2(3P) - 2S 2P3(3O)
ETH = 4.320E+00
REF. 10

X	BHATIA
3.47	1.734E+00
6.95	1.955E+00
10.42	2.125E+00

CA XV
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 5.085E+00
REF. 10

X	BHATIA
2.95	1.511E+00
5.90	1.702E+00
8.85	1.852E+00

CA XV
2S2 2P2(3P) - 2S 2P3(1O)
ETH = 6.535E+00
REF. 10

X	BHATIA
2.30	5.860E-02
4.59	5.910E-02
6.89	6.020E-02

CA XV
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 6.506E+00
REF. 10

X	BHATIA
2.31	1.163E+00
4.61	1.319E+00
6.92	1.442E+00

CA XV
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 7.286E+00
REF. 10

X	BHATIA
2.06	2.120E-02
4.12	2.090E-02
6.18	2.090E-02

CA XV
2S2 2P2(1O) - 2S2 2P2(1S)
ETH = 7.478E-01
REF. 10

X	BHATIA
20.06	3.790E-02
40.12	3.860E-02
60.18	3.920E-02

CA XV
2S2 2P2(1O) - 2S 2P3(5S)
ETH = 1.396E+00
REF. 10

X	BHATIA
10.75	8.000E-04
21.49	6.000E-04
32.24	5.000E-04

CA XV
2S2 2P2(1O) - 2S 2P3(3D)
ETH = 3.547E+00
REF. 10

X	BHATIA
4.23	1.012E-01
8.46	9.360E-02
12.69	8.840E-02

CA XV
2S2 2P2(1O) - 2S 2P3(3P)
ETH = 4.313E+00
REF. 10

X	BHATIA
3.48	2.460E-02
6.96	1.930E-02
10.43	1.580E-02

CA XV
2S2 2P2(1O) - 2S 2P3(1O)
ETH = 5.762E+00
REF. 10

X	BHATIA
2.60	1.499E+00
5.21	1.697E+00
7.81	1.853E+00

CA XV
2S2 2P2(1O) - 2S 2P3(3S)
ETH = 5.734E+00
REF. 10

X	BHATIA
2.62	7.000E-04
5.23	6.000E-04
7.85	4.000E-04

CA XV
2S2 2P2(1O) - 2S 2P3(1P)
ETH = 6.513E+00
REF. 10

X	BHATIA
2.30	7.682E-01
4.61	9.655E-01
6.91	9.435E-01

CA XV
2S2 2P2(1S) - 2S 2P3(3D)
ETH = 2.799E+00
REF. 10

X	BHATIA
5.36	1.900E-03
10.72	1.500E-03
16.08	1.300E-03

CA XV
2S2 2P2(1S) - 2S 2P3(3P)
ETH = 3.565E+00
REF. 10

X	BHATIA
4.21	2.220E-02
8.42	1.910E-02
12.62	1.700E-02

CA XV
2S2 2P2(1S) - 2S 2P3(3S)
ETH = 4.986E+00
REF. 10

X	BHATIA
3.01	5.200E-03
6.02	5.900E-03
9.03	6.200E-03

CA XV
2S2 2P2(1S) - 2S 2P3(1P)
ETH = 5.766E+00
REF. 10

X	BHATIA
2.60	3.061E-01
5.20	3.468E-01
7.81	3.787E-01

FE XXI
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 1.410E+00
REF. 10

X	BHATIA
14.18	8.200E-02
35.46	6.310E-02
70.92	4.610E-02

FE XXI
2S2 2P2(3P) - 2S2 2P2(1S)
ETH = 2.506E+00
REF. 10

X	BHATIA
7.98	1.180E-02
19.95	8.700E-03
39.90	6.100E-03

FE XXI
2S2 2P2(3P) - 2S 2P3(5S)
ETH = 3.492E+00
REF. 10

X	BHATIA
5.73	2.890E-02
14.32	2.240E-02
28.63	1.590E-02

FE XXI
2S2 2P2(3P) - 2S 2P3(3D)
ETH = 6.366E+00
REF. 10

X	BHATIA
3.14	9.302E-01
7.85	1.084E+00
15.71	1.252E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(3P)
ETH = 7.656E+00
REF. 10

X	BHATIA
2.61	8.210E-01
6.53	9.536E-01
13.06	1.107E+00

FE XXI
2S2 2P2(3P) - 2S 2P3(1D)
ETH = 9.526E+00
REF. 10

X	BHATIA
2.10	9.320E-02
5.25	1.045E-01
10.50	1.191E-01

FE XXI
2S2 2P2(3P) - 2S 2P3(3S)
ETH = 9.215E+00
REF. 10

X	BHATIA
2.17	6.513E-01
5.43	7.579E-01
10.85	8.826E-01

FE XXI
2S2 2P2(3P) - 2S 2P3(1P)
ETH = 1.082E+01
REF. 10

X	BHATIA
1.85	2.260E-02
4.62	2.430E-02
9.24	2.690E-02

FE XXI
2S2 2P2(1D) - 2S2 2P2(1S)
ETH = 1.095E+00
REF. 10

X	BHATIA
18.24	2.050E-02
45.60	2.010E-02
91.21	1.990E-02

FE XXI
2S2 2P2(1D) - 2S 2P3(5S)
ETH = 2.082E+00
REF. 10

X	BHATIA
9.60	2.300E-03
24.01	1.700E-03
48.02	1.200E-03

FE XXI
2S2 2P2(1D) - 2S 2P3(3D)
ETH = 4.956E+00
REF. 10

X	BHATIA
4.04	1.400E-01
10.09	1.504E-01
20.18	1.624E-01

FE XXI
2S2 2P2(1D) - 2S 2P3(3P)
ETH = 6.246E+00
REF. 10

X	BHATIA
3.20	2.000E-02
8.01	1.540E-02
16.01	1.110E-02

FE XXI
2S2 2P2(1D) - 2S 2P3(1D)
ETH = 8.116E+00
REF. 10

X	BHATIA
2.46	7.823E-01
6.16	9.114E-01
12.32	1.060E+00

FE XXI
2S2 2P2(1D) - 2S 2P3(3S)
ETH = 7.935E+00
REF. 10

X	BHATIA
2.56	2.500E-03
6.41	1.900E-03
12.81	1.500E-03

FE XXI
2S2 2P2(1D) - 2S 2P3(1P)
ETH = 9.407E+00
REF. 10

X	BHATIA
2.13	4.360E-01
5.32	5.016E-01
10.63	5.815E-01

FE XXI
2S2 2P2(1S) - 2S 2P3(3D)
ETH = 3.859E+00
REF. 10

X	BHATIA
5.18	6.800E-03
12.96	7.800E-03
25.91	9.000E-03

FE XXI
2S2 2P2(1S) - 2S 2P3(3P)
ETH = 5.149E+00
REF. 10

X	BHATIA
3.88	1.630E-02
9.71	1.540E-02
19.42	1.490E-02

FE XXI
2S2 2P2(1S) - 2S 2P3(3S)
ETH = 6.709E+00
REF. 10

X	BHATIA
2.98	1.320E-01
7.45	1.520E-02
14.91	1.740E-02
-	-
-	-

FE XXI
2S2 2P2(1S) - 2S 2P3(1P)
ETH = 8.311E+00
REF. 10

X	BHATIA
2.41	1.700E-01
6.02	1.991E-01
12.03	2.325E-01
-	-
-	-

FE XXII
2S2 2P(2P) - 2S 2P2(4P)
ETH = 3.568E+00
REF. 8

X	MASON
2.80	6.990E-02
14.01	6.760E-02
23.82	6.630E-02
42.04	6.620E-02
70.06	6.720E-02

FE XXII
2S2 2P(2P) - 2S 2P2(2D)
ETH = 6.139E+00
REF. 8

X	MASON
1.63	5.748E-01
8.14	7.084E-01
13.85	7.964E-01
24.43	9.248E-01
40.72	1.033E+00

FE XXII
2S2 2P(2P) - 2S 2P2(2S)
ETH = 7.093E+00
REF. 8

X	MASON
1.41	2.673E-01
7.05	3.321E-01
11.98	3.719E-01
21.15	4.246E-01
35.24	4.766E-01

FE XXII
2S2 2P(2P) - 2S 2P2(2P)
ETH = 8.321E+00
REF. 8

X	MASON
1.20	8.582E-01
6.01	1.064E+00
10.22	1.193E+00
18.03	1.369E+00
30.04	1.540E+00

O V
2S2 - 2S 2P(1P)
ETH = 1.447E+00
REF. 14

X	YOUNGER DW
2.00	3.520E+00
5.00	4.510E+00
8.00	5.210E+00
10.00	5.510E+00
16.00	6.160E+00
20.00	6.500E+00

AR VII
3S2 - 3S 3P(1P)
ETH = 1.556E+00
REF. 14

X	YOUNGER DW
2.00	7.340E+00
5.00	9.150E+00
8.00	1.040E+01
10.00	1.100E+01
16.00	1.220E+01
20.00	1.300E+01

AR XV
2S2 - 2S 2P(1P)
ETH = 4.122E+00
REF. 14

X	YOUNGER DW
2.00	6.540E-01
5.00	7.500E-01
8.00	8.260E-01
10.00	8.680E-01
16.00	9.660E-01
20.00	1.020E+00

FE XV
3S2 - 3S 3P(1P)
ETH = 3.207E+00
REF. 14

X	YOUNGER DW
2.00	2.920E+00
5.00	3.350E+00
8.00	3.670E+00
10.00	3.840E+00
16.00	4.310E+00
20.00	4.510E+00

FE XXIII
2S2 - 2S 2P(1P)
ETH = 6.807E+00
REF. 14

X	YOUNGER DW
2.00	3.190E-01
5.00	3.580E-01
8.00	3.900E-01
10.00	4.090E-01
16.00	4.510E-01
20.00	4.740E-01

AS IV
4S2 - 4S 4P(1P)
ETH = 1.038E+00
REF. 14

X	YOUNGER DW
2.00	1.300E+01
5.00	1.850E+01
10.00	2.270E+01
16.00	2.610E+01
20.00	2.800E+01
-	-

KR VII
4S2 - 4S 4P(1P)
ETH = 1.571E+00
REF. 14

X	YOUNGER DW
2.00	9.760E+00
5.00	1.220E+01
8.00	1.400E+01
10.00	1.480E+01
16.00	1.650E+01
20.00	1.740E+01

KR XXV
3S2 - 3S 3P(1P)
ETH = 5.736E+00
REF. 14

X	YOUNGER DW
2.00	1.330E+00
5.00	1.490E+00
8.00	1.610E+00
10.00	1.680E+00
16.00	1.850E+00
20.00	1.940E+00

MO XIII
4S2 - 4S 4P(1P)
ETH = 2.670E+00
REF. 14

X	YOUNGER DW
2.00	5.820E+00
5.00	6.860E+00
8.00	7.530E+00
10.00	7.970E+00
16.00	8.930E+00
20.00	9.320E+00

MO XIV
4S(2S) - 4P(2P)
ETH = 2.330E+00
REF. 14

X	YOUNGER DW
2.00	3.880E+00
5.00	4.350E+00
8.00	4.720E+00
10.00	4.950E+00
16.00	5.410E+00
20.00	5.610E+00

MO XXXI
3S2 - 3S 3P(1P)
ETH = 7.760E+00
REF. 14

X	YOUNGER DW
2.00	8.970E-01
5.00	9.910E-01
8.00	1.080E+00
10.00	1.120E+00
16.00	1.250E+00
20.00	1.290E+00

XE XXV
4S2 - 4S 4P(1P)
ETH = 5.354E+00
REF. 14

X	YOUNGER DW
2.00	2.750E+00
5.00	3.100E+00
8.00	3.370E+00
10.00	3.530E+00
16.00	3.880E+00
20.00	4.090E+00

DATA OF J. PEEK — PLOT SYMBOL 10

C III
2S2 2S 2P(3P)
ETH = 4.777E-01
REF. 15

X	PEEK OWUC
1.00	1.197E+00
1.15	1.140E+00
1.35	1.071E+00
1.55	1.009E+00
1.80	9.395E-01
2.10	8.673E-01
2.40	8.045E-01
2.70	7.495E-01
3.20	6.715E-01
4.20	5.522E-01
5.60	4.359E-01
7.50	3.306E-01
10.00	2.416E-01
13.50	1.663E-01
18.00	1.114E-01
24.00	7.197E-02
-	-
-	-
-	-
-	-
-	-

C III
2S2 2S 2P(1P)
ETH = 9.327E-01
REF. 15

X	PEEK OWUC
1.00	4.102E+00
1.15	4.395E+00
1.35	4.752E+00
1.55	5.082E+00
1.80	5.460E+00
2.10	5.878E+00
2.40	6.254E+00
2.70	6.602E+00
3.20	7.122E+00
4.20	8.011E+00
5.60	8.990E+00
7.50	1.003E+01
10.00	1.107E+01
13.50	1.218E+01
18.00	1.325E+01
24.00	1.430E+01
32.00	1.535E+01
56.00	1.734E+01
100.00	1.939E+01
180.00	2.139E+01
320.00	2.330E+01

O V
2S2 2S 2P(1P)
ETH = 1.447E+00
REF. 15

X	PEEK OWUC
1.00	2.913E+00
1.15	2.999E+00
1.35	3.106E+00
1.55	3.208E+00
1.80	3.329E+00
2.10	3.464E+00
2.40	3.592E+00
2.70	3.711E+00
3.20	3.896E+00
4.20	4.220E+00
5.60	4.597E+00
7.50	5.015E+00
10.00	5.449E+00
13.50	5.920E+00
18.00	6.381E+00
24.00	6.850E+00
32.00	7.322E+00
56.00	8.227E+00
100.00	9.145E+00
180.00	1.004E+01
320.00	1.093E+01

O V
2S2 2S 2P(3P)
ETH = 7.494E-01
REF. 15

X	PEEK OWUC
1.00	3.193E-01
1.15	3.122E-01
1.35	3.031E-01
1.55	2.945E-01
1.80	2.844E-01
2.10	2.730E-01
2.40	2.623E-01
2.70	2.524E-01
3.20	2.371E-01
4.20	2.105E-01
5.60	1.804E-01
7.50	1.487E-01
10.00	1.180E-01
13.50	8.841E-02
18.00	6.403E-02
24.00	4.443E-02
32.00	2.966E-02

NE VIII
2S - 2P
ETH = 1.189E+00
REF. 15

X	PEEK OWX
1.00	3.265E+00
1.01	3.267E+00
1.23	3.317E+00
1.50	3.374E+00
1.84	3.440E+00
2.73	3.610E+00
4.07	3.835E+00
6.06	4.120E+00
11.01	4.661E+00
20.00	5.312E+00
40.00	6.208E+00
100.00	7.310E+00
-	-
-	-
-	-
-	-
-	-

DATA OF M. BLAHA, J. DAVIS AND P. C. KEPPLE — PLOT SYMBOL 11

C II
1S2 2S2 2P - 1S2 2S 2P2(2P)
ETH = 9.920E-01
REF. 16

X	DAVIS
1.00	1.690E+01
1.50	2.480E+01
2.00	3.100E+01
3.00	3.850E+01
4.00	4.400E+01
5.00	4.900E+01

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 9.330E-01
REF. 16

X	DAVIS
1.00	5.800E+00
1.50	7.300E+00
2.00	8.400E+00
3.00	1.020E+01
4.00	1.175E+01
5.00	1.270E+01

C IV
1S2 2S - 1S2 2P
ETH = 5.883E-01
REF. 16

X	DAVIS
1.00	1.100E+01
1.50	1.150E+01
2.00	1.200E+01
3.00	1.300E+01
4.00	1.370E+01
5.00	1.430E+01

O IV
1S2 2S2 2P - 1S2 2S 2P2(2P)
ETH = 1.645E+00
REF. 16

X	OAVIS
1.00	1.500E+01
1.50	1.680E+01
2.00	1.810E+01
3.00	2.080E+01
4.00	2.230E+01
5.00	2.390E+01

O V
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 1.448E+00
REF. 16

X	DAVIS
1.00	4.200E+00
1.50	4.550E+00
2.00	4.950E+00
3.00	5.600E+00
4.00	6.000E+00
5.00	6.400E+00

O VI
1S2 2S - 1S2 2P
ETH = 9.819E-01
REF. 16

X	DAVIS
1.00	5.750E+00
1.50	5.900E+00
2.00	6.000E+00
3.00	6.400E+00
4.00	6.650E+00
5.00	7.000E+00

CA X
3S - 3P
ETH = 1.618E+00
REF. 17

X	BLAHA
1.00	7.340E+00
2.00	7.770E+00
4.00	8.510E+00
8.00	9.650E+00
16.00	1.110E+01

CA X
3S - 3D
ETH = 3.803E+00
REF. 17

X	BLAHA
1.00	7.510E-01
1.50	7.820E-01
2.00	8.050E-01
4.00	8.540E-01
8.00	8.800E-01

CA X
3S - 4S
ETH = 7.589E+00
REF. 17

X	BLAHA
1.00	2.560E-01
1.50	2.590E-01
2.00	2.610E-01
3.00	2.620E-01
4.00	2.620E-01

CA X
3S - 4P
ETH = 8.207E+00
REF. 17

X	BLAHA
1.00	3.560E-02
1.25	4.110E-02
1.50	4.720E-02
2.00	5.990E-02
3.00	8.490E-02

CA X
3S - 4D
ETH = 8.998E+00
REF. 17

X	BLAHA
1.00	5.040E-02
1.25	5.600E-02
1.50	6.090E-02
2.00	6.930E-02
3.00	8.170E-02

CA X
3S - 4F
ETH = 9.260E+00
REF. 17

X	BLAHA
1.00	1.750E-01
1.25	1.800E-01
1.50	1.830E-01
2.00	1.870E-01
3.00	1.880E-01

CA X
3P - 3D
ETH = 2.185E+00
REF. 17

X	BLAHA
1.00	1.190E+01
2.00	1.280E+01
4.00	1.430E+01
8.00	1.640E+01
16.00	1.950E+01

CA X
3P - 4S
ETH = 5.971E+00
REF. 17

X	BLAHA
1.00	1.010E-01
1.50	1.380E-01
2.00	1.710E-01
3.00	2.300E-01
4.00	2.790E-01

CA X
3P - 4P
ETH = 6.598E+00
REF. 17

X	BLAHA
1.00	9.990E-01
1.50	1.000E+00
2.00	1.010E+00
3.00	1.020E+00
4.00	1.020E+00

CA X
3P - 4D
ETH = 7.379E+00
REF. 17

X	BLAHA
1.00	1.820E-01
1.50	2.540E-01
2.00	3.200E-01
3.00	4.360E-01
4.00	5.370E-01

CA X
3P - 4F
ETH = 7.642E+00
REF. 17

X	BLAHA
1.00	8.060E-01
1.50	9.170E-01
2.00	1.000E+00
3.00	1.120E+00
4.00	1.200E+00

FE XVI
3S - 3P
ETH = 2.653E+00
REF. 17

X	BLAHA
1.00	3.710E+00
2.00	3.980E+00
4.00	4.200E+00
8.00	4.670E+00
16.00	5.410E+00

FE XVI
3S - 3D
ETH = 6.172E+00
REF. 17

X	BLAHA
1.00	3.520E-01
1.50	3.580E-01
2.00	3.630E-01
4.00	3.740E-01
8.00	3.790E-01

FE XVI
3S - 4S
ETH = 1.702E+01
REF. 17

X	BLAHA
1.00	1.190E-01
1.25	1.190E-01
1.50	1.190E-01
2.00	1.210E-01
3.00	1.210E-01

FE XVI
3S - 4P
ETH = 1.807E+01
REF. 17

X	BLAHA
1.00	1.850E-02
1.25	2.310E-02
1.50	2.800E-02
2.00	3.750E-02
3.00	5.540E-02

FE XVI
3S - 4D
ETH = 1.936E+01
REF. 17

X	BLAHA
1.00	4.800E-02
1.25	4.910E-02
1.50	5.290E-02
2.00	5.930E-02
3.00	6.880E-02

FE XVI
3S - 4F
ETH = 1.991E+01
REF. 17

X	BLAHA
1.00	9.960E-02
1.25	1.020E-01
1.50	1.030E-01
2.00	1.040E-01
3.00	1.040E-01

FE XVI
3P - 3D
ETH = 3.518E+00
REF. 17

X	BLAHA
1.00	5.640E+00
2.00	5.950E+00
4.00	6.470E+00
8.00	7.300E+00
16.00	8.350E+00

FE XVI
3P - 4S
ETH = 1.437E+01
REF. 17

X	BLAHA
1.00	3.040E-02
1.50	4.170E-02
2.00	5.220E-02
3.00	7.110E-02
4.00	8.720E-02

FE XVI
3P - 4P
ETH = 1.542E+01
REF. 17

X	BLAHA
1.00	4.390E-01
1.50	4.460E-01
2.00	4.500E-01
3.00	4.550E-01
4.00	4.570E-01

FE XVI
3P - 4D
ETH = 1.671E+01
REF. 17

X	BLAHA
1.00	1.650E-01
1.50	2.190E-01
2.00	2.680E-01
3.00	3.530E-01
4.00	4.250E-01

FE XVI
3P - 4F
ETH = 1.726E+01
REF. 17

X	BLAHA
1.00	4.220E-01
1.50	4.700E-01
2.00	5.080E-01
3.00	5.610E-01
4.00	5.970E-01

FE XXIII
2S2 - 2S 2P(1P)
ETH = 6.860E+00
REF. 18

X	BLAHA DW
1.00	4.050E-01
2.00	4.280E-01
4.00	4.660E-01
8.00	5.210E-01
16.00	6.100E-01

FE XXIII
2S2 - 2S 2P(3P)
ETH = 3.878E+00
REF. 18

X	BLAHA OW
1.00	2.217E-02
2.00	2.222E-02
4.00	2.246E-02
8.00	2.262E-02
16.00	2.265E-02

FE XXIII
2S 2P(1P) - 2P2(1S)
ETH = 6.071E+00
REF. 18

X	BLAHA OW
1.00	1.520E-01
2.00	1.590E-01
4.00	1.710E-01
8.00	1.900E-01
16.00	2.170E-01

FE XXIII
2S 2P(1P) - 2P2(1D)
ETH = 4.075E+00
REF. 18

X	BLAHA OW
1.00	7.360E-01
2.00	7.630E-01
4.00	8.130E-01
8.00	8.960E-01
16.00	1.010E+00

FE XXIII
2S 2P(3P) - 2P2(3P)
ETH = 5.631E+00
REF. 18

X	BLAHA DW
1.00	1.325E+00
2.00	1.382E+00
4.00	1.489E+00
8.00	1.654E+00
16.00	1.880E+00

MO XXXII
3S - 3P
ETH = 5.148E+00
REF. 17

X	BLAHA
1.00	1.155E+00
2.00	1.197E+00
4.00	1.282E+00
8.00	1.410E+00
16.00	1.576E+00

MO XXXII
3S - 3D
ETH = 1.379E+01
REF. 17

X	BLAHA
1.00	1.000E-01
1.50	1.010E-01
2.00	1.010E-01
4.00	1.020E-01
8.00	1.010E-01

MO XXXII
3S - 4S
ETH = 6.043E+01
REF. 17

X	BLAHA
1.00	3.400E-02
1.25	3.430E-02
1.50	3.460E-02
2.00	3.490E-02
3.00	3.520E-02

MO XXXII
3P - 3P
ETH = 6.300E+01
REF. 17

X	BLAHA
1.00	7.500E-03
1.25	9.470E-03
1.50	1.140E-02
2.00	1.520E-02
3.00	2.220E-02

MO XXXII
3P - 3D
ETH = 6.580E+01
REF. 17

X	BLAHA
1.00	2.160E-02
1.25	2.320E-02
1.50	2.470E-02
2.00	2.720E-02
3.00	3.090E-02

MO XXXII
3P - 4F
ETH = 6.760E+01
REF. 17

X	BLAHA
1.00	3.270E-02
1.25	3.310E-02
1.50	3.330E-02
2.00	3.350E-02
3.00	3.330E-02

MO XXXII
3P - 3D
ETH = 8.640E+00
REF. 17

X	8LAHA
1.00	1.688E+00
2.00	1.742E+00
4.00	1.873E+00
8.00	2.076E+00
16.00	2.319E+00

MO XXXII
3P - 4S
ETH = 5.430E+01
REF. 17

X	8LAHA
1.00	6.710E-03
1.50	9.130E-03
2.00	1.150E-02
3.00	1.570E-02
4.00	1.930E-02

MO XXXII
3P - 4P
ETH = 5.657E+01
REF. 17

X	8LAHA
1.00	1.170E-01
1.50	1.190E-01
2.00	1.200E-01
3.00	1.220E-01
4.00	1.220E-01

MO XXXII
3P - 4D
ETH = 5.937E+01
REF. 17

X	8LAHA
1.00	8.540E-02
1.50	1.070E-01
2.00	1.270E-01
3.00	1.610E-01
4.00	1.900E-01

MO XXXII
3P - 4F
ETH = 6.118E+01
REF. 17

X	8LAHA
1.00	1.340E-01
1.50	1.470E-01
2.00	1.570E-01
3.00	1.720E-01
4.00	1.820E-01

DATA OF M. S. PINOZOLA — PLOT SYMBOL 12

O III
2S2 2P2(3P) - 2S2 2P2(1D)
ETH = 2.513E+00
REF. 19

X	PINOZOLA
1.04	2.509E+00
1.19	2.520E+00
1.39	2.524E+00
1.59	2.540E+00
1.79	2.560E+00
1.99	2.580E+00
2.39	2.580E+00
3.18	2.593E+00
3.98	2.646E+00
7.96	2.514E+00
11.94	2.183E+00

DATA OF J. CALLAWAY, R. J. W. HENRY AND P. L. OUFTON — PLOT SYMBOL 13

C IV
1S2 2S(2S) - 1S2 2P(2P)
ETH = 5.933E-01
REF. 20

X	CALLAWAY
1.69	1.137E+01
3.71	1.300E+01
6.74	1.476E+01
10.11	1.622E+01
13.48	1.733E+01
20.23	1.884E+01
26.97	1.987E+01

FE XXIV
1S2 2S(2S) - 1S2 2P(2P)
ETH = 4.388E+00
REF. 20

X	CALLAWAY
1.37	4.700E-01
2.28	4.930E-01
3.42	5.080E-01
4.56	5.260E-01
6.84	5.580E-01
9.12	5.860E-01
11.39	6.110E-01

MO X1
1S2 2S(2S) - 1S2 2P(2P)
ETH = 1.265E+01
REF. 20

X	CALLAWAY
1.34	1.717E-01
1.90	1.757E-01
2.53	1.800E-01
3.95	1.889E-01
5.93	2.000E-01
-	-
-	-

DATA OF QUEENS UNIVERSITY-BELFAST (QUB) PLOT SYMBOL 14

K. A. BERRINGTON, P. G. BURKE, P. L. DUFTON AND A. E. KINGSTON

C III
1S2 2S2 - 1S2 2S 2P(3P)
ETH = 4.778E-01
REF. 21

X	BELFAST
3.35	4.864E-01
3.77	4.657E-01
4.19	4.367E-01
4.71	4.049E-01
5.23	3.611E-01

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 9.409E-01
REF. 21

X	BELFAST
1.70	4.781E+00
1.91	5.090E+00
2.13	5.376E+00
2.39	5.616E+00
2.66	5.849E+00

C III
2S 2P(3P) - 2P2(3P)
ETH = 7.820E-01
REF. 21

X	BELFAST
1.44	1.998E+01
1.69	2.145E+01
1.95	2.238E+01
2.27	2.359E+01
2.59	2.460E+01

O V
1S2 2S2 - 1S2 2S 2P(3P)
ETH = 7.470E-01
REF. 21

X	BELFAST
4.02	2.047E-01
4.69	1.902E-01
5.36	1.762E-01
6.02	1.627E-01
7.36	1.302E-01

O V
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 1.457E+00
REF. 21

X	BELFAST
2.06	3.107E+00
2.40	3.234E+00
2.75	3.306E+00
3.09	3.415E+00
3.78	3.536E+00

O V
2S 2P(3P) - 2P2(3P)
ETH = 1.203E+00
REF. 21

X	BELFAST
1.87	1.401E+01
2.29	1.440E+01
2.70	1.480E+01
3.12	1.513E+01
3.95	1.544E+01

DATA OF D. H. SAMPSON, A. O. PARKS, R. E. H. CLARK AND L. B. GOLDEN PLOT SYMBOL 15

SI XI
2S2(1S) - 2S 2P(3P)
ETH = 1.892E+00
REF. 23

X	SAMPSON C
1.00	4.990E-02
5.18	3.965E-02
16.54	2.612E-02
26.89	1.880E-02
78.68	7.602E-03
130.46	5.349E-03
234.02	4.253E-03
337.58	4.015E-03

SI XI
2S2(1S) - 2S 2P(1P)
ETH = 3.536E+00
REF. 23

X	SAMPSON C
3.77	1.380E+00
9.31	1.610E+00
14.86	1.788E+00
42.57	2.291E+00
70.29	2.527E+00
125.72	2.815E+00
181.14	2.983E+00
-	-

SI XI
2S 2P(1P) - 2P2(1S)
ETH = 3.101E+00
REF. 23

X	SAMPSON C
4.16	1.198E+00
10.48	1.401E+00
16.80	1.561E+00
48.40	2.005E+00
80.00	2.211E+00
143.19	2.461E+00
206.39	2.606E+00
-	-

SI XI
2S 2P(1P) - 2P2(1D)
ETH = 1.895E+00
REF. 23

X	SAMPSON C
6.17	3.780E+00
16.52	4.517E+00
26.86	5.015E+00
78.58	6.223E+00
130.31	6.862E+00
233.74	7.544E+00
337.18	7.938E+00
-	-

SI XI
2S 2P(3P) - 2P2(3P)
ETH = 2.937E+00
REF. 23

X	SAMPSON C
4.34	6.091E+00
11.01	7.113E+00
17.69	7.889E+00
51.06	1.003E+01
84.43	1.103E+01
151.17	1.224E+01
217.91	1.295E+01
-	-

SI XI
2S 2P(3P) - 2P2(1S)
ETH = 4.745E+00
REF. 23

X	SAMPSON C
1.00	9.346E-03
3.07	7.047E-03
7.20	4.331E-03
11.33	2.932E-03
31.98	9.121E-04
52.63	5.296E-04
93.94	3.456E-04
135.25	3.028E-04

SI XI
2S 2P(3P) - 2P2(1D)
ETH = 3.538E+00
REF. 23

X	SAMPSON C
3.77	8.455E-02
9.31	6.877E-02
14.85	6.144E-02
42.54	5.502E-02
70.24	5.638E-02
125.64	6.049E-02
181.03	6.348E-02
-	-

SI XI
2S 2P(1P) - 2P2(3P)
ETH = 1.293E+00
REF. 23

X	SAMPSON C
9.50	7.076E-02
23.73	6.640E-02
38.89	6.497E-02
114.67	6.605E-02
190.45	6.975E-02
342.01	7.480E-02
493.57	7.805E-02
-	-

AR XV
2S2(1S) - 2S 2P(3P)
ETH = 2.543E+00
REF. 23

X	SAMPSON C
1.00	2.854E-02
7.37	2.516E-02
20.11	1.844E-02
32.86	1.487E-02
96.57	9.697E-03
159.30	8.977E-03
287.72	8.920E-03
415.15	9.105E-03

AR XV
2S2(1S) - 2S 2P(1P)
ETH = 4.669E+00
REF. 23

X	SAMPSON C
4.47	8.234E-01
11.41	9.688E-01
18.35	1.075E+00
53.06	1.363E+00
87.76	1.498E+00
157.17	1.659E+00
226.57	1.753E+00

AR XV
2S 2P(1P) - 2P2(1S)
ETH = 4.121E+00
REF. 23

X	SAMPSON C
4.93	6.927E-01
12.79	8.179E-01
20.66	9.103E-01
59.97	1.152E+00
99.28	1.271E+00
177.91	1.407E+00
256.53	1.486E+00

AR XV
2S 2P(1P) - 2P2(1D)
ETH = 2.581E+00
REF. 23

X	SAMPSON C
7.28	2.118E+00
19.83	2.549E+00
32.38	2.837E+00
95.13	3.491E+00
157.89	3.934E+00
283.39	4.199E+00
408.90	4.410E+00

AR XV
2S 2P(3P) - 2P2(3P)
ETH = 3.881E+00
REF. 23

X	SAMPSON C
5.17	3.529E+00
13.52	4.159E+00
21.87	4.610E+00
63.61	5.763E+00
105.34	6.360E+00
188.82	7.022E+00
272.29	7.407E+00
-	-

AR XV
2S 2P(3P) - 2P2(1S)
ETH = 6.246E+00
REF. 23

X	SAMPSON C
1.00	5.264E-03
3.59	4.107E-03
8.78	2.635E-03
13.97	1.979E-03
39.90	8.093E-04
65.84	6.215E-04
117.71	5.507E-04
169.58	5.452E-04

AR XV
2S 2P(3P) - 2P2(1D)
ETH = 4.707E+00
REF. 23

X	SAMPSON C
4.44	1.117E-01
11.33	1.151E-01
18.21	1.198E-01
52.63	1.394E-01
87.04	1.511E-01
155.88	1.662E-01
224.71	1.753E-01
-	-

AR XV
2S 2P(1P) - 2P2(3P)
ETH = 1.756E+00
REF. 23

X	SAMPSON C
10.23	1.201E-01
28.68	1.359E-01
47.13	1.467E-01
139.39	1.714E-01
231.65	1.859E-01
416.17	2.015E-01
600.68	2.107E-01

FE XXIII
2S2(1S) - 2S 2P(3P)
ETH = 4.260E+00
REF. 23

X	SAMPSON C
8.93	2.316E-02
24.80	2.303E-02
40.67	2.321E-02
120.00	2.449E-02
199.34	2.598E-02
359.01	2.784E-02
516.69	2.901E-02

FE XXIII
2S2(1S) - 2S 2P(1P)
ETH = 7.493E+00
REF. 23

X	SAMPSON C
5.51	3.893E-01
14.53	4.628E-01
23.56	5.134E-01
68.67	6.380E-01
113.78	7.049E-01
204.00	7.765E-01
294.22	8.180E-01

FE XXIII
2S 2P(1P) - 2P2(1S)
ETH = 6.815E+00
REF. 23

X	SAMPSON C
5.96	2.965E-01
15.88	3.534E-01
25.80	3.929E-01
75.39	4.899E-01
124.98	5.412E-01
224.17	5.961E-01
323.36	6.279E-01

FE XXIII
2S 2P(1P) - 2P2(1D)
ETH = 4.708E+00
REF. 23

X	SAMPSON C
8.18	7.547E-01
22.54	9.118E-01
36.90	1.015E+00
108.70	1.243E+00
180.50	1.361E+00
324.10	1.487E+00
467.70	1.560E+00

FE XXIII
2S 2P(3P) - 2P2(3P)
ETH = 6.050E+00
REF. 23

X	SAMPSON C
6.59	1.500E+00
17.76	1.789E+00
28.93	1.983E+00
84.90	2.441E+00
140.67	2.689E+00
252.40	2.951E+00
364.14	3.103E+00

FE XXIII
2S 2P(3P) - 2P2(1S)
ETH = 1.005E+01
REF. 23

X	SAMPSON C
1.00	2.417E-03
4.36	2.069E-03
11.09	1.467E-03
17.82	1.153E-03
51.46	7.283E-04
85.10	6.690E-04
152.38	6.674E-04
219.65	6.824E-04

FE XXIII
2S 2P(3P) - 2P2(1D)
ETH = 7.940E+00
REF. 23

X	SAMPSON C
5.26	2.286E-01
13.77	2.653E-01
22.28	2.917E-01
64.85	3.588E-01
107.42	3.957E-01
192.56	4.357E-01
277.70	4.590E-01
-	-

FE XXIII
2S 2P(1P) - 2P2(3P)
ETH = 2.818E+00
REF. 23

X	SAMPSON C
13.00	2.653E-01
36.99	3.228E-01
60.98	3.554E-01
180.94	4.293E-01
300.90	4.765E-01
540.82	5.058E-01
780.74	5.284E-01
-	-

MO XXXIX
2S2 - 2S 2P(3P)
ETH • 6.035E+00
REF. 23

X	SAMPSON C8
15.61	2.964E-02
44.84	3.600E-02
74.07	3.885E-02
220.22	4.676E-02
366.37	5.051E-02
658.66	5.449E-02
950.95	5.678E-02

MO XXXIX
2S2 - 2S 2P(1P)
ETH • 1.688E+01
REF. 23

X	SAMPSON C8
6.23	1.231E-01
16.68	1.573E-01
27.13	1.741E-01
79.38	2.158E-01
131.64	2.383E-01
236.15	2.624E-01
340.66	2.763E-01

DATA OF D. E. OSTERBROCK — PLOT SYMBOL 16

C III
1S2 2S2 - 1S2 2S 2P(3P)
ETH • 3.500E-01
REF. 25

X	OSTERBROCK
2.71	6.690E-01
3.00	6.450E-01
3.86	5.940E-01
4.43	5.620E-01

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH • 8.960E-01
REF. 25

X	OSTERBROCK
1.06	5.870E+00
1.17	6.220E+00
1.51	6.780E+00
-	-

N IV
2S2 - 2S 2P(3P)
ETH • 4.590E-01
REF. 25

X	OSTERBROCK
2.53	3.880E-01
2.74	3.820E-01
4.05	3.400E-01
-	-

N IV
2S2 - 2S 2P(1P)
ETH • 1.133E+00
REF. 25

X	OSTERBROCK
1.02	5.080E+00
1.11	5.190E+00
1.64	5.710E+00

O V
2S2 - 2S 2P(3P)
ETH • 5.680E-01
REF. 25

X	OSTERBROCK
2.59	2.490E-01
3.64	2.290E-01
-	-

O V
1S2 2S2 - 1S2 2S 2P(1P)
ETH • 1.366E+00
REF. 25

X	OSTERBROCK
1.51	4.560E+00
-	-
-	-

NE VII
2S2 - 2S 2P(3P)
ETH • 7.830E-01
REF. 25

X	OSTERBROCK
2.53	1.270E-01
3.55	1.190E-01
6.39	1.000E-01

NE VII
2S2 - 2S 2P(1P)
ETH • 1.825E+00
REF. 25

X	OSTERBROCK
1.09	2.910E+00
1.53	2.940E+00
2.74	3.050E+00

DATA OF S. ORMONDE, K. SMITH, B. W. TORRES AND A. R. DAVIES — PLOT SYMBOL 17

N IV
2S2 - 2S 2P(3P)
ETH • 6.130E-01
REF. 26

X	ORMONDE
2.04	4.626E-01
2.45	4.523E-01
2.85	4.424E-01
3.26	4.241E-01
4.49	3.706E-01
5.71	3.160E-01
6.93	2.673E-01
-	-

N IV
2S2 - 2S 2P(1P)
ETH • 1.191E+00
REF. 26

X	ORMONDE
1.05	5.078E+00
1.26	5.072E+00
1.47	5.321E+00
1.68	5.581E+00
2.31	6.299E+00
2.94	6.916E+00
3.57	7.472E+00
-	-

O III
2S2 2P2(3P) - 2S 2P3(3S)
ETH • 1.796E+00
REF. 26

X	ORMONDE
1.03	4.990E+00
1.06	5.010E+00
1.11	5.270E+00
1.25	5.890E+00
1.53	6.920E+00
1.95	8.260E+00
2.37	9.280E+00
2.78	1.020E+01

O III
2S2 2P2(1D) - 2S 2P3(1P)
ETH • 1.732E+00
REF. 26

X	ORMONDE
1.15	2.380E+00
2.02	3.610E+00
2.99	4.460E+00

DATA OF O.H. CRANDALL, P.O. TAYLOR, D.C. GREGORY, G.H. DUNN AND R.A.PHANEUF PLOT SYMBOL 18

C IV
2S(1S) - 2P(1P)
ETH = 5.890E-01
REF. 27

X	TAYLOR
1.05	4.950E+00
1.10	6.870E+00
1.13	7.270E+00
1.16	7.450E+00
1.19	8.380E+00
1.24	9.000E+00
1.31	9.270E+00
1.39	8.500E+00
1.66	9.550E+00
2.84	1.051E+01
5.26	1.225E+01
11.20	1.258E+01
29.13	2.232E+01
41.21	1.471E+01

N V
2S(1S) - 2P(1P)
ETH = 7.348E-01
REF. 28

X	GREGORY
1.04	3.760E+00
1.09	5.220E+00
1.15	5.550E+00
1.20	6.290E+00
1.24	7.650E+00
1.30	8.110E+00
1.39	7.530E+00
1.52	6.660E+00
1.54	7.190E+00
1.68	7.350E+00
2.57	7.330E+00
5.21	7.940E+00
-	-
-	-

DATA OF Y. K. KIM AND K. T. CHENG PLOT SYMBOL 19

C IV
2S - 2P
ETH = 5.940E-01
REF. 30

X	KIM
5.00	1.409E+01
6.00	1.497E+01
7.00	1.551E+01
8.00	1.607E+01
9.00	1.656E+01
10.00	1.699E+01
15.00	1.865E+01
20.00	1.980E+01
40.00	2.258E+01
60.00	2.419E+01
80.00	2.533E+01
100.00	2.622E+01

N V
2S - 2P
ETH = 7.420E-01
REF. 30

X	KIM
5.00	9.724E+00
6.00	1.023E+01
7.00	1.066E+01
8.00	1.102E+01
9.00	1.134E+01
10.00	1.163E+01
15.00	1.271E+01
20.00	1.347E+01
40.00	1.530E+01
60.00	1.635E+01
80.00	1.710E+01
100.00	1.767E+01

O VI
2S - 2P
ETH = 8.890E-01
REF. 30

X	KIM
5.00	7.146E+00
6.00	7.506E+00
7.00	7.806E+00
8.00	8.054E+00
9.00	8.290E+00
10.00	8.491E+00
15.00	9.258E+00
20.00	9.796E+00
40.00	1.109E+01
60.00	1.193E+01
80.00	1.235E+01
100.00	1.276E+01

TI XII
3S - 3P
ETH = 1.959E+00
REF. 29

X	KIM
5.00	6.249E+00
6.00	6.635E+00
7.00	6.944E+00
8.00	7.216E+00
9.00	7.454E+00
10.00	7.657E+00
15.00	8.497E+00
20.00	9.046E+00
40.00	1.041E+01
60.00	1.120E+01
80.00	1.176E+01
100.00	1.219E+01

TI XX
2S - 2P
ETH = 3.356E+00
REF. 30

X	KIM
5.00	8.461E-01
6.00	8.803E-01
7.00	9.089E-01
8.00	9.335E-01
9.00	9.549E-01
10.00	9.741E-01
15.00	1.047E+00
20.00	1.098E+00
40.00	1.220E+00
60.00	1.291E+00
80.00	1.341E+00
100.00	1.379E+00

FE XVI
3S - 3P
ETH = 2.730E+00
REF. 29

X	KIM
5.00	4.051E+00
6.00	4.285E+00
7.00	4.480E+00
8.00	4.648E+00
9.00	4.796E+00
10.00	4.926E+00
15.00	5.426E+00
20.00	5.777E+00
40.00	6.615E+00
60.00	7.102E+00
80.00	7.447E+00
100.00	7.714E+00

FE XXIV
2S - 2P
ETH = 4.400E+00
REF. 30

X	KIM
5.00	5.987E-01
6.00	6.225E-01
7.00	6.423E-01
8.00	6.594E-01
9.00	6.744E-01
10.00	6.876E-01
15.00	7.382E-01
20.00	7.736E-01
40.00	8.592E-01
60.00	9.074E-01
80.00	9.421E-01
100.00	9.691E-01

MO XXXII
3S - 3P
ETH = 7.180E+00
REF. 29

X	KIM
5.00	1.277E+00
6.00	1.344E+00
7.00	1.400E+00
8.00	1.448E+00
9.00	1.491E+00
10.00	1.528E+00
15.00	1.671E+00
20.00	1.772E+00
40.00	2.012E+00
60.00	2.152E+00
80.00	2.251E+00
100.00	2.329E+00

MO XI
2S - 2P
ETH = 1.270E+01
REF. 30

X	KIM
5.00	2.127E-01
6.00	2.210E-01
7.00	2.281E-01
8.00	2.341E-01
9.00	2.394E-01
10.00	2.441E-01
15.00	2.619E-01
20.00	2.744E-01
40.00	3.043E-01
60.00	3.216E-01
80.00	3.338E-01
100.00	3.434E-01

DATA OF H. NUSSBAUMER — PLOT SYMBOL 20

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 9.330E-01
REF. 31

X	NUSSBAUMER
1.26	3.580E+00
1.58	3.660E+00
2.65	5.120E+00

C III
2S 2P(3P) - 2P2(3P)
ETH = 7.750E-01
REF. 31

X	NUSSBAUMER
1.29	2.230E+01
2.58	3.030E+01
-	-

C III
2S 2P(1P) - 2P2(1D)
ETH = 3.960E-01
REF. 31

X	NUSSBAUMER
1.37	1.670E+01
3.99	2.400E+01
-	-

DATA OF O. H. FLOWER, J. M. LAUNAY AND H. NUSSBAUMER — PLOT SYMBOL 21

C III
1S2 2S2 - 1S2 2S 2P(1P)
ETH = 1.033E+00
REF. 33

X	LAUNAY
1.45	3.667E+00
1.94	4.409E+00
2.42	5.034E+00

C III
1S2 2S2 - 1S2 2S 2P(3P)
ETH = 4.850E-01
REF. 33

X	LAUNAY
3.09	6.190E-01
4.12	5.270E-01
5.15	4.470E-01

N V
2S - 2P
ETH = 7.320E-01
REF. 32

X	FLOWER OW
3.07	8.050E+00
8.20	9.940E+00
-	-

O IV
2S2 2P - 2S 2P2(4P)
ETH = 6.500E-01
REF. 35

X	NUSSBAUMER
4.31	7.410E-01
6.46	5.840E-01
8.62	4.810E-01

O IV
2S2 2P - 2S 2P2(2D)
ETH = 1.154E+00
REF. 35

X	NUSSBAUMER
2.43	6.800E+00
3.64	7.142E+00
4.85	7.201E+00

O IV
2S2 2P - 2S 2P2(2S)
ETH = 1.495E+00
REF. 35

X	NUSSBAUMER
1.87	2.430E+00
2.81	2.780E+00
3.75	2.980E+00

O IV
2S2 2P - 2S 2P2(2P)
ETH = 1.644E+00
REF. 35

X	NUSSBAUMER
1.70	7.910E+00
2.56	9.430E+00
3.41	1.043E+01

O IV
2S 2P2(4P) - 2S 2P2(2D)
ETH = 5.040E-01
REF. 35

X	NUSSBAUMER
5.56	2.344E+00
8.33	1.738E+00
11.11	1.302E+00

O IV
2S 2P2(4P) - 2S 2P2(2S)
ETH = 8.450E-01
REF. 35

X	NUSSBAUMER
3.31	3.590E-01
4.97	2.590E-01
6.63	1.890E-01

O IV
2S 2P2(4P) - 2S 2P2(2P)
ETH = 9.940E-01
REF. 35

X	NUSSBAUMER
2.82	4.330E-01
4.23	3.050E-01
5.63	2.180E-01

SI IV
3S - 3P
ETH = 6.520E-01
REF. 34

X	NUSSBAUMER
1.07	1.695E+01
2.30	1.834E+01
3.83	2.094E+01

CA X
3S - 3P
ETH = 1.610E+00
REF. 34

X	NUSSBAUMER
1.05	6.820E+00
2.54	7.190E+00
3.72	7.280E+00

CA X
3S - 3D
ETH = 3.800E+00
REF. 34

X	NUSSBAUMER
1.08	7.000E-01
1.58	7.000E-01

CA X
3P - 3D
ETH = 2.190E+00
REF. 34

X	NUSSBAUMER
1.97	1.100E+01
2.74	1.175E+01

FE XIV
3S2 3P - 3S 3P2(4P)
ETH = 1.693E+00
REF. 32

X	FLOWER
2.48	9.200E-02
3.54	8.500E-01

FE XIV
3S2 3P - 3S 3P(2D)
ETH • 2.370E+00
REF. 32

X	FLOWER
1.77	2.430E+00
2.53	2.410E+00

FE XIV
3S2 3P - 3S 3P(2S)
ETH • 3.038E+00
REF. 32

X	FLOWER
1.38	1.170E+00
1.97	1.200E+00

FE XIV
3S2 3P - 3S 3P(2P)
ETH • 3.386E+00
REF. 32

X	FLOWER
1.24	9.850E+00
1.77	1.014E+01

FE XIV
3S2 3P - 3S2 3D(2D)
ETH • 4.150E+00
REF. 32

X	FLOWER
1.01	8.190E+00
1.45	8.430E+00
-	-

FE XV
3S2 - 3S 3P(1P)
ETH • 3.073E+00
REF. 32

X	FLOWER
1.01	3.330E+00
-	-
-	-

FE XVI
3S - 3P
ETH • 2.640E+00
REF. 34

X	NUSSBAUMER
1.14	3.430E+00
2.46	3.670E+00
3.03	3.650E+00

FE XVI
3S - 3D
ETH • 6.150E+00
REF. 34

X	NUSSBAUMER
1.06	3.200E-01
1.30	3.200E-01

FE XVI
3P - 3D
ETH • 3.500E+00
REF. 34

X	NUSSBAUMER
1.86	5.439E+00
2.29	5.495E+00

DATA OF R. J. W. HENRY, W. L. WYNGAARDEN AND J. N. GAU — PLOT SYMBOL 22

C IV
2S - 2P
ETH • 5.290E-01
REF. 39

X	GAU
1.35	9.300E+00
2.36	1.050E+01
3.72	1.170E+01
6.81	1.350E+01
10.21	1.520E+01
13.61	1.660E+01
27.22	2.010E+01

N V
2S - 2P
ETH • 7.334E-01
REF. 38

X	VAN WYNGAA
1.36	6.900E+00
2.73	7.760E+00
5.45	9.040E+00
9.18	9.650E+00
10.91	1.016E+01
21.82	1.178E+01
-	-

NE VIII
2S - 2P
ETH • 1.170E+00
REF. 37

X	VAN WYNGAA
1.37	3.340E+00
2.74	3.590E+00
4.84	4.230E+00
11.97	4.560E+00
15.38	4.960E+00
25.64	5.600E+00
-	-

AR XVI
2S - 2P
ETH • 2.309E+00
REF. 39

X	GAU
1.36	9.800E-01
2.00	1.020E+00
3.00	1.060E+00
6.00	1.160E+00
23.39	1.330E+00
30.32	1.410E+00
50.24	1.590E+00

FE XXIII
2S2 - 2P2(1D)
ETH • 9.070E+00
REF. 40

X	HENRY UNM
1.10	1.240E-03
2.20	1.210E-03
3.30	1.200E-03
4.40	1.200E-03
6.60	1.210E-03
8.80	1.240E-03
11.00	1.270E-03

FE XXIII
2S2 - 2S 2P(3P)
ETH • 3.121E+00
REF. 40

X	HENRY UNM
3.20	1.240E-02
6.40	1.130E-02
9.60	1.040E-02
12.80	9.530E-03
19.20	8.090E-03
25.60	6.930E-03
32.00	5.990E-03

FE XXIII
2S2 - 2S 2P(1P)
ETH • 6.072E+00
REF. 40

X	HENRY UNM
1.65	3.060E-01
3.30	3.290E-01
4.95	3.490E-01
6.60	3.590E-01
9.90	3.970E-01
13.20	4.220E-01
16.50	4.440E-01

FE XXIII
2S2 - 2P2(3P)
ETH • 8.054E+00
REF. 40

X	HENRY UNM
1.24	5.100E-04
2.48	4.510E-04
3.72	4.010E-04
4.96	3.570E-04
7.44	2.860E-04
9.92	2.320E-04
12.40	1.900E-04

6. COLLISION STRENGTH FITS

6.1. Calculation of Excitation Rates

The rate coefficients can be obtained by numerical integration of the cross-sections (or collision strengths). The tables so obtained are commonly large and require in addition some interpolation formulae. We have chosen to accurately fit the collision strengths in forms that allow integration in terms of known functions for the rate coefficients. The rate coefficients are given in terms of the fit parameters and exponential integrals and simple exponential functions.

The fit forms are rather simple and are the same as those given in LA-6691-MS. However, for the cases where configuration mixing is large, it was convenient to represent the fits as combinations of optically allowed and nonallowed transitions. Computer programs in some applications have been written to accept the rate coefficients in very specific form, e.g., the so-called $\bar{g}$ form. While we do not recommend this form for the rate coefficients, it is straightforward to convert the rates given here to that form.

For convenience we list the form of the fit formulae and the resultant rates below.

Form A - Dipole allowed and Spin Allowed transition

$$\Omega(X) = C_o + \frac{C_1}{X} + \frac{C_2}{X^2} + C_3 \ln X \qquad (1)$$

$$R = C_E \left[\frac{C_o e^{-y}}{y} + \left(C_1 + \frac{C_3}{y}\right) E_1(y) + C_2 E_2(y)\right] \text{cm}^3\text{s}^{-1} \qquad (2)$$

where C_o, C_1, C_2, C_3 are least square fit determined coefficients ($C_3 = 0$ for dipole forbidden transitions)

$y = E_t/T$

$E_n(y)$ = Exponential integral of order n

T = electron temperature (eV)

E_t = threshold energy (eV)

$C_E = 8.010 \times 10^{-8}\ y/[(2L + 1)(2S + 1)T^{1/2}]$

L, S = L, S values of ground state configuration.

Form B - Spin forbidden transitions

$$\Omega(X) = \frac{C_o}{X^2} + \sum_{n=1}^{4} C_n e^{-n\alpha X} \tag{3}$$

$$R = C_E \left[C_o E_2(y) + \sum_{n=1}^{4} \frac{C_n e^{-(n\alpha+y)}}{n\alpha + y}\right] \text{ cm}^3\text{s}^{-1} \tag{4}$$

where α is also determined from the least square fit of the data.

Form D - Mixed spin forbidden and dipole allowed transitions.

$$\Omega(X) = \frac{C_o}{X^2} + \sum_{n=1}^{4} C_n e^{-n\alpha X} + C_5 + \frac{C_6}{X} + C_7 \ln X \tag{5}$$

$$R = C_E \left[C_o E_2(y) + \sum_{n=1}^{4} \frac{C_n e^{-(n\alpha+y)}}{n\alpha + y} + \frac{C_5 e^{-y}}{y} + \left(C_6 + \frac{C_7}{y}\right) E_1(y)\right] \text{ cm}^3\text{s}^{-1} \tag{6}$$

Conversion of these rates to a $\bar{g}$ formula can be accomplished as follows. A typical $\bar{g}$ formula is

$$R = 1.57 \times 10^{-5} \frac{f\,\bar{g}}{E_t T^{\frac{1}{2}}} e^{-E_t/T} \text{ cm}^3\text{s}^{-1}$$

where f is the optical (oscillator strength). By using our rate fit to produce the numbers for R, one can multiply by $T^{\frac{1}{2}}e^{y}$ and remove some of the temperature dependence, and obtain a expression for $\bar{g}$. Knowing the oscillator strength then gives a formula for the $\bar{g}$ rate.

An explanation of the format used in presenting the fits to the collision strengths follows. First however, let us say that for obvious reasons a meaningful fit can be obtained only if there are many more points than fit parameters. Secondly, in some cases the fits to different authors' collision strengths gave essentially the same rate coefficient in which case we do not present both. Thirdly, the data must include points over a reasonable range of energy and must also include a point near threshold. For specific fits to the data not included in Tables II, III, and IV the reader should contact the authors.

Tables II, III and IV contain all the information needed to calculate the excitation rate, namely the element, ion and transition identification (column 1), the threshold energy (column 3) and the coefficients C_o through C_7 and α. Table II contains all the spin allowed and dipole allowed transitions, Table III contains the spin forbidden transitions and Table IV contains the mixed configuration transitions. Note that the coefficients C_5 through C_7 appear on a second line in this last table due to lack of space. In each, the transitions are arranged by increasing Z and increasing ionization stage. Column 2 of each table identifies the author whose data was used for the fit.

6.2. Comments on Single Parameter Scaling

The calculations for many needed transitions have not been done and it does not seem likely to expect many of them to be calculated in the near future. The cases which fall along an isoelectronic sequence may be scaled with sufficient accuracy to be useful in applications. Indeed, for $Z > 3N$, simple Z_{eff}^2 scaling is frequently accurate enough for many applications. Examples of this scaling law can be seen in Figs. 5 through 9, showing the actual calculations and the scaled calculations with different screening constants (Z_{eff} = Z - screening constant). Note that the scaling is, in general, not better than a factor of 2 for lightly ionized ions, especially near threshold.

The relation ($Z \geq 3N$) is such that many ions of interest are eliminated. We show in Appendix B that we can do considerably better, for some cases, especially in the range of N = Z - 1 to Z/3. A good example of this can be seen by comparing Fig. 8, which shows that Z_{eff}^2 scaling is poor for low Z elements, compared with the relatively good agreement for the 3s - 3p transition obtained in Appendix B (Fig. B16).

The nominally optically forbidden transitions deserve special consideration. The effects of increasing Z may introduce considerable intermediate coupling with optically allowed configurations. The result of this mixing is to substantially change the shape of the collision strength as a function of Z. Figure 10 shows this effect graphically. The individual collision strengths can be fit as a function of the scaled energy X. However, to date, no attempt has been made to fit these transitions as a function of Z.

The data used in the isoelectronic sequence plots is listed on page 187, following Fig. 10.

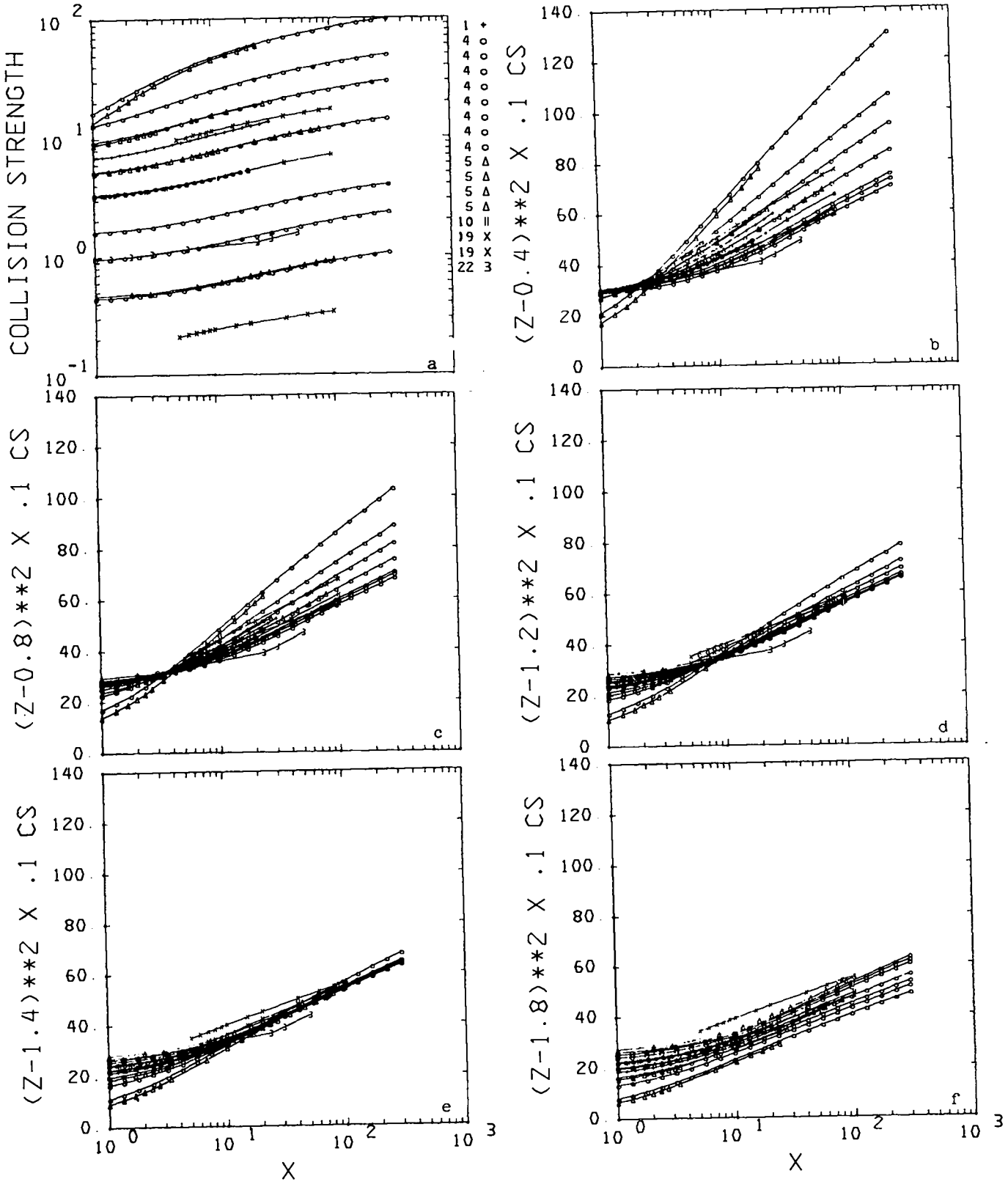


Fig. 5. Lithium isoelectronic sequence ($1s^2$ 2s - $1s^2$ 2p) from Be to Mo. Graph 5a shows the actual collision strengths while 5b - 5f illustrate single parameter scaling of the collision strengths.

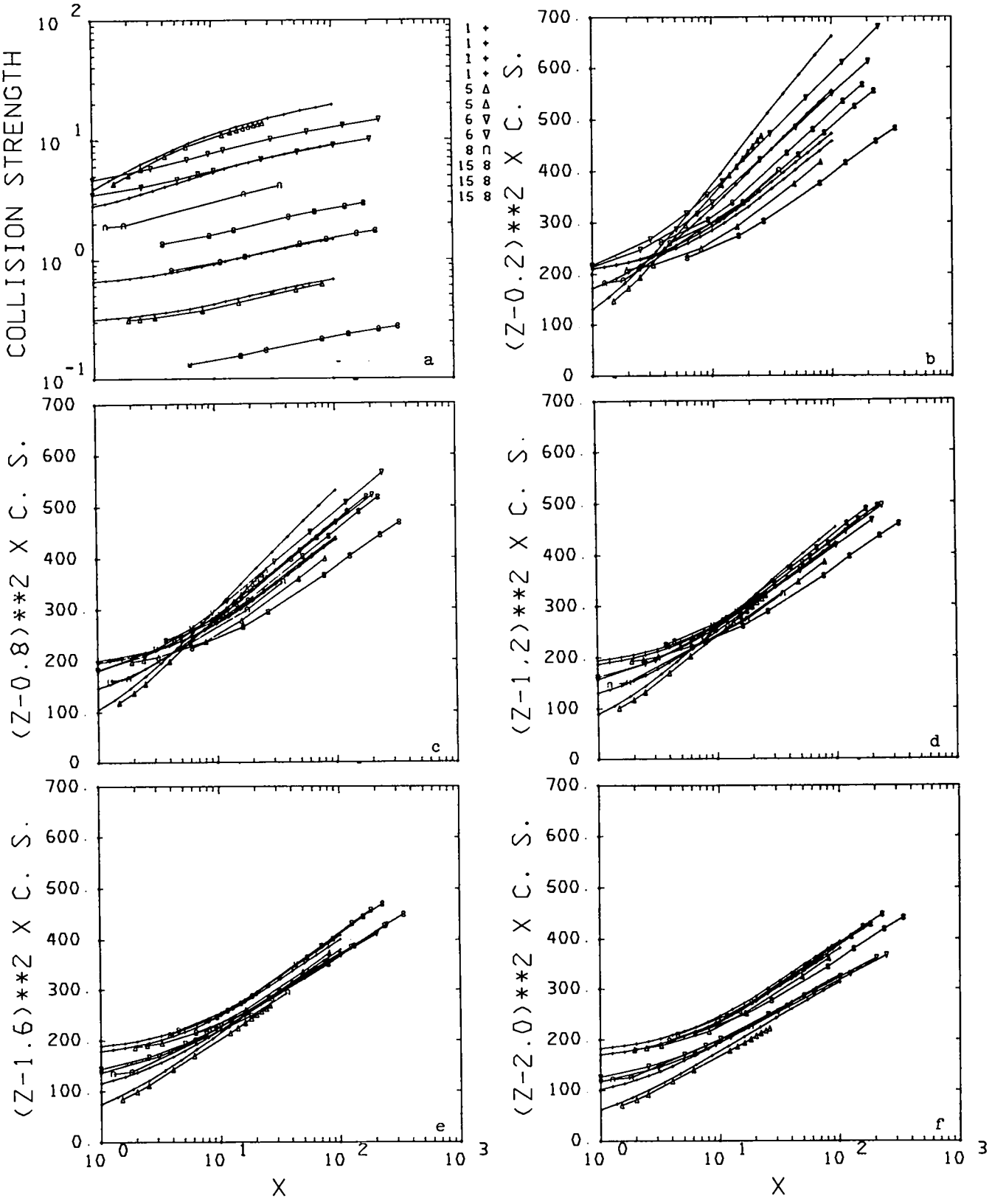


Fig. 6. Beryllium isoelectronic sequence ($2s^2$ - 2s 2p ^{1}p) from C to Fe. Graph 6a shows the actual collision strengths while 6b - 6f illustrate single parameter scaling of the collision strengths.

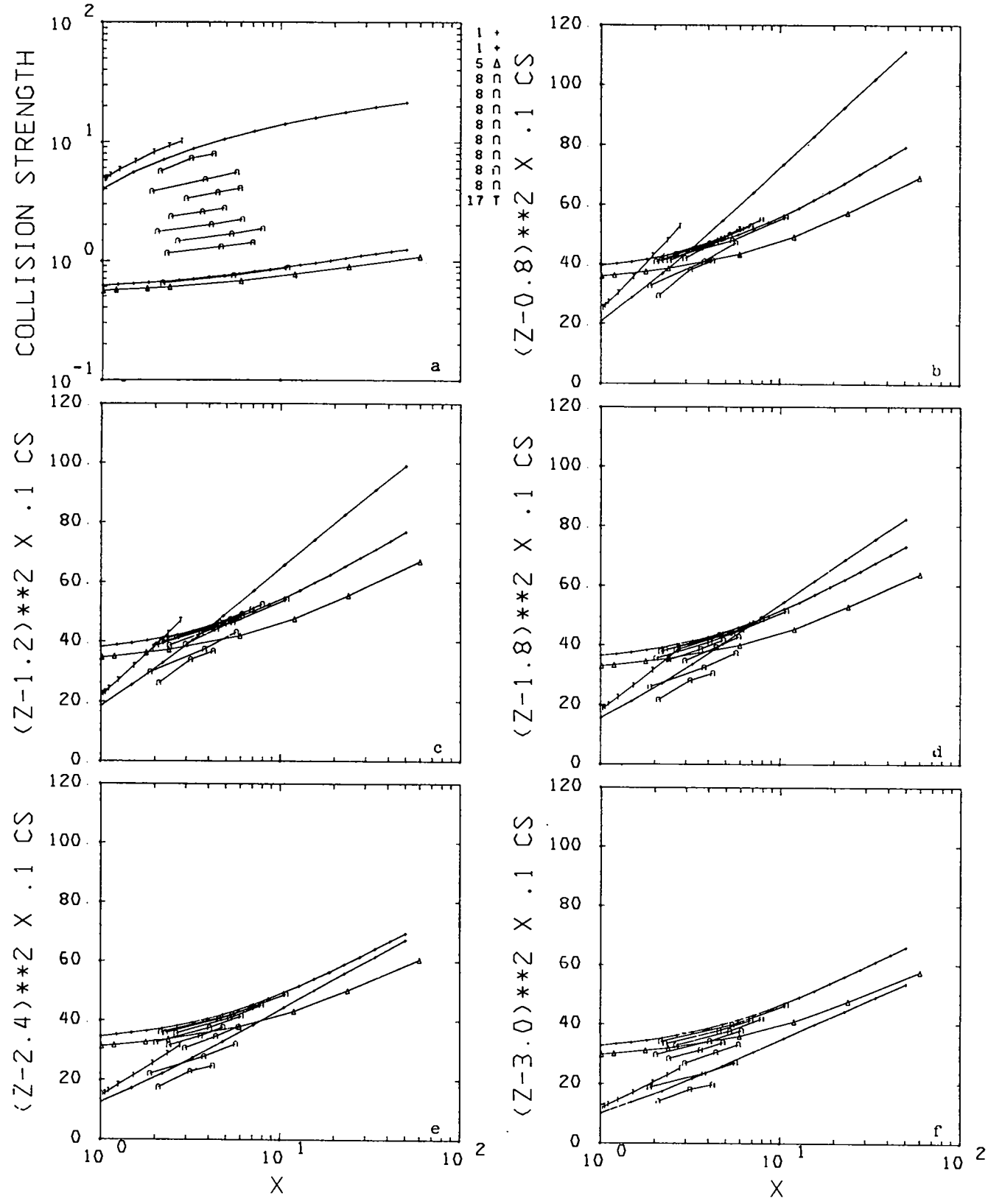


Fig. 7. Carbon isoelectronic sequence ($2s^2\ 2p^2\ ^3p$ - $2s\ 2p^3\ ^3s$) from O to Fe. Graph 7a shows the actual collision strengths while 7b - 7f illustrate single parameter scaling of the collision strengths.

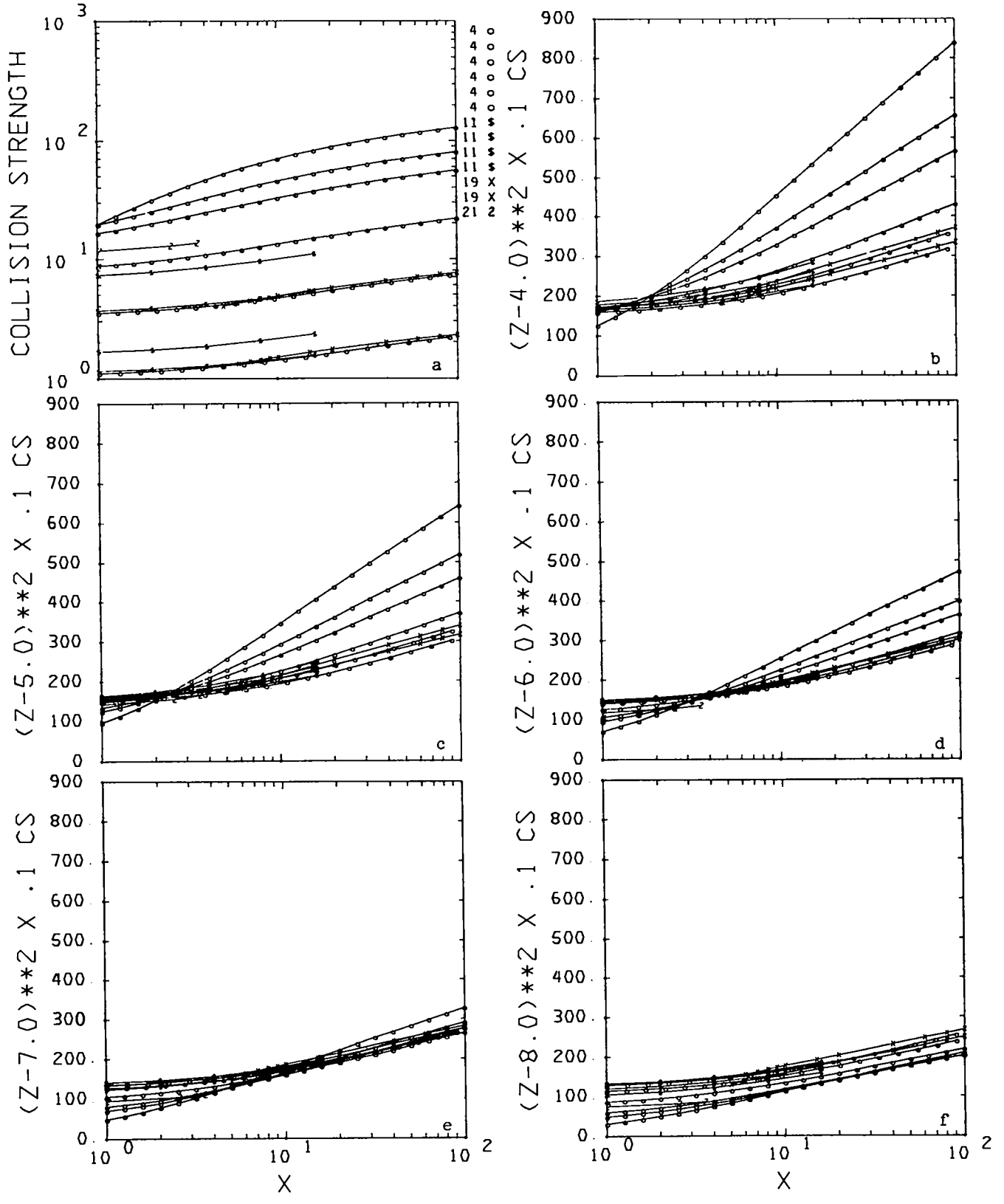


Fig. 8. Sodium isoelectronic sequence (3s - 3p) from Mg to Mo. Graph 8a shows the actual collision strengths while 8b - 8f illustrate single parameter scaling of the collision strengths.

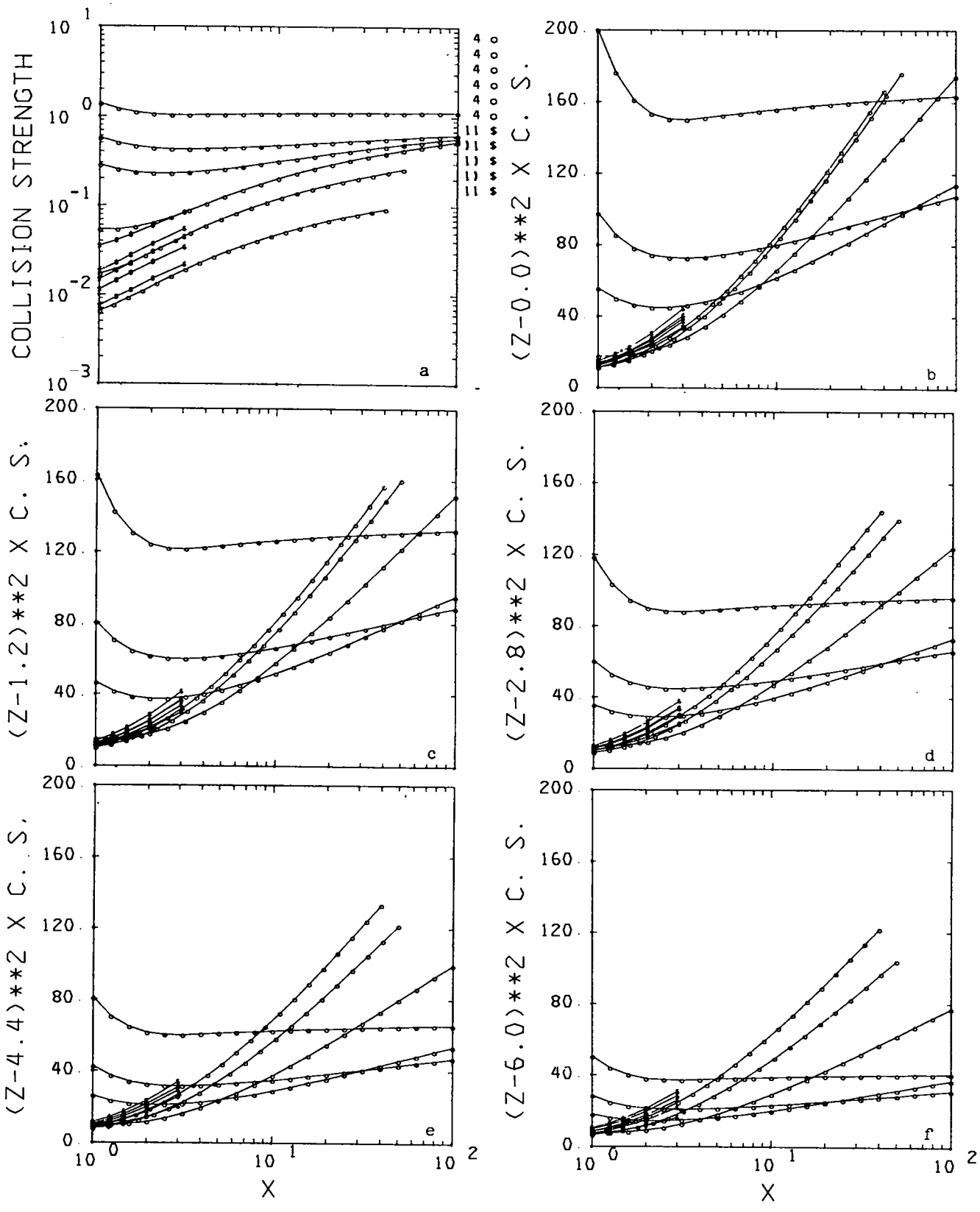


Fig. 9. Sodium iselectronic sequence (3s - 4p) from Mg to Mo. Graph 9a shows the actual collision strengths while 9b - 9f illustrate single parameter scaling of the collision strengths.

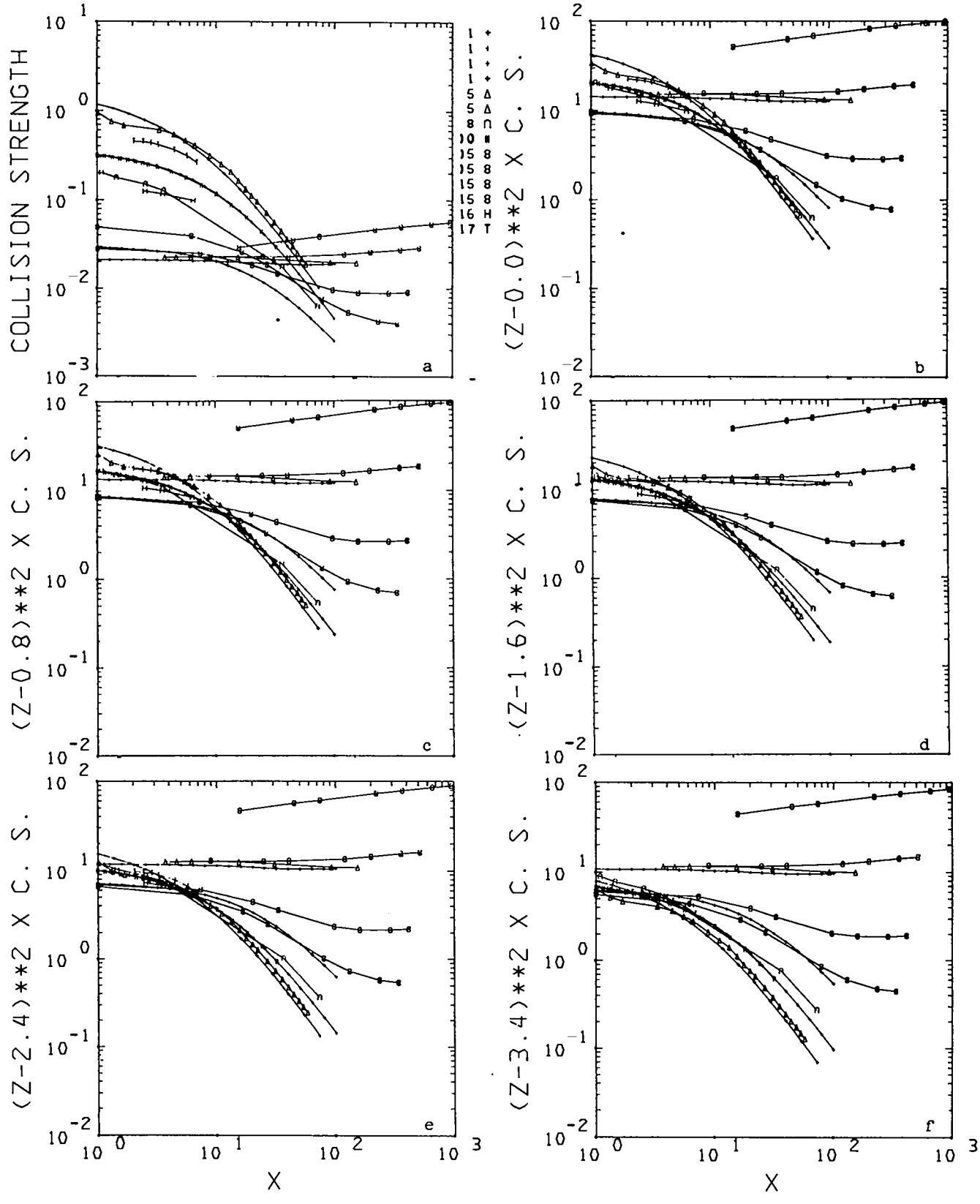


Fig. 10. Beryllium isoelectronic sequence ($2s^2 - 2s\ 2p\ ^3p$) from C to Mo. Graph 10a shows the actual collision strengths while 10b - 10f illustrate single parameter scaling of the collision strengths.

PAGE NO.	ELEMENT AND ION	... DATA SETS		
181	LI ION SEQ 1S2 2S — 1S2 2P			
		ROBB 2CCX	BE II	2S - 2P
		MANN DWX II	BE II	2S TO 2P HFR DW II
		MANN DWX II	B III	2S TO 2P HFR DW II
		ROBB 2CCX	C IV	2S - 2P
		MANN DWX II	C IV	2S TO 2P HFR DW II
		KIM SCALED	N V	2S — 2P
		MANN DWX II	N V	1S2 2S TO 1S2 2P HFR DW UNITARIZED
		ROBB 2CCX	O VI	2S - 2P
		MANN DWX II	O VI	2S TO 2P HFR DW II
		PEEK DWX	NE VIII	1S2 2S TO 1S2 2P HF DW
		MANN DWX	NE VIII	(S2 2S TO 1S2 2P HF DW
		MANN DWX II	SI XII	2S TO 2P HFR DW II
		GAU—HENRY 9CCX	AR XVI	2S — 2P
		MANN DWX II	A XVI	2S TO 2P HFR DW II
		ROBB CCX	FE XXIV	2S — 2P
		MANN DWX II	FE XXIV	2S TO 2P HFRDW II
		KIM SCALED	MO XL	2S — 2P
182	BE ION SEQ 1S2 2S2 — 1S2 2S 2P(1P			
		MANN DWXCI II	C III	2S2 TO 2S 2P(1P) MIX (2 X 2(HF DW
		ROBB 9CCX	C III	2S(2(- 2S2P(1P(
		NAKAZAKI	N IV	2S2(1S(— 2S 2P(1P(
		NAKAZAKI	O V	2S2(1S) — 2S 2P(1P(
		MANN DWXCI II	O V	2S2 TO 2S 2P(1P(HFR DWXCI II
		HUMMER UCL	NE VII	2S2 - 2S 2P(1P(
		SAMPSON CBX	SI XI	2S2 - 2S 2P(1P)
		MANN DWXCI	AR XV	2S2 TO 2S 2P(1P(HFR DW MIX(3 X 2(
		SAMPSON CBX	AR XV	2S2 - 2S 2P(1P(
		ROBB 6CCX	FE XXIII	1S2 2S2 - 1S2 2S 2P(1P(
		MANN DWXCI	FE XXIII	2S2 TO 2S 2P(1P) HFR DW MIX
		SAMPSON CBX	MO XXXIX	2S2 - 2S 2P(1P(
183	C ION SEQ 2S2 2P2(3P(— 2S 2P3(3S(			
		ORMONDE	O III	2S2 2P2(3P(— 2S 2P3(3S(
		BHATIA UCL	O III	1S2 2S2 2P2(3P(— 1S2 2S 2P3(3S(
		MANN DWXCI II	O III	2S2 2P2(3P(TO 2S 2P3(3S(MIX (2 X 1(
		BHATIA UCL	NE V	1S2 2S2 2P2(3P(- 1S2 2S 2P3(3S)
		MASON UCL	MG VII	1S2 2S2 2P2(3P(— 1S2 2S 2P3(3S)
		MASON UCL	SI IX	1S2 2S2 2P2(3P) — 1S2 2S 2P3(3S)
		MASON UCL	S XI	1S2 2S2 2P2(3P(— 1S2 2S 2P3(3S(
		BHATIA UCL	AR XIII	1S2 2S2 2P2(3P) — 1S2 2S 2P3(3S)
		BHATIA UCL	CA XV	1S2 2S2 2P2(3P(- 1S2 2S 2P3(3S)
		BHATIA UCL	FE XXI	1S2 2S2 2P2(3P(- 1S2 2S 2P3(3S(
		ROBB 6CCX	FE XXI	2S2 2P2(3P(— 2S 2P3(3S)
		MANN DWXCI	FE XXI	2S2 2P2(3P) TO 2S 2P3(3S) DWCI1D
184	NA ION SEQ 3S — 3P			
		MANN DWX II	MG II	3S TO 3P HFR DW II
		MANN DWX II	AL III	3S TO 3P HFR DW
		MANN DWX II	SI IV	3S TO 3P HFR DW II
		NUSSBAUMER-FLOWER S VI		3S — 3P
		MANN DWX II	AR VIII	3S TO 3P HFR DW II
		BLAHA DW	CA X	3S - 3P
		KIM SCALED	FE XVI	3S — 3P
		BLAHA DW	FE XVI	3S - 3P
		MANN DWX	FE XVI	2P6 3S TO 2P6 3P HFR DW
		BLAHA DW	KR XXVI	3S - 3P
		KIM SCALED	MO XXXII	3S — 3P
		BLAHA DW	MO XXXII	3S — 3P
		MANN DWX	MO XXXII	2P6 3S TO 2P6 3P HFR DW
185	NA ION SEQ 3S - 4P			
		MANN DWX II	MG II	3S TO 4P HFR DW II
		MANN DWX II	AL III	3S TO 4P HFR DW
		MANN DWX II	SI IV	3S TO 4P HFR DW II
		MANN DWX II	AR VIII	3S TO 4P HFR DW II
		BLAHA DW	CA X	3S — 4P
		BLAHA DW	FE XVI	3S — 4P
		MANN DWX	FE XVI	2P6 3S TO 2P6 4P HFR DW
		BLAHA DW	ZN XX	3S - 4P
		BLAHA DW	KR XXVI	3S — 4P
		BLAHA DW	MO XXXII	3S — 4P
		MANN DWX	MO XXXII	2P6 3S TO 2P6 4P HFR DW
186	BE ION SEQ 2S2 — 2S 2P(3P(			
		MANN DWXCI II	C III	2S2 TO 2S 2P(3P(HF DW II MIX(2 X 2)
		ROSS 5CCX	C III	2S(2) - 2S2P(3P)
		ORMONDE	N IV	2S2 — 2S 2P(3P(
		PEEK DWUCI	O V	2S2 — 2S 2P(3P(
		MANN DWXCI II	O V	2S2 TO 2S 2P(3P(HFR DWXCI II
		OSTERBROCK 3CCX	NE VIII	2S2 — 2S 2P(3P)
		HUMMER UCL	NE VII	2S2 — 2S 2P(3P(
		SAMPSON CBX	SI XI	2S2 — 2S 2P(3P(
		SAMPSON CBX	AR XV	2S2 — 2S 2P(3P)
		MANN DWXCI	AR XV	2S2 TO 2S 2P(3P(HFR DW MIX(3 X 2)
		ROBB 6CCX	FE XXIII	1S2 2S2 — 1S2 2S 2P(3P)
		SAMPSON CBX	FE XXIII	2S2 — 2S 2P(3P)
		MANN DWXCI	FE XXIII	2S2 TO 2S 2P(3P) HFR DW MIX
		SAMPSON CBX	MO XXXIX	2S2 - 2S 2P(3P)

TABLE II

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
BE II									
2S - 2P	ROBB CC	3.330E-01	A	5.635E+00	5.007E+00	3.024E+00	1.722E+01		
	MANN DWX	2.910E-01	A	1.274E+01	-5.447E+00	9.697E+00	1.559E+01		
B III									
2S - 2P	MANN DWX	4.409E-01	A	7.411E+00	4.786E+00	8.697E-01	7.594E+00		
C III									
1S2 2S2 - 1S2 2S 2P(1P)	NAKAZAKI	9.540E-01	A	3.531E+00	2.650E+00	1.305E-01	3.366E+00		
	ROBB CC	9.954E-01	A	2.329E+00	-1.618E-02	1.413E+00	3.555E+00		
	PEEK DWXCI	9.327E-01	A	2.885E+00	9.869E-02	1.201E+00	3.566E+00		
	MANN DWXCI	9.327E-01	A	2.373E+00	8.203E-01	7.495E-01	3.779E+00		
C III									
2S 2P(3P) - 2P2(3P)	ROBB CC	8.104E-01	A	1.359E+01	-5.321E+00	1.016E+01	1.360E+01		
C III									
2S 2P(1P) - 2P2(1D)	ROBB CC	3.546E-01	A	4.194E+00	1.009E+01	-2.127E+00	8.142E+00		
C IV									
1S2 2S - 1S2 2P	MANN DWX	5.883E-01	A	4.903E+00	5.134E+00	-6.772E-01	4.485E+00		
C IV									
1S2 2S - 1S2 3S	MANN DWX	2.760E+00	A	4.853E-01	-2.317E-02	-2.242E-02	0.		
C IV									
1S2 2S - 1S2 3P	MANN DWX	2.917E+00	A	-5.554E-01	8.937E-01	-2.256E-01	5.580E-01		
C IV									
1S2 2S - 1S2 3D	MANN DWX	2.961E+00	A	1.270E+00	-1.376E+00	7.201E-01	0.		
C IV									
1S2 2S - 1S 2S2	MANN DWXCI	2.147E+01	A	2.321E-02	-4.067E-03	7.756E-04	0.		
C IV									
1S2 2S - 1S 2S(1S) 2P(2P)	MANN DWXCI	2.202E+01	A	-4.133E-03	1.987E-02	3.419E-02	2.150E-01		
C IV									
1S2 2S - 1S 2S(3S) 2P(2P)	MANN DWXCI	2.230E+01	A	-4.949E-03	1.537E-02	2.228E-02	2.471E-02		
N IV									
2S2(1S) - 2S 2P(1P)	NAKAZAKI	1.200E+00	A	2.424E+00	2.790E+00	-5.019E-01	2.239E+00		
N V									
1S2 2S - 1S2 2P	MANN DWXCI	7.349E-01	A	2.824E+00	6.099E+00	-2.091E+00	3.144E+00		
O III									
2S2 2P2(3P) - 2S 2P3(3D)	MANN DWXCI	1.092E+00	A	4.678E+00	5.458E+00	-1.139E+00	6.239E+00		
O III									
2S2 2P2(3P) - 2S 2P3(3P)	MANN DWXCI	1.296E+00	A	4.233E+00	3.101E+00	-3.908E-01	5.680E+00		
O III									
2S2 2P2(3P) - 2S 2P3(3S)	MANN DWXCI	1.794E+00	A	3.039E+00	5.938E-01	4.254E-01	4.721E+00		
O IV									
2S2 2P - 2S 2P2(2D)	ROBB CC	1.211E+00	A	2.080E+00	4.711E+00	-1.248E+00	3.241E+00		
	MANN DWXCI	1.155E+00	A	2.919E+00	4.479E+00	-1.034E+00	3.422E+00		
O IV									
2S2 2P - 2S 2P2(2S)	ROBB CC	1.552E+00	A	1.132E+00	4.199E-01	5.236E-01	1.437E+00		
	MANN DWXCI	1.496E+00	A	1.101E+00	1.122E+00	-1.256E-01	1.321E+00		
O IV									
2S2 2P - 2S 2P2(2P)	ROBB CC	1.756E+00	A	3.746E+00	2.307E+00	7.380E-01	5.651E+00		
	MANN DWXCI	1.644E+00	A	4.131E+00	2.986E+00	6.640E-01	6.048E+00		

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
O V									
2S2 - 2S 2P(1P)	NAKAZAKI	1.450E+00	A	1.755E+00	2.384E+00	-6.063E-01	1.570E+00		
	PEEK DWXCI	1.447E+00	A	1.571E+00	1.435E+00	-6.767E-02	1.633E+00		
	MANN DWXCI	1.447E+00	A	1.323E+00	1.850E+00	-3.145E-01	1.703E+00		
O V									
2S 2P(3P) - 2P2(3P)	MANN DWX	1.199E+00	A	6.162E+00	1.014E+01	-2.487E+00	7.376E+00		
O VI									
2S - 2P	ROBB CC	8.832E-01	A	2.062E+00	4.712E+00	-1.677E+00	2.252E+00		
	MANN DWX	8.815E-01	A	2.394E+00	4.089E+00	-1.261E+00	2.151E+00		
O VI									
2S - 3S	MANN DWX	5.833E+00	A	2.382E-01	-3.111E-02	2.162E-03	0.		
O VI									
2S - 3P	MANN DWX	6.071E+00	A	-3.017E-01	4.964E-01	-1.151E-01	3.453E-01		
NE VII									
2S2(1S) - 2S 2P(1P)	NAKAZAKI	1.950E+00	A	1.052E+00	1.644E+00	-5.046E-01	9.019E-01		
NE VIII									
2S - 2P	ROBB CC	1.168E+00	A	1.244E+00	3.239E+00	-1.311E+00	1.320E+00		
	PEEK DWXCI	1.189E+00	A	1.285E+00	3.143E+00	-1.173E+00	1.303E+00		
	MANN DWX	1.189E+00	A	1.530E+00	2.823E+00	-1.039E+00	1.235E+00		
MG II									
3S - 3P	MANN DWX	3.256E-01	A	9.373E+00	2.476E+00	8.349E+00	2.661E+01		
MG II									
3S - 4P	MANN DWX	7.349E-01	A	1.109E+00	-4.681E-01	7.735E-01	6.766E-03		
AL II									
3S2 - 3S 3P(1P)	MANN DWXCI	5.454E-01	A	9.212E-01	1.813E+00	5.292E+00	1.556E+01		
AL II									
3S 3P(3P) - 3P2(3P)	MANN DWX	5.166E-01	A	1.065E+01	-6.699E+00	2.995E+01	5.624E+01		
AL II									
3S 3P(3P) - 3S 3D(3D)	MANN DWX	5.288E-01	A	-2.417E+01	5.376E+01	1.437E+01	7.943E+01		
AL II									
3S2 - 3S 4P(1P)	MANN DWXCI	9.743E-01	A	1.088E+00	-7.801E-01	2.961E-01	3.876E-02		
AL III									
3S - 3P	MANN DWX	4.906E-01	A	8.132E+00	1.172E+01	-9.621E-02	1.595E+01		
AL III									
3S - 4P	MANN DWX	1.309E+00	A	2.904E-01	1.105E-01	1.826E-01	7.563E-02		
AL III									
3S - 5P	MANN DWX	1.626E+00	A	4.456E-02	4.314E-02	7.340E-02	3.559E-02		
AL IV									
2P6 - 2P5 3S(1P)	MANN DWXCI	5.693E+00	A	-7.979E-02	1.057E-01	2.630E-03	1.393E-01		
AL IV									
2P6 - 2P5 3D(1P)	MANN DWXCI	6.990E+00	A	-2.181E-01	4.292E-01	-8.999E-02	5.332E-01		
AL V									
2S2 2P5(2P) - 2S1 2P6(2S)	MANN DWX	3.259E+00	A	9.015E-01	1.081E+00	-2.239E-01	1.012E+00		
AL VI									
2S2 2P4(3P) - 2S1 2P5(3P)	MANN DWX	2.937E+00	A	2.533E+00	3.919E+00	-9.664E-01	2.857E+00		
SI III									
3S2 - 3S 3P(1P)	MANN DWXCI	7.553E-01	A	2.742E+00	4.317E+00	1.744E+00	1.007E+01		

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
SI III									
3S 3P(3P) - 3P2(3P)	MANN DWXCI	7.016E-01	A	1.202E+01	1.267E+01	5.308E+00	3.291E+01		
SI IV									
3S - 3P	MANN DWX	6.525E-01	A	6.701E+00	1.257E+01	-2.588E+00	1.090E+01		
SI IV									
3S - 4P	MANN DWX	1.990E+00	A	-6.266E-03	3.027E-01	-1.056E-02	1.278E-01		
SI XII									
2S - 2P	MANN DWX	1.809E+00	A	6.607E-01	1.580E+00	-6.200E-01	6.003E-01		
S IV									
3S2 3P - 3S 3P2(2D)	MANN DWXCI	8.520E-01	A	1.763E+00	5.083E+00	-1.238E+00	2.136E+00		
S IV									
3S2 3P - 3S 3P2(2S)	MANN DWXCI	1.120E+00	A	1.376E+00	1.988E+00	-3.959E-01	2.156E+00		
S IV									
3S2 3P - 3S 3P2(2P)	MANN DWXCI	1.216E+00	A	3.140E+00	1.593E+01	-2.549E+00	1.794E+01		
AR VIII									
3S - 3P	MANN DWX	1.293E+00	A	3.262E+00	8.713E+00	-3.235E+00	4.059E+00		
AR VIII									
3S - 4P	MANN DWX	5.731E+00	A	-1.939E-01	3.464E-01	-9.909E-02	1.584E-01		
AR XV									
2S2 - 2S 2P(1P)	MANN DWXCI	3.787E+00	A	2.453E-01	6.900E-01	-2.725E-01	2.695E-01		
AR XV									
2S 2P(3P) - 2P2(3P)	MANN DWXCI	3.391E+00	A	1.043E+00	2.860E+00	-1.166E+00	1.061E+00		
A XVI									
2S - 2P	MANN DWX	2.480E+00	A	3.730E-01	9.996E-01	-4.115E-01	3.502E-01		
FE XV									
3S2 - 3S 3P(1P)	MANN DWXCI	3.207E+00	A	9.791E-01	2.987E+00	-1.208E+00	1.155E+00		
FE XV									
3S2 - 3S 3D(1D)	MANN DWXCI	6.945E+00	A	2.737E-01	-2.095E-01	1.223E-01	0.		
FE XV									
3S2 - 3S 4P(1P)	MANN DWXCI	1.719E+01	A	-1.341E-01	2.125E-01	-6.820E-02	1.098E-01		
FE XV									
3S2 - 3S 4F(1F)	MANN DWX	1.935E+01	A	9.381E-02	-5.107E-02	6.155E-03	0.		
FE XVI									
2P6 3S - 2P6 3P	MANN DWX	2.653E+00	A	1.266E+00	3.897E+00	-1.659E+00	1.347E+00		
FE XVI									
2P6 3S - 2P6 4P	MANN DWX	1.807E+01	A	-1.157E-01	1.892E-01	-5.708E-02	9.519E-02		
FE XVI									
2P6 3S - 2P5 3S2	MANN DWX	5.239E+01	A	-1.037E-02	1.810E-02	-3.119E-03	1.210E-02		
FE XVI									
2P6 3S - 2P5 3S 3D(TOTAL)	MANN DWX	5.900E+01	A	-9.136E-02	4.305E-01	-2.267E-02	4.299E-01		
FE XVI									
2P6 3S - 2P5 3S 4D(TOTAL)	MANN DWX	7.274E+01	A	1.183E-02	5.346E-02	2.068E-02	8.248E-02		
FE XVI									
2S2 2P6 3S-2S 2P6 3S 3P(TOT)	MANN DWX	6.500E+01	A	-5.306E-02	8.275E-02	-1.543E-02	6.327E-02		
FE XVII									
2S2 2P6 - 2S2 2P5 3S(1P)	MANN DWXCI	5.370E+01	A	-7.028E-03	1.076E-02	-2.111E-03	8.871E-03		

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
FE XVII									
2S2 2P6 - 2S2 2P5 3P(1D)	MANN DWXCI	5.628E+01	A	4.604E-03	-4.696E-03	4.074E-03	0.		
FE XVII									
2S2 2P6 - 2S2 2P5 3D(1F)	MANN DWXCI	5.959E+01	A	3.309E-03	-2.365E-03	3.720E-03	1.553E-04		
FE XVII									
2S2 2P6 - 2S2 2P5 3D(1P)	MANN DWXCI	5.959E+01	A	-3.818E-02	1.627E-01	-3.727E-02	1.755E-01		
FE XVII									
2S2 2P6 - 2S1 2P6 3S(1S)	MANN DWX	6.371E+01	A	1.954E-02	-4.457E-03	-7.098E-04	0.		
FE XVII									
2S2 2P6 - 2S1 2P6 3P(1P)	MANN DWXCI	6.535E+01	A	-1.726E-02	2.508E-02	-5.640E-03	1.976E-02		
FE XVII									
2S2 2P6 - 2S1 2P6 3D(1D)	MANN DWXCI	6.911E+01	A	4.809E-02	-5.722E-02	2.223E-02	0.		
FE XVIII									
2P5 - 2P4 3S(2P)	MANN DWXCI	5.742E+01	A	-1.853E-02	2.757E-02	-4.348E-03	2.262E-02		
FE XVIII									
2P5 - 2P4 3S(2D)	MANN DWXCI	5.742E+01	A	-1.552E-02	2.694E-02	-4.303E-03	1.825E-02		
FE XVIII									
2P5 - 2P4 3S(2S)	MANN DWXCI	5.742E+01	A	-3.098E-03	5.381E-03	-8.593E-04	3.641E-03		
FE XVIII									
2P5 - 2P4(3P)3D(2F)	MANN DWXCI	6.301E+01	A	-1.303E-03	4.942E-02	2.203E-03	5.880E-02		
FE XVIII									
2P5 - 2P4(3P)3D(2D)	MANN DWXCI	6.301E+01	A	-1.629E-02	9.610E-02	-1.042E-02	9.698E-02		
FE XVIII									
2P5 - 2P4(3P)3D(2P)	MANN DWXCI	6.301E+01	A	-3.318E-03	1.976E-02	4.672E-03	1.278E-02		
FE XVIII									
2P5 - 2P4(1D)3D(2G)	MANN DWXCI	6.301E+01	A	8.919E-03	1.349E-03	1.873E-02	8.712E-04		
FE XVIII									
2P5 - 2P4(1D)3D(2F)	MANN DWXCI	6.301E+01	A	1.717E-03	1.138E-02	1.232E-02	1.055E-02		
FE XVIII									
2P5 - 2P4(1D)3D(2D)	MANN DWXCI	6.301E+01	A	-7.702E-02	3.688E-01	-7.990E-02	3.866E-01		
FE XVIII									
2P5 - 2P4(1D)3D(2P)	MANN DWXCI	6.301E+01	A	-5.701E-02	2.693E-01	-5.767E-02	2.778E-01		
FE XVIII									
2P5 - 2P4(1D)3D(2S)	MANN DWXCI	6.301E+01	A	-1.366E-02	6.498E-02	-1.176E-02	6.363E-02		
FE XVIII									
2P5 - 2P4(1S)3D(2D)	MANN DWXCI	6.301E+01	A	-2.406E-02	1.223E-01	-1.813E-02	1.238E-01		
FE XVIII									
2S2 2P5 - 2S 2P6	ROBB CC	8.735E+00	A	2.434E-01	2.708E-01	-5.941E-02	1.728E-01		
	MANN DWX	9.390E+00	A	1.795E-01	4.273E-01	-1.630E-01	1.815E-01		
FE XVIII									
2S2 2P5 - 2S 2P5(3P)3P(2D)	MANN DWXCI	6.851E+01	A	-3.376E-02	5.431E-02	-1.226E-02	4.145E-02		
FE XVIII									
2S2 2P5 - 2S 2P5(3P)3P(2P)	MANN DWXCI	6.851E+01	A	-2.976E-02	4.718E-02	-1.109E-02	3.670E-02		
FE XVIII									
2S2 2P5 - 2S 2P5(3P)3P(2S)	MANN DWXCI	6.851E+01	A	-1.423E-02	2.235E-02	-5.388E-03	1.760E-02		
FE XVIII									
2S2 2P5 - 2S 2P5(1P)3P(2D)	MANN DWXCI	6.851E+01	A	-2.112E-02	3.491E-02	-7.300E-03	2.573E-02		

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
FE XVIII									
2S2 2P5 - 2S 2P5(1P)3P(2P)	MANN DWXCI	6.851E+01	A	-1.768E-02	2.863E-02	-6.345E-03	2.167E-02		
FE XVIII									
2S2 2P5 - 2S 2P5(1P)3P(2S)	MANN DWXCI	6.851E+01	A	-3.748E-04	1.072E-03	5.077E-05	3.559E-04		
FE XIX									
2S2 2P4(3P) - 2S 2P5(3P)	ROBB CC	7.498E+00	A	3.902E-01	1.578E+00	-7.489E-01	5.167E-01		
	MANN DWXCI	8.396E+00	A	5.017E-01	1.262E+00	-4.932E-01	5.096E-01		
FE XIX									
2S2 2P4(1D) - 2S 2P5(1P)	ROBB CC	9.400E+00	A	2.301E-01	6.841E-01	-2.808E-01	2.720E-01		
FE XIX									
2S2 2P4(1S) - 2S 2P5(1P)	ROBB CC	8.390E+00	A	-4.063E-02	1.372E-01	-6.094E-02	4.214E-02		
FE XX									
2S2 2P3(4S) - 2S 2P4(4P)	MANN DWXCI	7.189E+00	A	3.283E-01	8.436E-01	-3.388E-01	3.233E-01		
FE XXI									
2S2 2P2(3P) - 2S 2P3(3D)	MANN DWXCI	6.456E+00	A	3.585E-01	8.684E-01	-3.575E-01	3.169E-01		
FE XXI									
2S2 2P2(3P) - 2S 2P3(3P)	MANN DWXCI	7.681E+00	A	2.847E-01	7.653E-01	-3.059E-01	2.945E-01		
FE XXI									
2S2 2P2(3P) - 2S 2P3(3S)	ROBB CC	8.395E+00	A	1.962E-01	6.478E-01	-2.824E-01	2.157E-01		
	MANN DWXCI	9.069E+00	A	2.332E-01	6.346E-01	-2.473E-01	2.563E-01		
FE XXI									
2S2 2P2(3P) - 2P1 3D1(3F)	MANN DWXCI	7.426E+01	A	-8.369E-03	1.014E-01	3.385E-03	7.723E-02		
FE XXI									
2S2 2P2(3P) - 2P1 3D1(3D)	MANN DWXCI	7.426E+01	A	-5.579E-02	3.381E-01	-6.669E-02	3.189E-01		
FE XXI									
2S2 2P2(3P) - 2P1 3D1(3P)	MANN DWXCI	7.426E+01	A	-3.202E-02	1.827E-01	-3.191E-02	1.640E-01		
FE XXII									
2S2 2P - 2S 2P2(2P)	ROBB CC	7.216E+00	A	3.659E-01	8.124E-01	-3.088E-01	3.422E-01		
	MANN DWXCI	7.959E+00	A	3.239E-01	9.319E-01	-3.734E-01	3.549E-01		
FE XXII									
2S2 2P - 2S 2P2(2D)	ROBB CC	5.293E+00	A	2.069E-01	6.761E-01	-3.402E-01	2.168E-01		
	MANN DWXCI	5.935E+00	A	2.354E-01	6.521E-01	-2.769E-01	2.246E-01		
FE XXII									
2S2 2P - 2S 2P2(2S)	ROBB CC	6.781E+00	A	1.224E-01	2.051E-01	-7.536E-02	9.400E-02		
	MANN DWXCI	6.727E+00	A	1.015E-01	3.023E-01	-1.244E-01	1.097E-01		
FE XXII									
2S2 2P - 2S2 3S	MANN DWXCI	7.338E+01	A	-7.184E-03	1.284E-02	-2.124E-03	8.101E-03		
FE XXII									
2S2 2P - 2S2 3P	MANN DWXCI	7.685E+01	A	-4.112E-02	2.541E-01	-3.854E-02	2.239E-01		
FE XXII									
2S2 2P - 2S2 3D	MANN DWXCI	7.685E+01	A	-3.748E-02	2.474E-01	-3.653E-02	2.189E-01		
FE XXII									
2S2 2P - 2S2 4S	MANN DWX	7.948E+01	A	-4.301E-04	1.521E-03	2.220E-04	1.139E-03		
FE XXIII									
2S2 - 2S 2P(1P)	MANN DWXCI	6.478E+00	A	1.103E-01	3.506E-01	-1.456E-01	1.247E-01		
FE XXIII									
2S 2P(3P) - 2P2(3P)	MANN DWXCI	5.547E+00	A	4.195E-01	1.295E+00	-5.522E-01	4.393E-01		

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
FE XXIII									
2S2 - 2S 3S(1S)	MANN DWXCI	8.166E+01	A	1.764E-02	-4.215E-03	-3.242E-05	0.		
FE XXIII									
2S2 - 2S 3P(1P)	MANN DWXCI	8.289E+01	A	-1.880E-02	3.335E-02	-9.132E-03	2.447E-02		
FE XXIII									
2S2 - 2S 3D(1D)	MANN DWXCI	8.433E+01	A	5.007E-02	-5.656E-02	2.379E-02	0.		
FE XXIV									
1S2 2S - 1S2 2P	ROBB CC	3.451E+00	A	1.537E-01	5.504E-01	-2.383E-01	1.686E-01		
	MANN DWX	4.289E+00	A	1.620E-01	4.950E-01	-2.129E-01	1.611E-01		
FE XXIV									
1S2 2S - 1S2 3S	MANN DWX	8.450E+01	A	1.725E-02	-3.943E-03	8.891E-04	0.		
FE XXIV									
1S2 2S - 1S2 3P	MANN DWX	8.570E+01	A	-2.701E-02	5.041E-02	-1.268E-02	3.548E-02		
FE XXIV									
1S2 2S - 1S 2S2	MANN DWX	4.861E+02	A	1.330E-03	-4.121E-04	2.048E-04	0.		
FE XXIV									
1S2 2S - 1S 2S(1S)2P(2P)	MANN DWXCI	4.902E+02	A	-1.092E-04	1.227E-03	8.563E-04	2.670E-03		
FE XXIV									
1S2 2S - 1S 2S(3S)2P(2P)	MANN DWXCI	4.902E+02	A	2.792E-04	2.291E-03	1.091E-03	1.036E-02		
MO XXXVIII									
2S2 2P(2P) - 2S 2P2(2S)	ROBB CC	1.140E+01	A	1.227E-02	1.547E-01	-8.780E-02	2.773E-02		
MO XXXVIII									
2S2 2P(2P) - 2S 2P2(2P)	ROBB CC	1.202E+01	A	-1.343E-01	8.273E-01	-4.011E-01	1.998E-01		
MO XXXI									
3S2 - 3S 3P(1P)	MANN DWXCI	7.722E+00	A	2.866E-01	9.651E-01	-4.200E-01	3.175E-01		
MO XXXI									
3S2 - 3S 4S(1S)	MANN DWXCI	5.916E+01	A	3.609E-02	-6.366E-03	3.954E-04	0.		
MO XXXI									
3S2 - 3S 4F(1F)	MANN DWXCI	6.658E+01	A	3.030E-02	-1.546E-02	3.160E-03	0.		
MO XXXII									
2P6 3S - 2P6 4P	MANN DWX	6.308E+01	A	-4.214E-02	6.996E-02	-2.157E-02	3.651E-02		
MO XXXII									
2P6 3S - 2P5 3S2	MANN DWXCI	1.762E+02	A	-2.968E-03	5.357E-03	-9.875E-04	3.284E-03		
MO XXXII									
2S2 2P6 3S - 2S 2P6 3S2	MANN DWX	1.986E+02	A	6.748E-03	-1.607E-03	4.122E-04	0.		

TABLE III

TRANSITION	DATA	THRESHOLD ENERGY	FIT		COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
C III 2S 2P(3P) - 2P2(3P)	ROBB CC	4.522E-01	B		1.950E-01	3.130E-01	-8.384E-01	2.360E+00	-1.047E+00	4.640E-02
	MANN DWXCI	7.751E-01	B		1.114E+01	6.478E+00	2.595E+00	1.587E+01	0.	0.
C IV 1S2 2S - 1S 2S 2P(4P)	MANN DWX	2.162E+01	B		5.757E-02	4.533E-03	-1.256E-02	1.179E-01	-1.349E-01	4.650E-01
O IV 2S 2P2(4P) - 2S 2P2(2S)	ROBB CC	9.538E-01	B		3.477E-03	2.964E-02	2.477E-03	-4.641E-03	4.758E-01	5.179E-02
O IV 2S 2P2(4P) - 2S 2P2(2P)	ROBB CC	1.158E+00	B		7.622E-02	7.117E-02	-5.254E-02	-9.925E-02	6.900E-01	5.625E-02
O IV 2S 2P2(2S) - 2S 2P2(2P)	ROBB CC	2.044E-01	B	*	-9.174E-03	1.113E-01	-1.309E-01	-1.344E-01	4.163E-01	7.219E-03
O V 2S2 - 2S 2P(3P)	PEEK DWXCI	7.494E-01	B		1.118E-02	1.175E-01	9.798E-03	5.721E-03	2.189E-01	4.460E-02
	MANN DWXCI	7.494E-01	B		4.785E-02	5.771E-02	-1.691E-02	-7.987E-02	3.544E-01	2.567E-02
AR XV 2S2 - 2S 2P(3P)	MANN DWXCI	2.173E+00	B		7.685E-06	1.039E-02	-2.664E-03	1.471E-03	2.150E-02	1.381E-02
FE XV 3S2 - 3S 4S(3S)	MANN DWXCI	1.607E+01	B		1.441E-02	-2.303E-03	-9.168E-03	2.585E-02	-1.078E-01	5.651E-01
FE XV 3S2 - 3S 4F(3F)	MANN DWX	1.922E+01	B		6.102E-02	-5.449E-03	-3.479E-02	6.735E-02	-5.386E-01	7.401E-01
FE XVII 2S2 2P6 - 2S2 2P5 3P(3S)	MANN DWXCI	5.628E+01	B		2.024E-02	-3.514E-03	-1.054E-02	4.536E-02	-1.579E-01	5.226E-01
FE XVII 2S2 2P6 - 2S2 2P5 3P(1P)	MANN DWXCI	5.628E+01	B		3.909E-03	4.951E-04	-5.322E-03	2.225E-02	-3.337E-02	4.181E-01
FE XVII 2S2 2P6 - 2S2 2P5 3D(1D)	MANN DWXCI	5.959E+01	B		2.363E-03	4.743E-05	2.335E-04	-5.492E-04	2.813E-03	2.314E-01
FE XVII 2S2 2P6 - 2S1 2P6 3S(3S)	MANN DWXCI	6.326E+01	B		3.769E-03	-4.673E-04	-1.298E-03	7.086E-03	-2.239E-02	4.849E-01
FE XXIII 2S2 - 2S 3S(3S)	MANN DWXCI	9.108E+01	B		4.480E-03	-6.406E-04	-1.843E-03	8.723E-03	-2.928E-02	4.944E-01

TABLE IV

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0 C1 C2 C3 C4 C5 C6 C7	ALPHA
AL IV 2P6 - 2P5 3S(3P)	MANN DWXCI	5.628E+00	D	5.208E-02 -3.063E-02 1.767E-02 2.640E-01 -1.561E+00 -1.052E-02 2.503E-02 1.665E-02	1.085E+00
AL IV 2P6 - 2P5 3D(3P)	MANN DWXCI	6.929E+00	D	1.140E-01 -2.631E-01 -5.698E+00 2.448E+01 -2.290E+02 -5.780E-04 -2.500E-03 2.023E-03	2.752E+00
AL IV 2P6 - 2P5 3D(3D)	MANN DWXCI	7.000E+00	D	2.982E-04 2.162E-01 -1.153E+00 1.182E+01 -6.095E+01 -2.390E-02 6.106E-02 6.782E-02	2.219E+00
FE XV 3S2 - 3S 3P(3P)	MANN DWXCI	2.250E+00	D	-2.331E-03 1.077E-02 1.236E-02 4.915E-03 1.769E-02 1.432E-02 8.785E-03 6.534E-03	5.270E-02
FE XV 3S2 - 3S 4P(3P)	MANN DWXCI	1.719E+01	D	-9.388E-03 1.797E-03 2.272E-03 -7.224E-03 1.110E-02 -2.429E-02 3.948E-02 1.944E-02	2.073E-01
FE XVII 2S2 2P6 - 2S2 2P5 3S(3P)	MANN DWXCI	5.370E+01	D	-1.162E-03 7.030E-04 9.419E-04 -1.174E-03 4.147E-03 -5.686E-03 7.854E-03 7.377E-03	1.974E-01
FE XVII 2S2 2P6 - 2S2 2P5 3P(3D)	MANN DWXCI	5.628E+01	D	5.259E-03 3.363E-03 5.210E-03 -3.651E-03 2.314E-02 4.809E-03 -9.620E-03 -2.540E-04	2.946E-01
FE XVII 2S2 2P6 - 2S2 2P5 3P(3P)	MANN DWXCI	5.628E+01	D	-9.941E-04 -1.761E-03 -6.642E-04 1.936E-03 -4.524E-03 8.437E-03 5.778E-03 -1.158E-04	7.848E-02
FE XVII 2S2 2P6 - 2S2 2P5 3P(1S)	MANN DWXCI	5.628E+01	D	3.908E-03 1.615E-03 2.320E-04 -2.125E-04 2.791E-03 5.840E-02 -1.731E-02 -3.756E-04	5.844E-02
FE XVII 2S2 2P6 - 2S2 2P5 3D(3F)	MANN DWXCI	5.959E+01	D	2.901E-02 -4.657E-03 -4.072E-02 -2.437E-02 -3.725E-01 2.968E-03 -4.346E-03 4.053E-05	1.148E+00
FE XVII 2S2 2P6 - 2S2 2P5 3D(3D)	MANN DWXCI	5.959E+01	D	-4.317E-03 -2.977E-03 6.298E-04 4.999E-03 -6.534E-03 -6.841E-03 4.832E-02 4.770E-02	8.136E-02
FE XVII 2S2 2P6 - 2S2 2P5 3D(3P)	MANN DWXCI	5.959E+01	D	3.244E-02 -7.503E-03 -6.972E-02 3.706E-03 -4.788E-01 -1.197E-04 3.456E-04 6.724E-04	1.145E+00
FE XVII 2S2 2P6 - 2S1 2P6 3P(3P)	MANN DWXCI	6.595E+01	D	-1.287E-04 3.806E-04 5.057E-04 -6.289E-06 2.339E-03 -2.173E-03 3.590E-03 2.410E-03	2.524E-01
FE XVII 2S2 2P6 - 2S1 2P6 3D(3D)	MANN DWXCI	6.911E+01	D	1.824E-02 -2.694E-03 -2.126E-02 1.019E-02 -2.098E-01 1.683E-04 -3.044E-04 -7.936E-06	9.846E-01
FE XVIII 2P5 - 2P4 3S(4P)	MANN DWXCI	5.742E+01	D	-1.199E-03 1.318E-03 2.074E-03 6.172E-04 6.988E-03 -6.197E-03 1.024E-02 7.667E-03	2.521E-01
FE XVIII 2P5 - 2P4(3P)3D(4F)	MANN DWXCI	6.301E+01	D	9.022E-02 -2.059E-02 -1.265E-01 -3.038E-02 -1.123E+00 4.302E-03 -8.147E-03 4.726E-03	1.091E+00

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0 C1 C2 C3 C4 ALPHA C5 C6 C7
FE XVIII 2P5 - 2P4(3P)3D(4D)	MANN DWXCI	6.301E+01	D	9.463E-02 -1.634E-02 -1.508E-01 1.687E-02 -1.205E+00 1.063E+00 9.345E-04 -2.688E-03 5.393E-04
FE XVIII 2P5 - 2P4(3P)3D(4P)	MANN DWXCI	6.301E+01	D	-5.455E-03 -5.965E-03 4.015E-04 8.124E-03 -1.342E-02 7.944E-02 -4.365E-03 6.817E-02 5.226E-02
FE XVIII 2S2 2P5 - 2S 2P5(3P)3P(4D)	MANN DWXCI	6.851E+01	D	-3.358E-03 1.891E-03 1.192E-03 -2.426E-03 6.499E-03 2.093E-01 -1.959E-02 2.899E-02 2.414E-02
FE XVIII 2S2 2P5 - 2S 2P5(3P)3P(4P)	MANN DWXCI	6.851E+01	D	-4.676E-03 2.368E-03 2.369E-03 -3.826E-03 6.424E-03 1.741E-01 -2.596E-02 3.411E-02 3.244E-02
FE XVIII 2S2 2P5 - 2S 2P5(3P)3P(4S)	MANN DWXCI	6.851E+01	D	2.838E-03 -9.090E-04 -7.369E-03 4.503E-04 -3.950E-02 1.107E+00 -1.229E-04 2.663E-04 1.416E-04
FE XIX 2S2 2P4(3P) - 2S 2P5(1P)	ROBB CC	1.034E+01	D	-5.300E-04 -2.592E-02 -1.509E-01 3.081E-01 -4.160E-01 4.274E-01 7.321E-02 8.826E-02 8.235E-03
	MANN DWXCI	1.124E+01	D	-4.428E-03 8.999E-03 6.281E-03 1.738E-03 4.868E-03 1.269E-01 2.471E-02 2.030E-02 1.828E-02
FE XIX 2S2 2P4(1D) - 2S 2P5(3P)	ROBB CC	6.563E+00	D	2.703E-03 8.540E-02 -3.108E-01 4.906E-01 -2.576E-01 1.319E-01 4.672E-02 2.086E-02 1.725E-02
FE XX 2S2 2P3(4S) - 2S 2P4(2D)	MANN DWXCI	9.440E+00	D	-1.486E-03 2.139E-03 2.285E-03 -5.596E-04 2.624E-03 1.366E-01 8.028E-03 6.891E-03 6.442E-03
FE XX 2S2 2P3(4S) - 2S 2P4(2S)	MANN DWXCI	1.060E+01	D	-4.832E-04 8.894E-04 9.221E-04 -2.269E-04 8.120E-04 1.079E-01 2.585E-03 2.093E-03 1.772E-03
FE XX 2S2 2P3(4S) - 2S 2P4(2P)	MANN DWXCI	1.134E+01	D	-1.984E-03 4.156E-03 4.767E-03 -1.126E-03 3.990E-03 1.056E-01 1.172E-02 9.021E-03 7.946E-03
FE XXI 2S2 2P2(3P) - 2S 2P3(5S)	MANN DWXCI	3.856E+00	D	1.164E-03 -1.180E-02 1.251E-02 5.428E-03 -8.505E-03 2.717E-02 4.408E-02 -2.788E-03 -9.854E-04
FE XXI 2S2 2P2(3P) - 2S 2P3(1D)	MANN DWXCI	9.388E+00	D	-8.870E-03 1.282E-02 1.392E-02 -2.257E-03 1.524E-02 1.452E-01 4.753E-02 4.166E-02 3.974E-02
FE XXI 2S2 2P2(3P) - 2S 2P3(1P)	MANN DWXCI	1.051E+01	D	-2.045E-03 3.005E-03 3.166E-03 -6.654E-04 3.306E-03 1.277E-01 1.054E-02 9.204E-03 8.236E-03
FE XXI 2S2 2P2(3P) - 2P1 3D1(1F)	MANN DWXCI	7.426E+01	D	7.193E-03 -9.335E-04 -2.727E-02 -3.935E-03 -1.945E-01 1.355E+00 -3.112E-03 2.052E-02 1.749E-02
FE XXI 2S2 2P2(3P) - 2P1 3D1(1D)	MANN DWXCI	7.426E+01	D	-7.988E-03 -2.033E-02 1.277E-02 -7.139E-03 -2.226E-03 6.908E-02 9.687E-03 5.715E-02 5.175E-02

TRANSITION	DATA	THRESHOLD ENERGY	FIT	COEFFICIENTS C0	C1	C2	C3	C4	ALPHA
				C5	C6	C7			
FE XXI									
2S2 2P2(3P) - 2P1 3D1(1P)	MANN DWXCI	7.426E+01	D	8.168E-03	-2.623E-03	-2.828E-02	-4.260E-03	-1.723E-01	1.395E+00
				8.893E-05	1.671E-03	1.827E-03			
FE XXIII									
2S2 - 2S 3P(3P)	MANN DWXCI	8.289E+01	D	-2.071E-03	7.057E-04	5.424E-04	-8.370E-04	2.194E-03	2.031E-01
				-7.314E-03	1.243E-02	9.464E-03			
FE XXIII									
2S2 - 2S 3D(3D)	MANN DWXCI	8.438E+01	D	1.927E-02	-4.513E-03	-3.061E-02	1.437E-02	-2.359E-01	9.588E-01
				3.477E-04	-3.908E-04	-1.320E-05			
FE XXIV									
1S2 2S - 1S 2S 2P(4P)	MANN DWXCI	4.870E+02	D	4.116E-03	-1.031E-03	-1.184E-02	-5.039E-03	-7.680E-02	1.456E+00
				3.825E-05	-1.102E-04	3.440E-04			
MO XXXI									
3S2 - 3S 3P(3P)	MANN DWXCI	5.541E+00	D	-6.078E-03	1.521E-02	1.830E-02	-1.515E-02	3.294E-02	9.456E-02
				3.998E-02	3.498E-02	3.478E-02			
MO XXXI									
3S2 - 3S 3D(3D)	MANN DWXCI	1.423E+01	D	-3.655E-04	2.371E-03	3.427E-03	9.523E-04	3.988E-03	7.416E-02
				4.436E-03	7.812E-04	-2.434E-04			

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REFERENCES

1. J. B. Mann, private communication.

2. W. D. Robb, private communication.

3. S. Nakazaki and T. Hashino, "Excitation of Beryllium-like Ions by Electron Impact," Journ. of the Phys. Soc. of Japan 43, 281 (1977).

4. A. R. Jackson, "Excitation of C II]λ2326, O III]λ1664 and Other Semiforbidden Emission Lines in Quasars," Mon. Not. R. Astron. Soc. 165, 53-60 (1973).

5. W. Eissner, "Computer Methods and Packages in Electron-Atom Collisions II," the VII ICPEAC Invited Papers and Progress Reports, T. R. Govers and F. J. deHeer, Eds. (North Holland Publishing Co., Amsterdam, 1971), pp. 460-78.

6. K. P. Dere, H. E. Mason, K. G. Widing and A. K. Bhatia (Preprint).

7. H. E. Mason, "The Excitation of Several Iron and Calcium Lines in the Visible Spectrum of the Solar Corona," Mon. Not. R. Astron. Soc. 170, 651 (1975).

8. H. E. Mason and P. J. Storey (Preprint).

9. H. E. Mason and A. K. Bhatia, "Theoretical Intensity Ratios for the UV Lines of Mg VII, Si IX, and S XI," Mon. Not. R. Astron. Soc. 184, 423 (1978).

10. A. K. Bhatia and H. E. Mason, private communication.

11. A. K. Bhatia, private communication.

12. M. J. Seaton, "Computer programs for the Calculation of Electron-Atom Collision Cross Sections, "J. Phys. B1, 1817 (1974).

13. D. G. Hummer and D. W. Norcross, "Light Ions of Astrophysical Interest-Radiative Transition Probabilities for C III, N IV, O V and Ne VII," Mon. Not. R. Astron. Soc. 168, 263-272 (1974).

14. S. M. Younger, private communication.

15. J. Peek, private communication.

16. J. Davis, P. C. Kepple and M. Blaha, "Distorted Wave Calculations for Gaunt Factors, Cross Sections and Rate Coefficients of Selected Allowed Forbidden and Spin Exchange Transitions," Naval Research Laboratory Memorandum Report 2939, November 1974.

17. M. Blaha and J. Davis, "Electron Impact Excitation of Highly Charged Sodium-like Ions," J. Quant. Spectrosc. Radiant. Transfer 19, 227 (1978).

18. M. Blaha, private communication.

19. M. S. Pindzola, "Electron Impact Excitation of Oxygen III," Phys. Rev. A 15, 2238 (1977).

20. J. Callaway, R. J. W. Henry and A. P. Msezane, "Excitation of Ions of the Lithium Isoelectronic Sequence in the Relativistic Coulomb Born Approximation," preprint.

21. K. A. Berrington, P. G. Burke, P. L. Dufton and A. E. Kingston, "Electron Collisional Excitations of C III and O V," J. Phys. B 10, 1465 (1977).

22. P. L. Dufton, K. A. Berrington, P. G. Burke and A. E. Kingston, "The Interpretation of C III and O V Emission Line Ratios in the Sun," Astrophys. 62, 111 (1978).

23. P. G. Burke and A. E. Kingston, private communication.

24. D. H. Sampson, R. E. H. Clark, L. B. Golden and A. D. Parks, "Collision Strengths for Transitions Among Levels of the $1s^2 2s^2$, $1s^2 2s2p$ and $1s^2 2p^2$ Configurations in Highly Charged Be-like Ions," preprint.

25. D. H. Sampson, H. D. Parks and R. E. H. Clark, "Intermediate-Coupling Collision Strengths for Fine-Structure Transitions Between S and P Levels and S and D Levels in Highly Charged He-like Ions," Phys. Rev. A 17, 1619 (1978).

26. D. E. Osterbrock, "Excitation of Semi-Forbidden $2s^2\ ^1S$ - $2s2p\ ^3P$ Lines Observed in Quasars and Nebulae," J. Phys. B 3, 149-160 (1970).

27. S. Ormonde, K. Smith, B. W. Torres and A. R. Davies, "Configuration Interaction Effects in the Scattering of Electrons by Atoms and Ions of Nitrogen and Oxygen," Phys. Rev. A 8, 262 (1973).

28. P. O. Taylor, D. C. Gregory, G. H. Dunn, R. A. Phaneuf and D. H. Crandall, "Absolute Cross Sections for 2s - 2p Excitation of C^{3+} by Electron Impact," Phys. Rev. Lett. 39, 1256 (1977).

29. D. C. Gregory, G. H. Dunn, R. A. Phaneuf and D. H. Crandall, private communication.

30. Y. K. Kim and K. T. Cheng, "Bethe Cross Sections for the Sodium Isoelectronic Sequence," Phys. Rev. A 18, 36-47 (1978).

31. Y. K. Kim, private communication.

32. H. Nussbaumer, "Spectral Lines in the Be I Isoelectronic Sequence," Astron. and Astrophys. 16, 77-80 (1972).

33. D. R. Flower, "Collision Strengths for Electron Excitation of Highly Ionized Complex Ions," J. Phys. B 4, 647 (1971).

34. D. R. Flower and J. M. Launay, "Electron Collisional Excitation of C^{2+}," Astron. and Astrophys. 29, 321-6 (1973).

35. D. R. Flower and H. Nussbaumer, "Relative Intensities of Solar Emission Lines of Ions in the Sodium Isoelectronic Sequence," Astron. and Astrophys. 42, 265 (1975).

36. D. R. Flower and H. Nussbaumer, "On the Extreme Ultraviolet Solar Emissions of B-like Ions: O IV," Astron. and Astrophys. 45, 145 (1975).

37. D. R. Flower and H. Nussbaumer, "On the Extreme Ultraviolet Solar Emission of B-like Ions: Na VII, Si X, S XII," Astron. and Astrophys. 45, 349 (1975).

38. W. L. Wyngaarden and R. J. W. Henry, "Excitation of Ne VIII by Electron Impact," Canadian Journal of Physics 54, 2019 (1976).

39. W. L. Wyngaarden and R. J. W. Henry, "Excitation of N V by Electron Impact," J. Phys. B 9, 1461 (1976).

40. J. N. Gau and R. J. W. Henry, "Excitation of Lithium-like Ions by Electron Impact," Phys. Rev. A 16, 986 (1977).

41. R. J. W. Henry, private communication.

42. N. H. Magee, J. B. Mann, A. L. Merts, and W. D. Robb, "Electron Impact Excitation of Carbon and Oxygen Ions," Los Alamos Scientific Laboratory report LA-6691-MS (1977).

43. P. G. Burke and M. J. Seaton, "Numerical Solutions of the Integro-Differential Equation of Electron-Atom Collision Theory," Methods Comp. Phys. 10, 1 (1971).

44. M. A. Cross, M. J. Seaton and P. M. H. Wilson, "IMPACT, A Program for the Solution of the Coupled Integro-Differential Equations of Electron-Atom Collision Theory," Comp. Phys. Commun. 15, 23 (1978).

45. K. A. Berrington, P. G. Burke, M. LeDourneuf, W. D. Robb, K. I. Taylor and Vo Ky Lan, "A New Version of the General Program to Calculate Atomic Continuum Processes using the R-Matrix Method," Comp. Phys. Commun. 14, 367 (1978).

46. E. R. Smith and R. J. W. Henry, "Noniterative Integral-Equation Approach to Scattering Problems," Phys. Rev. A7, 1585 (1973).

47. S. Ormonde, K. Smith, B. W. Torres and A. R. Davies, "Configuration-Interaction Effects in the Scattering of Electrons by Atoms and Ions of Nitrogen and Oxygen," Phys. Rev. A8, 262 (1973).

48. J. M. Peek and J. B. Mann, "Continuum Orbital Approximations in Weak-Coupling Theories for Inelastic Electron Scattering," Phys. Rev. 16, 2375 (1977).

49. R. D. Cowan and D. C. Griffin, "Approximate Relavistic Corrections to Atomic Radial Wave Functions," J.O.S.A. 66, 1010 (1976).

50. M. E. Riley and D. G. Truhlar, "Approximations for the Exchange Potential in Electron Scattering," J. Chem. Phys. 63, 2182 (1975).

51. R. D. Cowan, Theory of Atomic Structure and Spectra, University of California Press, Berkeley (1980).

52. K. A. Berrington, P. G. Burke, P. L. Dufton, A. E. Kingston and A. L. Sinfailam, "Electron Collisional Excitation of O V: Effect of Resonances Converging to the n = 3 Thresholds," J. Phys. B: Atom. Molec. Phys. in press.

53. R. D. Cowan, "Resonant-Scattering (Autoionization) Contributions to Excitation Rates in O^{4+} and Similar Ions," J. Phys. B: Atom. Molec. Phys. in press.

APPENDIX A

Yong-Ki Kim

I enclose a few tables of cross sections in the hope that you may be able to include some of them in the Atomic Data Workshop Report. For the resonance transitions of some Li-like and Na-like ions, I converted the Bethe cross sections to Seaton's collision strength, Ω, in the same unit as that used in your report. The tables of Ω are there only to help you compare with your results. Since Ω can be easily calculated from the Bethe parameters (AA, BB, CC), I think it is unnecessary to include the Ω tables in the report.

For fitting purposes, I suggest that the high-energy values of the first two parameters (AA and BB) be retained and fit the other parameters (e.g., C_1 and C_2 of Form A, p. 122 of LASL preliminary report) to the low-x part of Ω calculated by Mann and Robb.

I used relativistic Hartree-Fock wavefunctions, and the parameters for the $np_{\frac{1}{2}}$ and $np_{3/2}$ excitations should be summed to be compared with corresponding nonrelativistic results. For example, $\Omega(2s \rightarrow 2p;C^{3+}) = \Omega(2s \rightarrow 2p_{\frac{1}{2}}) + \Omega(2s \rightarrow 2p_{3/2})$,

$AA(2s \rightarrow 2p;C^{3+}) = AA(2s \rightarrow 2p_{\frac{1}{2}}) + AA(2s \rightarrow 2p_{3/2}) = 1.313 + 2.626 = 3.939$

$BB(2s \rightarrow 2p;C^{3+}) = 2.697 + 5.392 = 8.089$

$CC(2s \rightarrow 2p;C^{3+}) = -0.5584 - 1.117 = -1.675.$

The excitation energies for the $np_{\frac{1}{2}}$ and $np_{3/2}$ states of Fe and Mo ions show 10-200% differences according to relativistic calculations, and I am not sure whether one should put them together on the same x(=T/E) scale or not. Please feel free to use the enclosed data in any way you choose, and let me know if you have any questions. Our Na-sequence data should be credited to Y.-K. Kim and K. T. Cheng, Phys. Rev. A 18, 36 (1978), but the Li-sequence data have not been published yet.

D. H. Sampson

Intermediate Coupling Collision Strengths for Transitions Among Levels of the $1s^2 2s^2$, $1s^2 2s2p$ and $1s^2 2p^2$ Configurations in Highly Charged Be-like Ions

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Summary

Intermediate coupling collision strengths are given for transitions among the levels of the $1s^2 2s^2$, $1s^2 2s2p$ and $1s^2 2p^2$ configurations in the Be-like ions Si^{10+}, A^{14+}, Fe^{22+}, Mo^{38+} and W^{70+}. The method used is a Coulomb Born exchange method described in Secs. II and III of Ref. 1. The approach can be regarded as use of first order time dependent perturbation theory in which the entire electrostatic interaction between the electrons and the relativistic interactions are treated as the perturbation. Hence the zeroth order Hamiltonian is a sum of independent hydrogenic-ion Hamiltonions all of the same form. As a consequence of this no orthogonality problems arise and exchange is handled in a completely consistent manner. Also the results for complex ions can be expressed in terms of the scaled R-matrix elements $Z R_H$ for hydrogenic ions so the computational

effort is relatively small. Configuration mixing and intermediate coupling effects are included through use of mixing coefficients determined by diagonalizing the electrostatic interaction between the electrons in the target ion and the relativistic interaction. For the latter we use the terms going as $\alpha^2 Z^4$. Mixing is allowed among all states having a common J value and belonging to the same complex. For optically allowed transitions the Coulomb-Bethe approximation[2] is used to obtain the contribution for large L. In doing this we used line strengths calculated with the same target ion wave functions as used in determining the R-matrix elements for small L. Our calculations give the scaled collision strengths $Z^2\Omega$. In order to obtain Ω we divided by Z^2_{eff}, where $Z_{eff} = Z - 2.46$ for Be-like ions.

[1]D. H. Sampson, A. D. Parks and R.E.H. Clark, Phys. Rev. A 17, 1619 (1978).
[2]A. Burgess and V. B. Sheorey, J. Phys. B: Atom. Molec. Phys. 7, 2403 (1974).

J. Callaway

EXCITATION OF IONS OF THE LITHIUM ISOELECTRONIC SEQUENCE IN THE RELATIVISTIC COULOMB BORN APPROXIMATION

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ABSTRACT

The cross sections for the electron impact excitation of the $2p_{\frac{1}{2}}$ and $2p_{3/2}$ states of the lithium-like ions C^{3+}, Fe^{23+}, Mo^{39+}, and W^{71+} were calculated in the Relativistic Coulomb-Born Approximation. Exchange and unitarization were neglected. A range of incident electron energies from the $2p_{\frac{1}{2}}$ threshold to (approximately) 10 times the $2p_{3/2}$ threshold was considered. Numerical wave functions for the ionic states were obtained from a Dirac-Fock program. The continuum Coulomb wave functions were also computed numerically. The most significant relativistic effects result from the spin orbit splitting of the 2p states. An interpolation formula was obtained which permits the estimation of these cross sections for similar ions of intermediate charges.

S. M. Younger

Brief Description of Calculations

Electron impact excitation collision strengths were computed in a nonunitarized distorted wave approximation with consideration of exchange in the transiticn matrix element. The target states were Hartree-Fock orbitals and the partial waves were generated in the direct electrostatic potential corresponding to the frozen-core Hartree-Fock target. Distinct initial and final state potentials were employed. Configuration interaction within the target was approximated by multiplying the single configuration collision strengths by the ratio of the correlated to noncorrleated line strength corresponding to the transition under study.

APPENDIX B

FITTING COLLISION STRENGTHS ALONG ISOELECTRONIC SEQUENCES*

N. H. Magee, Jr., and A. L. Merts

ABSTRACT

In many applications that use electron-ion impact cross sections (collisions strengths or excitation rates), it is prohibitive in time or storage to either calculate or store all of the necessary cross section data. Since accuracy of 10-20% is usually adequate, it is highly suggestive tc use scaling along an isoelectronic sequence. However, it is easy to demonstrate that single parameter scaling will not work to better than a factor of 2 over the entire energy range unless one is only interested in quite high stages of ionization. We will show, for optically allowed, $\Delta n = 0$ transitions, that a 2 parameter type "scaling" can be used to achieve results with about a 10% maximum error. Examples are shown in this paper for Li, Be, and Na like sequences. The form of the fit is

$$\Omega = F_1(Z)(A + B/X + C/X^2) + F_2(Z)\ \ell n(X)$$

where A, B and C are constants for each isoelectronic sequence. The X (or energy dependence) fit has been used previously to better than a few percent error for a large number of optically allowed transitions.

B-1. INTRODUCTION

There are a growing number of applications today that require the use of a large number of electron impact cross-sections (collision strengths or excitation rates). These include Tokamak power loss and transport calculations and many astrophysical calculations. For diagnostic work, the most precise values possible are required, but for modeling and transport calculations, accuracy of 10 to 20% is usually quite adequate. In solving a system containing a large number of elements and possible ionization stages, it is prohibitive in time or storage to either calculate or store all of the necessary cross section data. Thus, it was

*Work performed under the auspices of the U.S. Department of Energy.

felt to be useful to provide fits that would be accurate to better than 20%.

Our first venture into this field[42] arose from a meeting on collision strengths held in Los Alamos in September 1976. Using the data available from this meeting, we developed fits for spin allowed and spin forbidden transitions, which are given below.

Spin allowed transition:

$$\Omega(X) = C_0 + \frac{C_1}{X} + \frac{C_2}{X^2} + C_3 \ln X \quad . \tag{B.1}$$

Spin forbidden transition:

$$\Omega(X) = \frac{C_0}{X^2} + \sum_{n=1}^{4} C_n e^{-n\alpha X} \tag{B.2}$$

where $X = E/E_{threshold}$.

For $\Delta n = 0$, dipole allowed transitions (a subset of the spin allowed transitions and the only ones to be discussed in the rest of this paper), this fit proved to be accurate to better than a few percent for more than fifty transitions in elements from beryllium to molybdnum and a wide variety of ionization stages. This was an improvement for calculations, as only four members needed to be stored for each individual transition. However, it would be more convenient to have a single fit for every transition in an isoelectronic sequence, as long as the accuracy was still acceptable. Using the data from the November 1978 Atomic Data Workshop held in Los Alamos, we are presenting our intial attempt to provide a single fit for both energy and Z.

B.2 CALCULATIONS

We have restricted ourselves to $\Delta n = 0$, optically allowed transitions for three reasons:

1. They are perhaps the most important types of transition in radiation power loss calculations.

2. There is much more data (relatively speaking) available for these transitions than for other spin allowed or spin forbidden transitions.

3. As stated above, the energy fits that we developed in Eq. B.1 are very accurate, and it was felt that adapting this fit into an energy and Z dependent fit would leave us with an expression that would be accurate to within 10% over the entire data range. The isoelectronic sequences considered in this paper are: Li 2s - 2p, Be $2s^2$ - 2s2p (^1P) and Na 3s - 3p. We have used the data of J. B. Mann,[1] Y. K. Kim,[30,31] and M. Blaha[17] in our calculations (see Table B-I for more details). Figures B1-B5 show the actual collision strength data for each author.

When presenting the data at the Atomic Data Workshop we tried to scale the transitions in an isoelectronic sequence using a single parameter scaling $(Z-C)^2$. An example of this is shown in Fig. B6 for the sodium 3s - 3p sequence. It was not possible to find a single constant C that simultaneously scaled both the threshold and high energy points. In order to show this point more effectively, let us consider the following. If it is true that a single parameter scaling exists, then it can be states that

$$(Z_1 - C)^2 \, \Omega_{Z_1}(X) = (Z_2 - C)^2 \, \Omega_{Z_2}(X) \tag{B.3}$$

or

$$\frac{\Omega_{Z_1}(X)}{\Omega_{Z_2}(X)} = \frac{(Z_2 - C)^2}{(Z_1 - C)^2} = \text{constant for all X.}$$

To show this for an entire isoelectronic sequence, the following ratio is more easily plotted.

$$R = \frac{\Omega_Z(X)}{\Omega_{Z_{max}}(X)} \cdot \frac{\Omega_{Z_{max}}(100)}{\Omega_Z(100)}$$

this gives a family of curves that are all normalized to 1. at X = 100. and where the highest Z curve is normalized to 1 for all X. These ratios are shown in Figs. B7-B10 for the data of Figs. B1-B4. As can been seen, all of the sequences diverge from 1. at threshold, more than a factor of 2 for the lightly

ionized elements. Normalizing at a smaller X will reduce the differences at threshold, but the high energy values will then diverge. Overall, if one attempts to fit these sequences with a single parameter scaling, one can not d better than a factor of two over the full energy range, unless you only consider high stages of ionization or large X.

In Fig. B11, we plot the collision strength at X = 1. and X = 100. for the lithium and sodium sequences versus ionization stage (Roman nomenclature). It is apparent that the threshold and high energy curves display different behavior. For this reason, we use a two parameter "Z scaling" to handle the threshold and asymptotic regions, but we use for each the form of the single parameter scaling, for reasons to be discussed later. Combining this with the energy fit of Eq. B.1, we have

$$\Omega_Z(X) = \frac{1}{(Z - B_1)^2}\left(C_0 + \frac{C_1}{X} + \frac{C_2}{X^2}\right) + \frac{1}{(Z - B_2)^2} C_3 \ln X \qquad (B.4)$$

The constants are obtained as follows. Each data set is fit using Eq. B.1 to get a C_3 for each element, which represents the asymptotic slope. For both C_3 and $\Omega(1)$, we have the form:

$$\frac{A}{(Z - B)^2} \quad .$$

A_1, B_1 and A_2, B_2 are obtained from all the $\Omega(1)$'s and C_3's respectively using a weighed least squares fit over the available data. B_1 and B_2 are then substituted into Eq. B.4 and C_0, C_1, C_2 and C_3 obtained from a least square fit over the entire data set. The constants for the first four sets of data are given in Table B-II (the Na 3s - 3p numbers for the Blaha data are omitted as the data only goes to X = 16. and this was not far enough to establish the asymptotic behavior). Figures B12-B16 show the fits plotted against the data. Note that only the 2^+ and higher stages of ionization are included. While we have fit the 1^+ ionization state, we are presently getting a 25% error at threshold for those curves and that is outside the accuracy we are attempting to establish. With that data excluded, we can fit the remaining data to better than 10% for all X and Z. This is shown in Figs. B17-B20, where we plot the ratio $\Omega_{Fit}(X)/\Omega(X)$.

B-3. CONCLUSIONS

We feel that the 2 parameter "scaling" gives good results for optically allowed transitions, but that the results must be considered preliminary due to the small sample of transitions studies thus far. It is encouraging that we can fit the data of three different authors as this indicates that the procedure is not dependent upon any specific method of calculation, such as Distorted Wave, R-Matrix, Coulomb Born, etc. It is possible that the Z dependence may need to be changed, especially for the threshold term. B_2, which reflects the high energy behavior, is quite close to the screening calculated from hydrogenic shielding and thus $Z - B_2$ becomes the effective Z, which we feel is a good representation for the high energy behavior. We can find no such simple interpretation of B_1, which may be trying to represent the effects of exchange, unitarization, and configuration interaction. Comparison of B_1, B_2 and the shielding constants are shown in Table B-III. After we have examined the above in more detail and for more transitions, we hope to extend our calculations to all spin allowed and the spin forbidden transitions.

TABLE B-I

THRESHOLD ENERGIES

Sequence	Z	Averaged Threshold Energy (Ryd.)		
		Mann	Kim	Blaha
Li like 2s - 2p	4	.2910		
	5	.4409		
	6	.5883	.5940	
	7	.7348	.7417	
	8	.8815	.8892	
	14	1.8000		
	18	2.4797		
	22		3.3560	
	26	4.2888	4.4010	
	42		12.7000	
Be like $2s^2$ - $2s2p\ ^1P$	6	.9327		
	8	1.4471		
	18	3.7870		
	26	6.4781		
Na like 3s - 3p	11		.1435	
	12	.3256	.3142	
	13	.4906	.4825	
	14	.6525		
	15		.8086	
	18	1.2928	1.2940	
	20			1.6184
	26	2.6532	2.6670	2.6531
	30			3.1389
	36		4.7940	4.1309
	42	6.4235	6.4990	5.1484

TABLE B-II

FIT COEFFICIENTS

Sequence	Author	B_1	B_2	C_0	C_1	C_2	C_3
Li 2s - 2p	Mann	.238	1.498	107.90	339.36	-145.69	98.23
Li 2s - 2p	Kim	-.12	1.81	287.90	-31.71	-18.06	70.70
Be $2s^2$ - 2s2p ^1P	Mann	-1.95	1.53	54.74	376.31	-178.88	81.03
Na 3s - 3p	Mann	4.02	7.66	682.04	1412.1	-434.24	441.53

TABLE B-III

Z COEFFICIENT COMPARISON

Sequence	B_1			B_2			Screening Constant
	Kim	Blaha	Mann	Kim	Blaha	Mann	
Li 2s - 2p	-.12		.238	1.81		1.498	1.679
Be $2s^2$ - 2s2p ^1P			-1.95			1.525	2.28
Na 3s - 3p		5.48	4.02	7.69	8.69*	7.66	7.99
			(4.73)**				

*Data only goes to X = 16., not far enough to establish asymptotic behavior.

**Comparison with Blaha when using approximately same range of elements.

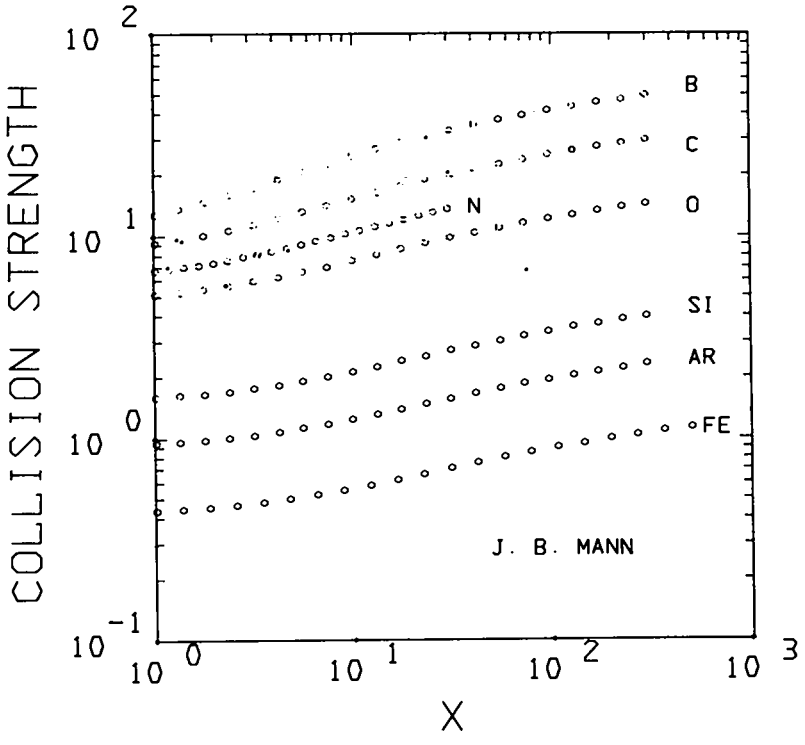


Fig. B1. Lithium isoelectronic sequence ($1s^2$ 2s - $1s^2$ 2p) of J. B. Mann data from B to Fe.

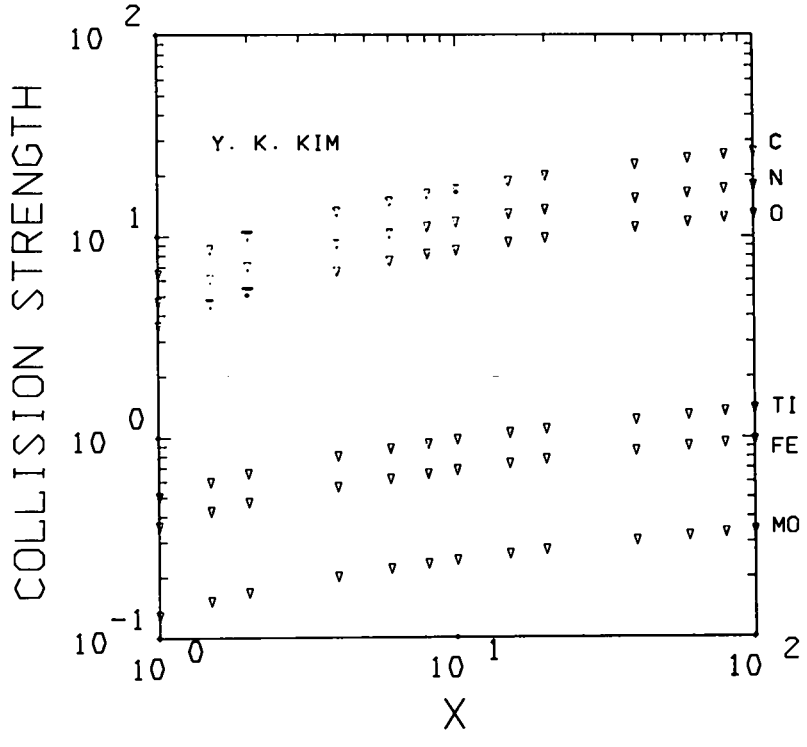
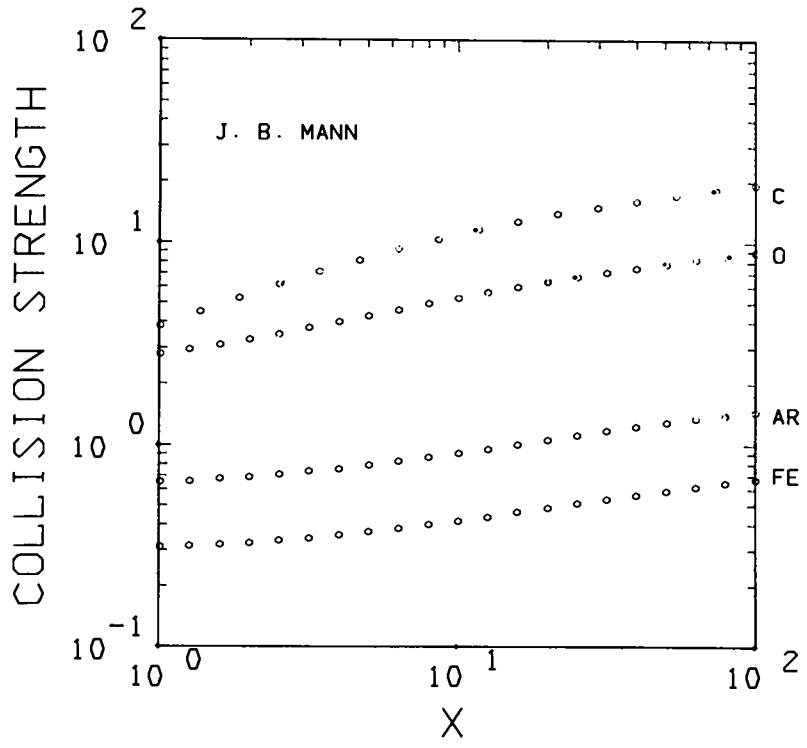


Fig. B2. Lithium isoelectronic sequence ($1s^2$ 2s - $1s^2$ 2p) of Y. K. Kim data from C to Mo.



. Fig. B3. Beryllium isoelectronic sequence ($2s^2$ - 2s 2p ^1p) of J. B. Mann data from C to Fe.

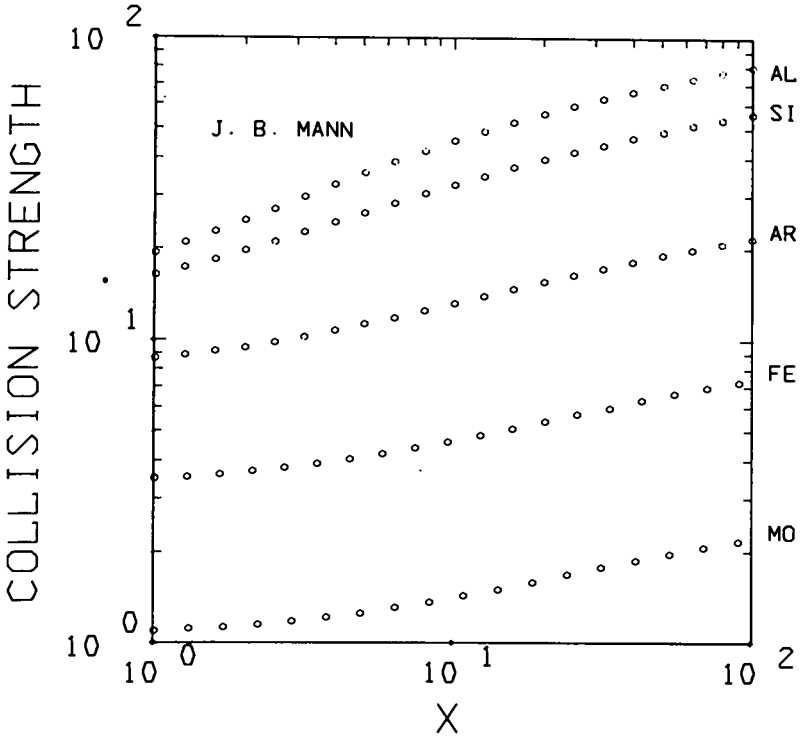


Fig. B4. Sodium isoelectronic sequence (3s - 3p) of J. B. Mann data from Al to Mo.

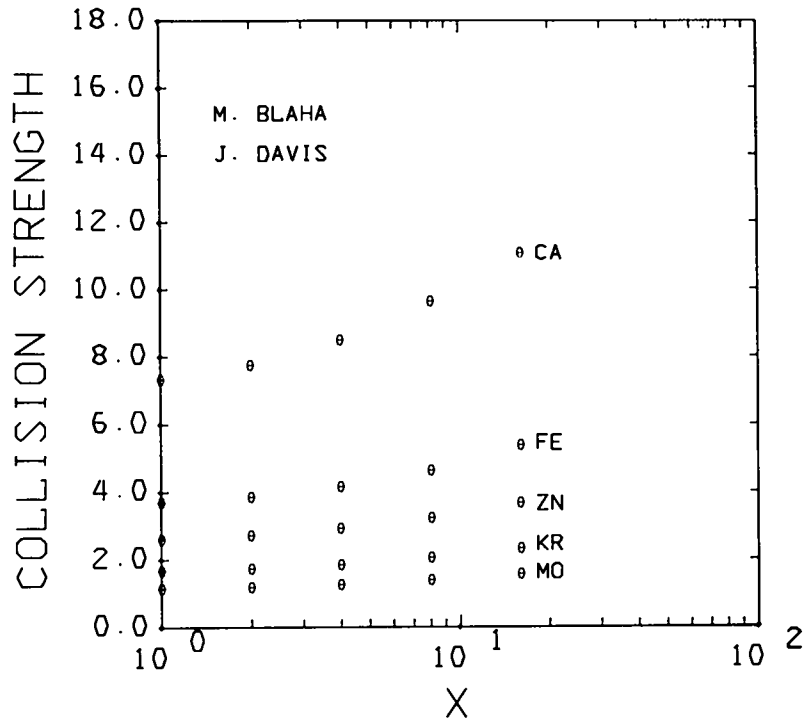


Fig. B5. Sodium isoelectronic sequence (3s - 3p) of Blaha and Davis data from Ca to Mo.

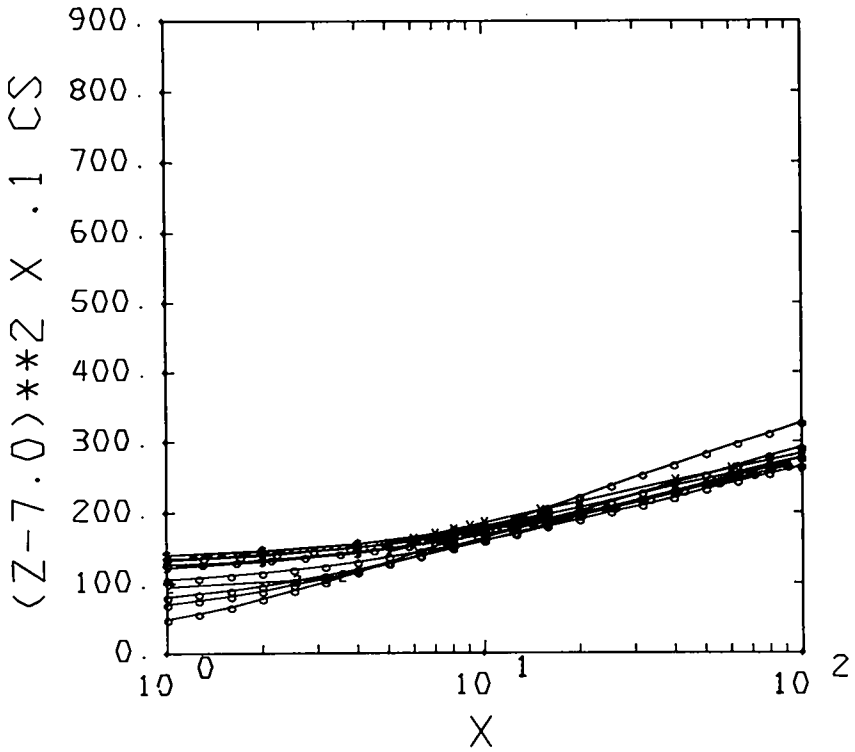


Fig. B6. Scaled sodium isoelectronic sequence, several authors data included (see Fig. 8).

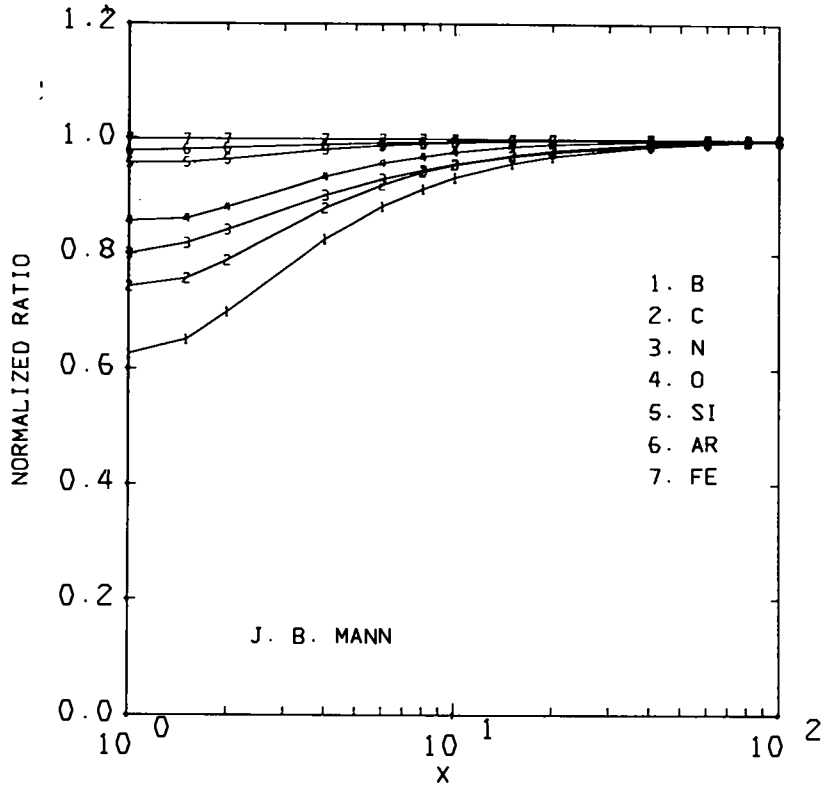


Fig. B7. Collision strength ratios of J. B. Mann for the Lithium sequence of Fig. B1.

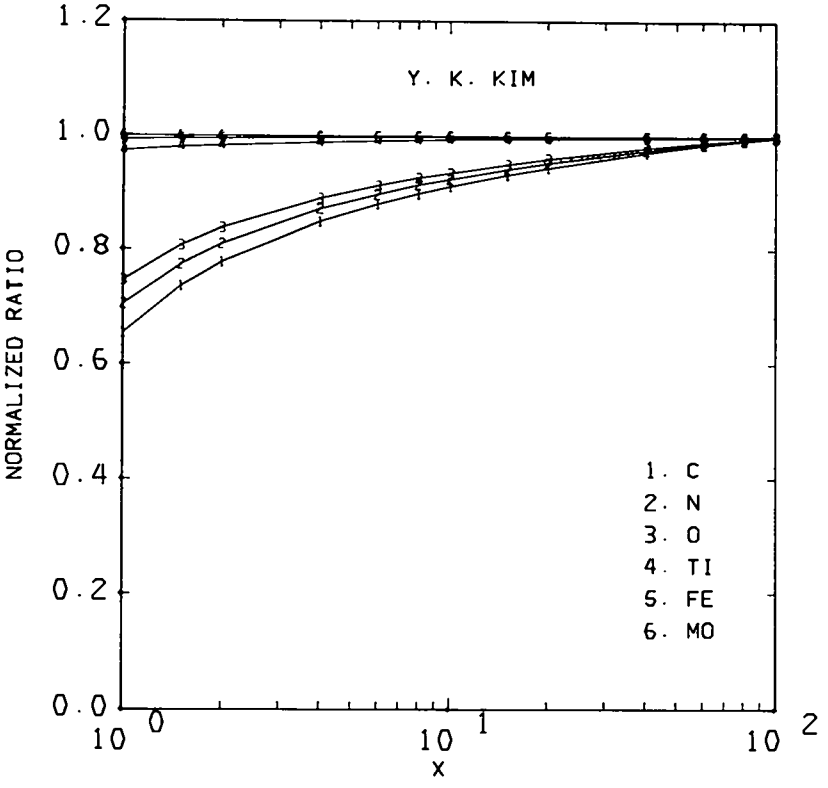


Fig. B8. Collision strength ratios of Y.K. Kim for the Lithium sequence of Fig. B2.

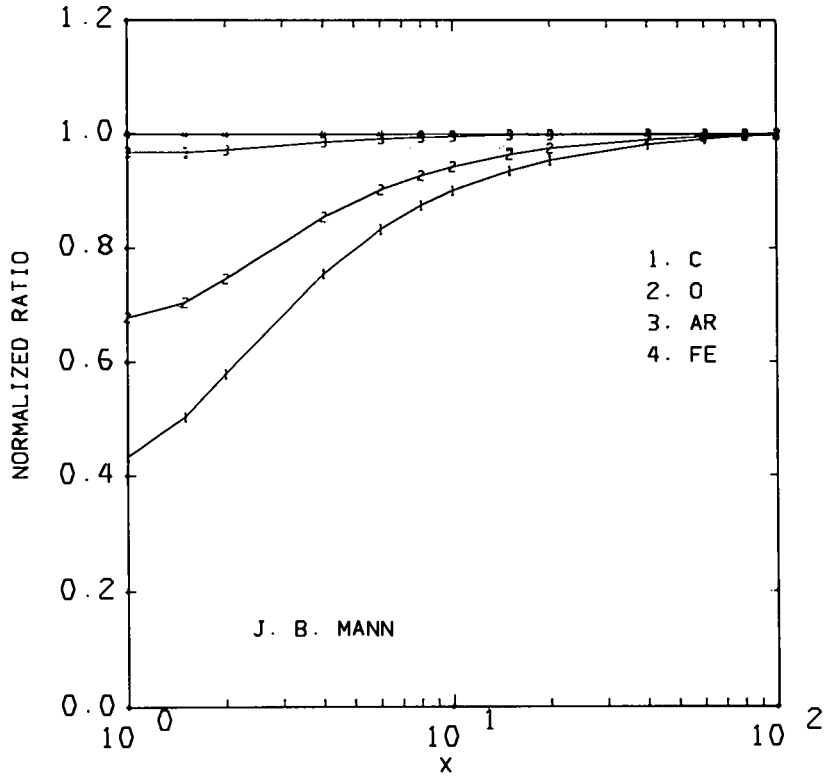


Fig. B9. Collision strength ratios of J. B. Mann for the Beryllium sequence of Fig. B3.

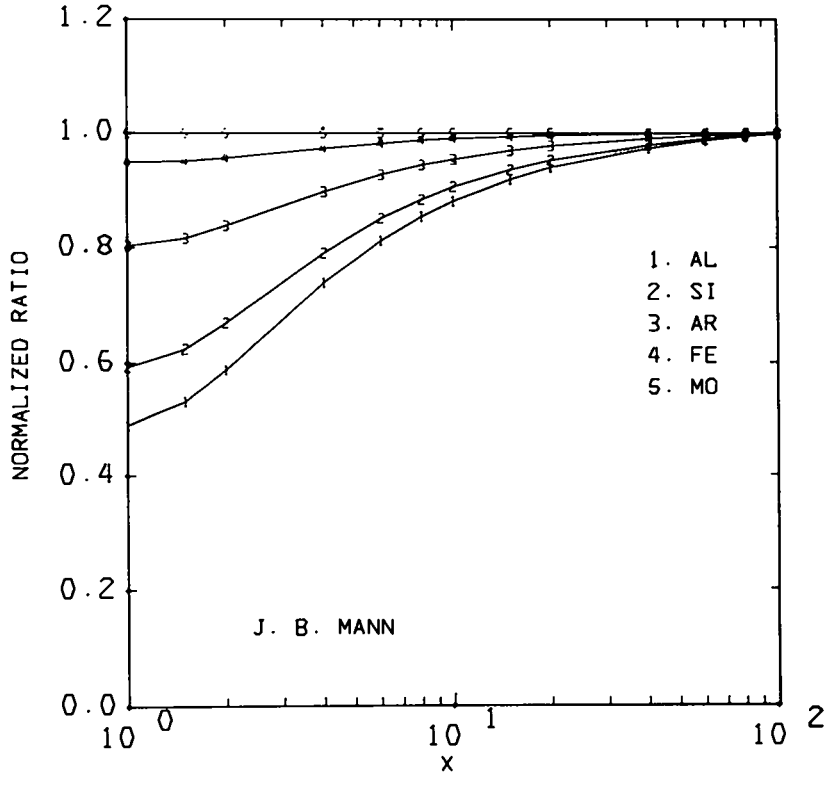


Fig. B10. Collision strength ratios of J. B. Mann for the Sodium sequence of Fig. B4.

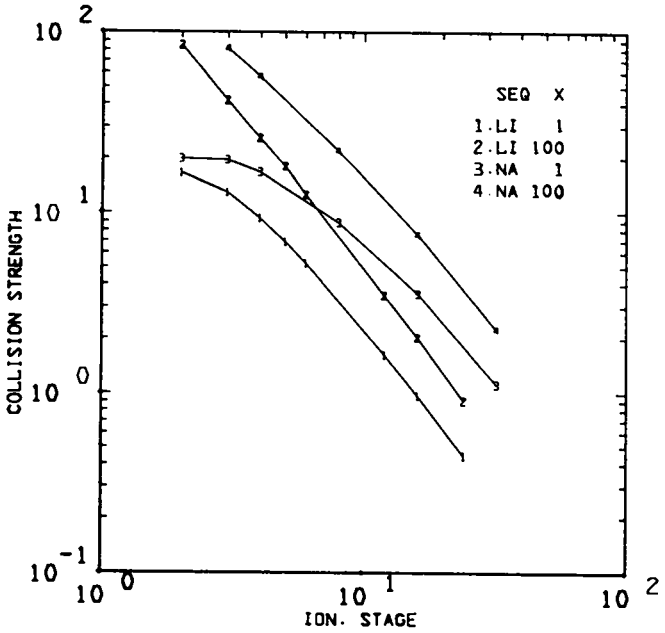


Fig. B11. Plots of Mann collision strengths at X = 1 and X = 100 ($X = E/E_T$) for the Lithium and Sodium isoelectronic sequences, demonstrating the difference in X dependence at threshold and high energy.

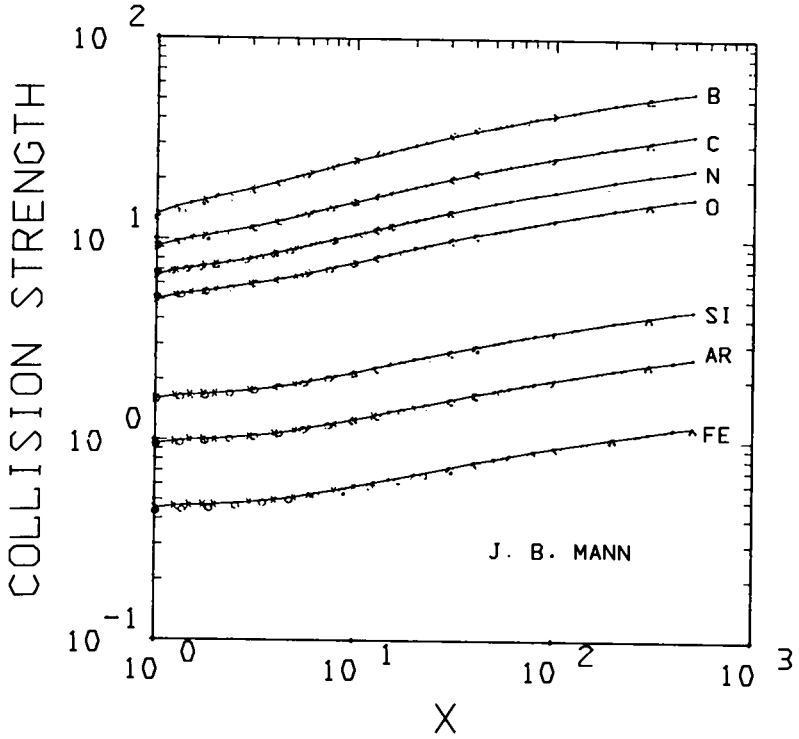


Fig. B12. Fits (connected X's) and data for the Lithium sequence ($1s^2$ 2s - $1s^2$ 2p) of Fig. B1.

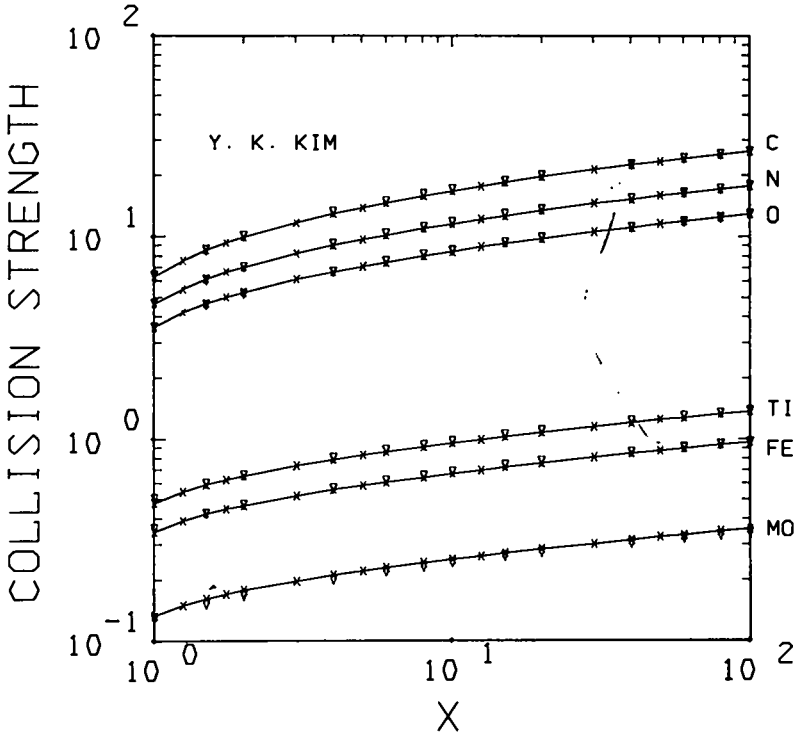


Fig. B13. Fits (connected X's) and data for the Lithium sequence ($1s^2$ 2s - $1s^2$ 2p) of Fig. B2.

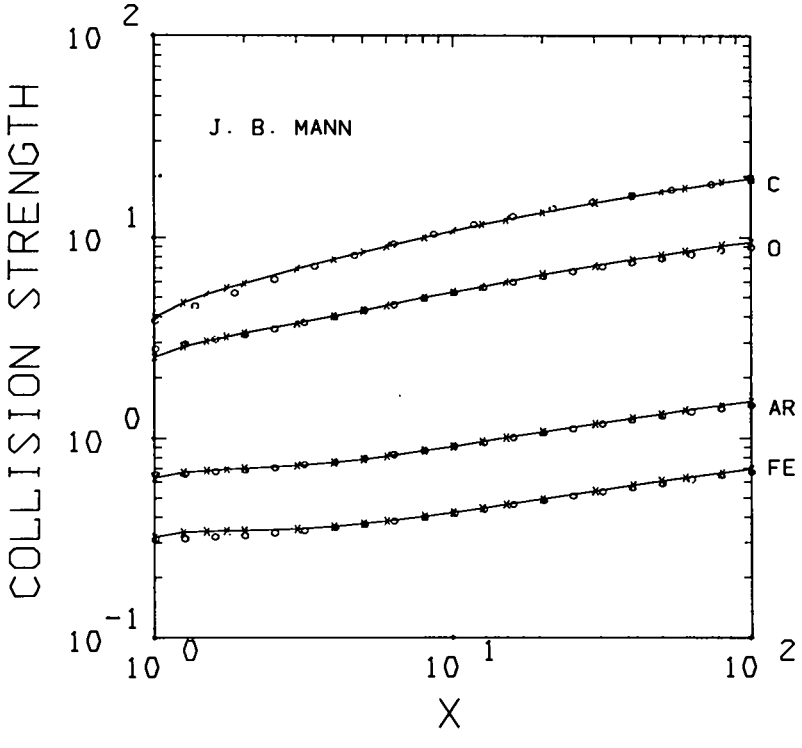


Fig. B14. Fits (connected X's) and data for the Beryllium sequence ($2s^2$ - 2s 2p ^{1}p of Fig. B3.

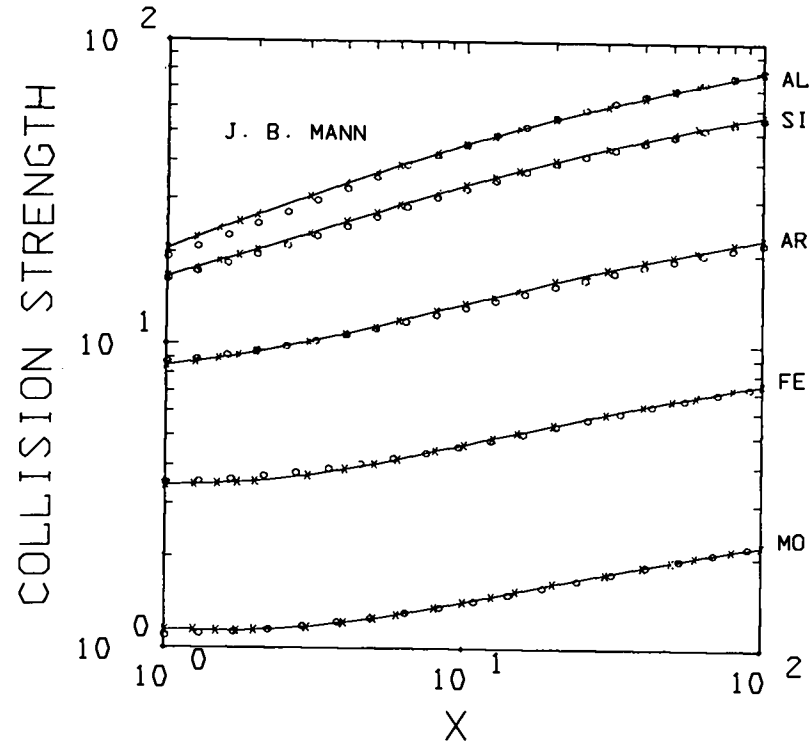


Fig. B15. Fits (connected X's) and data for the Sodium sequence (3s - 3p) of Fig. B4.

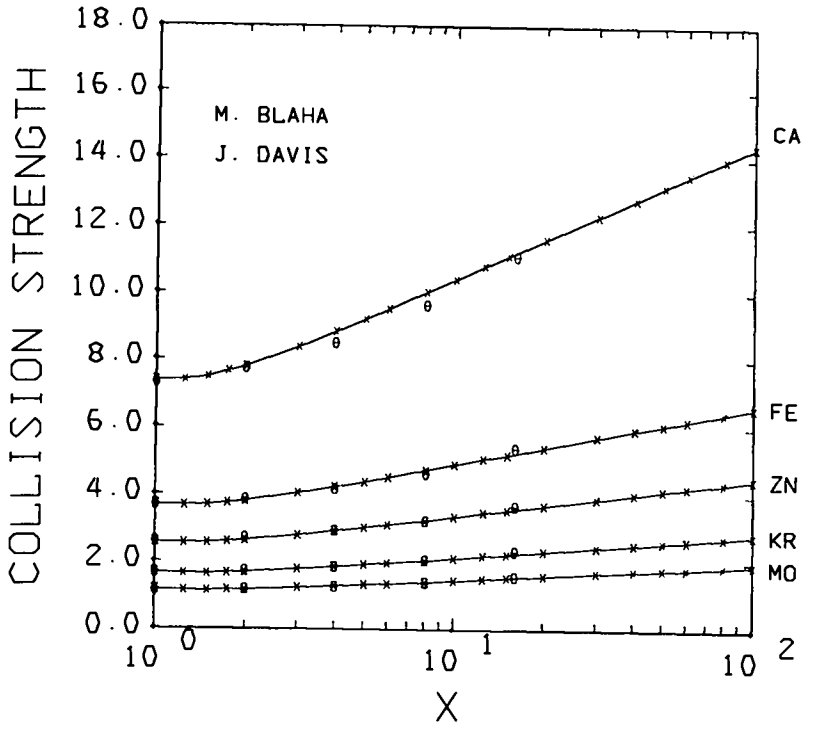


Fig. B16. Fits (connected X's) and data for the Sodium sequence (3s - 3p) of Fig. B5.

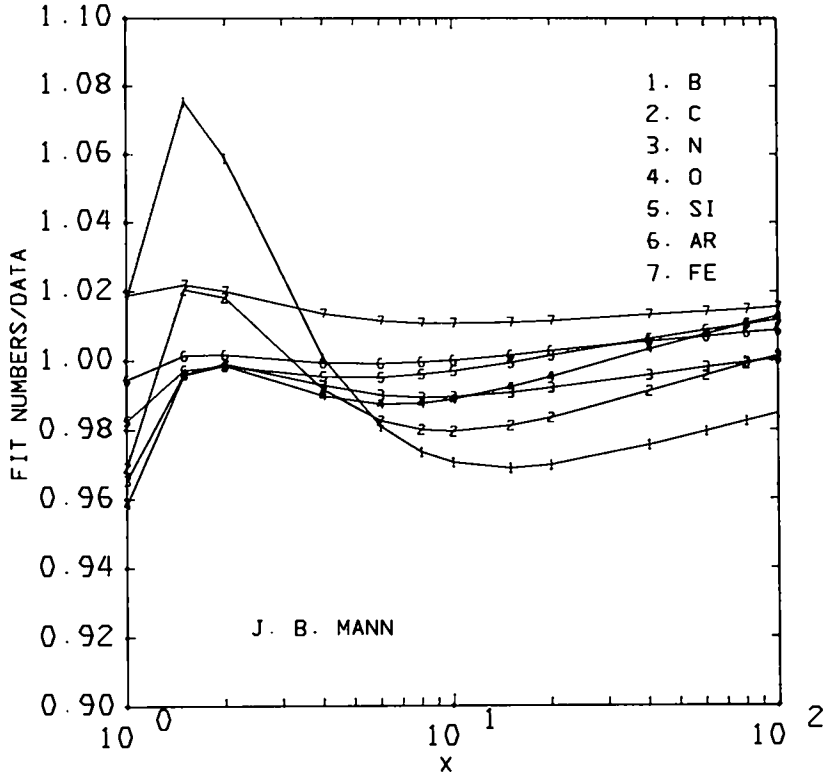


Fig. B17. Relative error ratio between fit and data for Lithium sequence of Fig. B12.

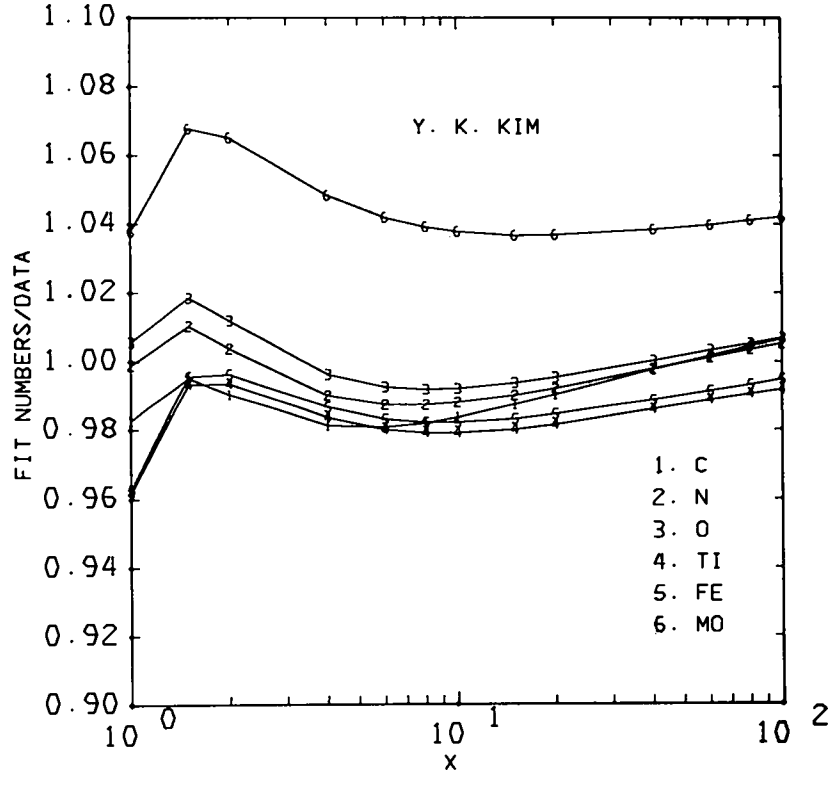


Fig. B18. Relative error ratio between fit and data for Lithium sequence of Fig. B13.

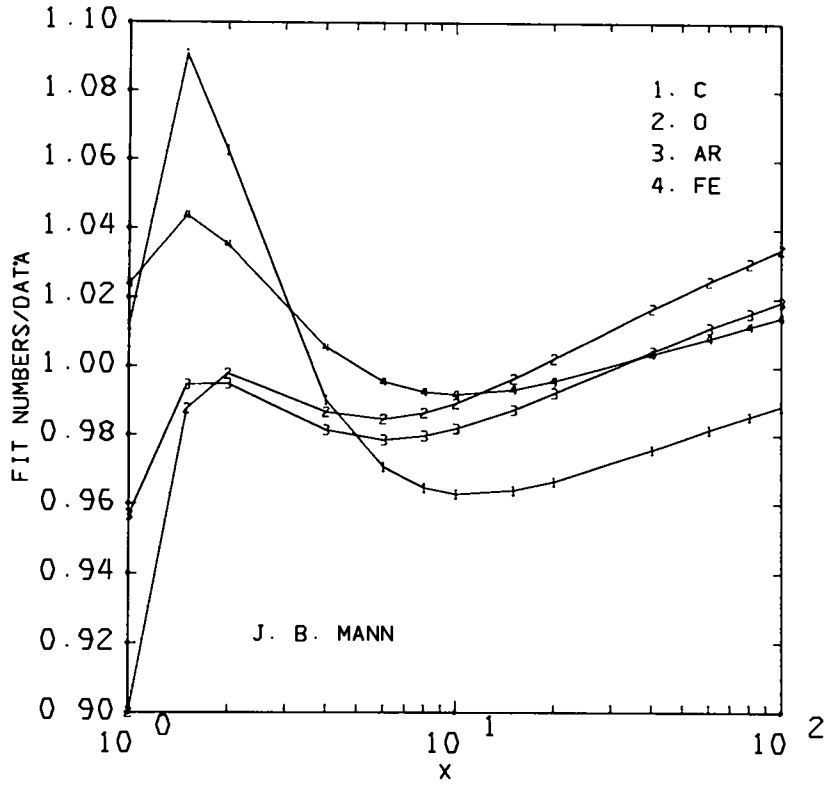


Fig. B19. Relative error ratio between fit and data for Beryllium sequence of Fig. B14.

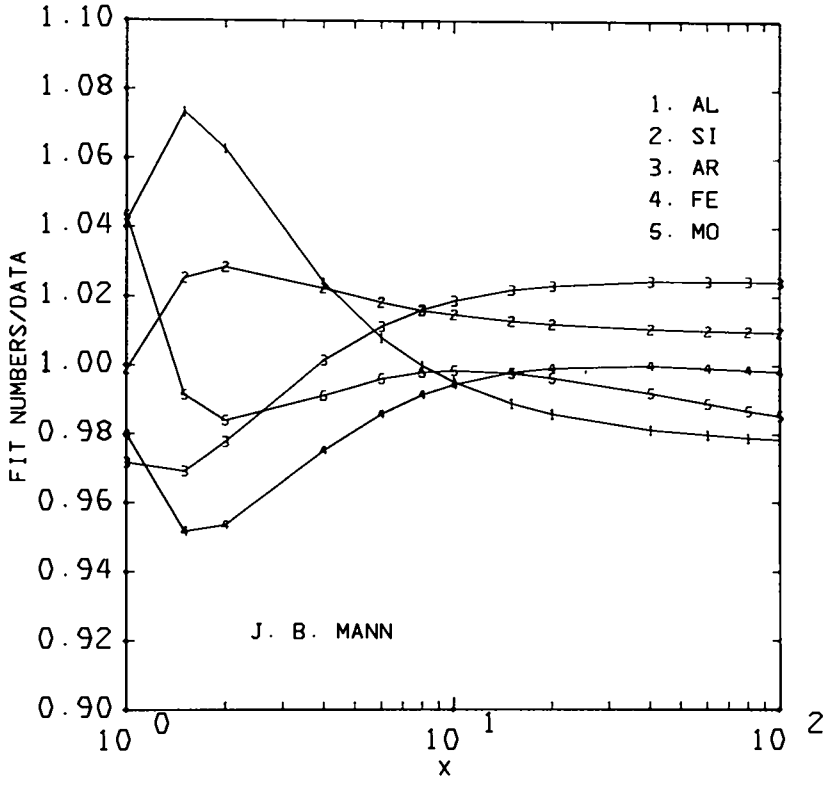


Fig. B20. Relative error ratio between fit and data for Sodium sequence of Fig. B15.

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