A BIBLIOGRAPHY OF LOW ENERGY ELECTRON COLLISION CROSS SECTION DATA

1965

by

L. J. Kieffer

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University of Colorado
Boulder, Colorado
April 1, 1966
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INTRODUCTION

This is the third updating of A Bibliography of Low Energy Electron Collision Cross Section Data (previously issued as JILA Reports #4 and #34). The format has been completely changed to make it more readable and useful. The current literature for this bibliography was searched through December 1965. (See the appendix for the journals currently being searched.) Because we rely upon the abstracting journals to obtain references from journals which do not in general contain information of interest, there may be some material from late 1965 issues of the latter journals which is not included in this bibliography. During 1966 we expect to publish this bibliography as a number in the National Standard Reference Data Series.

Electron Scattering Cross Section Bibliography

The criterion used in choosing the references for this bibliography is that the publication contain original measurements or calculations of electron cross sections in the energy range 0 to 10 KeV for specific atomic or molecular targets. The upper limit on the energy was not used as an absolute limit but indicates the order of magnitude of interest. This means that one should not expect to find electron collision cross sections in the range of 50 KeV and above.

Papers containing the following quantities, which are not explicitly cross sections, have also been collected:
1. phase shifts,
2. scattering lengths,
3. ionization efficiencies,
4. excitation efficiencies.

The reason for including these quantities is that under the proper conditions cross sections have been or can be simply derived from them.

Published manuscripts, theses, reports given at meetings, and company or agency reports which have been printed and circulated are included in the bibliography. However, reference is not made to material that is unavailable either through library facilities or government document centers. (No classified material is included.)

There is a tendency for authors to publish material which is identical to that which they have reported on at a meeting (which is printed and circulated) and also issued as a company or agency report. In some cases it is possible to verify that this is so and in those cases only one reference (the formal publication if there is one) is kept in our bibliography. In most cases it is not possible to make such a precise distinction among such documents, since only some of the material may have been made available before. Because of this, there may be cases of duplication in the sense that there may be more than one reference to the same original data. We have tried to keep this to a minimum consistent with our aim of collecting all published data.
Inclusion of a reference in this bibliography does not imply a value judgment about the accuracy of the information. We only assert that this reference reports a measured or calculated electron collision cross section (or the equivalent as described previously). The question of the accuracy of the data will be treated in separate published critical reviews. (See Reviews of Modern Physics, 38, 1, (1966).)

Description of the Bibliography Format

The Electron Cross Section Bibliography is divided into two main sections. The first section describes the data which are in the references included in the bibliography. The data are categorized by a hierarchy of descriptors in the following order:

1. Process (e.g., elastic scattering, electron excitation, etc.)
2. Experimental or Theoretical
3. Normalized or Relative
   (The data are considered normalized if given in absolute units.)
4. Atomic or Molecular Species including the degree of ionization of the species. (A negative ion is indicated by a minus sign; neutral unexcited species by a blank; neutral excited species by a star; and a positive ion by a number indicating the degree of positive ionization. All of these symbols follow the atomic species, which are listed in ascending order of nuclear charge, Z. Molecular species are listed in arbitrary order.)
5. The references in which the data described are found. The references are identified by an arbitrary file number, the first author and the year of publication (e.g., 63 implies 1963).

The second main section lists the title, authors and complete reference for the paper cited. These are ordered by their "file" number.

The abbreviations for journal titles are taken from Chemical Abstracts or if not abstracted there, from Science Abstracts, Section A: Physics Abstracts.

The following comments about categories (see Table of Contents) are necessary in order to use the bibliography properly. Category ELASTIC SCATTERING, for theoretical papers, includes all references to elastic scattering cross section computations except differential elastic scattering cross section references, which are given in a separate category. In the case of experimental papers only those references in which cross section measurements were reported with energy discrimination for the scattered electrons are included under ELASTIC SCATTERING.

Category TOTAL SCATTERING includes theoretical papers which give a total cross section which is the sum of elastic and inelastic cross sections.
It also includes any references to experimentally determined cross sections in which the experiment does not distinguish between elastically and inelastically scattered electrons even if the experiment is carried out in an energy range in which only elastic scattering is expected.

Acknowledgments

The author would like to gratefully acknowledge the assistance of the staff of the JILA Information Center. The computer programs used for this report were written by Patricía Ruttenberg. The manuscript was prepared by Mary Ann Lefler and Elizabeth Lovell.
BIBLIOGRAPHY: ELECTRON PAPERS
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Dissociative Ionization

Experimental

Normalized:

C $^+$ 0948.6 Glick et al.
1410 Rapp et al.
1129 Englander-Golden et al.

Relative:

N $^+$ 027H Saha et al.
0241 Németh et al.
0212 Saha et al.
0212 Houdt et al.
0205 Gurney et al.
0458 Baul et al.
0205 Hall et al.
0212 Houdt et al.

O $^+$ 027H Houdt et al.
0241 Frost et al.
027H Frost et al.
027H Frost et al.

F $^+$ 0212 Houdt et al.

Cl $^+$ 0212 Houdt et al.
0241 Clouter et al.
0458 Frost et al.

N $^+$ 0241 Clouter et al.

O $^+$ 0212 Houdt et al.
027H Houdt et al.
0212 Houdt et al.
0458 Frost et al.

H $^+$ 0241 Finken et al.
0205 Houdt et al.

D $^+$ 0205 Houdt et al.

C $^+$ 0212 Houdt et al.
0241 Clouter et al.
0458 Frost et al.

C$^+$O$^+$ 0212 Houdt et al.

S $^+$ 0212 Finken et al.

Cl$^+$O$^+$ 0212 Stepan et al.

Cs$^+$ 0212 Stepan et al.

Dissociative Recombination

Experimental

Normalized:

O$^+$ 1234 Biondi et al.
0498 Fahey et al.
1341 Biondi et al.

N $^+$ 1270 Courtois et al.

O $^+$ 1219 Dominguez et al.

He$^+$ 1234 Biondi et al.

Ar$^+$ 1234 Biondi et al.

K$^+$ 1204 Richardson et al.

Cs$^+$ 1177 Hammer et al.

Na$^+$ 1234 Dominguez et al.

Dissociative Recombination

Theoretical

Normalized:

H 1194 Jena et al.
1300 Massey et al.
1219 Lochte-Holtgreven et al.

O 0241 Yamashita et al.
1194 Massey et al.
1187 Branscomb et al.

Na 027H Houdt et al.
1300 Massey et al.

Hg 1300 Massey et al.

Radiative Capture

Experimental

Normalized:

H 1194 Földi et al.
0184 Elm et al.
0184 Elm et al.

K$^+$ 1098 Mies et al.
1098 Mies et al.
1098 Mies et al.

Cs$^+$ 1213 Molen et al.

He$^+$ 0205 Jungen et al.

Relative:

Ar 1098 Mies et al.

K$^+$ 1098 Mies et al.

Cs$^+$ 1098 Mies et al.

Radiative Capture

Theoretical

Normalized:

H 0214 Bions et al.
0241 Bions et al.
0241 Bions et al.

Me 0151 Burgs et al.
0151 Burgs et al.
0151 Burgs et al.

He 0151 Burgs et al.
0151 Burgs et al.
0151 Burgs et al.

O 0241 Bions et al.
1194 Massey et al.

He 0495 Hill et al.

Ca 0490 Zirin et al.

Fe 13 0495 Hill et al.

Sr 0490 Zirin et al.

Relative:

M 0295 Cailleau et al.
TOTAL SCATTERING

NORMALIZED
C2H4 0.005 BRUCHE+29
O2 0.005 FORESTER+63
H F 0.004 BRUCHE+29
O3B 0.009 BRUCHE+30
S 0 0.007 BAYES+62
C HCl 0.001 HOLST+31
M C N 0.007 BAYES+62

RELATIVE
He 0.009 NIMROD+35
Ne 0.012 HUSCHke+65
Ar 0.016 HUSCHke+65
Kr 0.016 PERL+62
Xe 0.016 HUSCHke+65
CO 0.018 HAWKINS+23
He 0.013 PEASE+63
Ne 0.018 HUSCHke+65
Ar 0.012 LAUTSCHEF+30
Kr 0.012 HUSCHke+65
Xe 0.017 ZACHARIAH+27
C 0.013 HERZBERG+61

TOTAL SCATTERING

THEORETICAL

NORMALIZED
He 0.004 GALEY+83
Li 0.010 DAMBURA+60
Na 0.010 DAMBURA+60
K 0.010 DAMBURA+60
Xe 0.009 GALEY+83
Ar 0.004 GALEY+83
Cl 0.010 DAMBURA+60
F 0.002 NOBISHITA+54

FULL-FREE ABSORPTION

THEORETICAL

NORMALIZED
H 0.007 VAINEH+63
O2 0.013 SOMERVILLE+64
### Total Elastic Scattering

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APPENDIX

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PAGE 1, COLUMN 1

Sub-heading TOTAL ELASTIC SCATTERING THEORETICAL:

The following reference was garbled in the printout:

0151 BURKE, 62

The following three references were inadvertently suppressed:

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0393 BOYET, 54
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