



# Contents

## Part I. Selected Reviews in Swarm Studies

A Comparative Study of the Computing Methods Actually in Use for Accurate Determination of Swarm Parameters <i>Pierre Segur, M.-C. Bordage and M. Yousfi</i> .....	3
Recent Advances in High-Pressure Swarms <i>R. Johnsen and H.S. Lee</i> .....	23
Electron-Ion Recombination in High-Pressure Gases <i>Wm. Lowell Morgan</i> .....	43

## Part II. Kinetic Theory

Principles of the Measurement of Electron Drift Velocities <i>H. Tagashira</i> .....	55
Effect of Boundaries and Field Inhomogeneities on Swarms <i>Kailash Kumar</i> .....	63

## Part III. Abstracts of Contributed Swarm Papers

Program of the JILA Atomic Collisions Cross-Section Data Center <i>Jean W. Gallagher</i> .....	75
Collisionally Induced Dissociation of Ions in a Strong Drift Field and its use as an Analysis Tool <i>Fred L. Eisele</i> .....	77
Retarding Potential Difference Analysis of Ion Swarm Velocity Distributions: A Computer Simulation Study <i>H.R. Skullerud and S. Holmstrom</i> .....	79
Transverse Diffusion of Lithium Ions in Helium <i>H.R. Skullerud, T. Eide and Thorarinn Stefansson</i> .....	81
Electron Attachment to F <sub>2</sub> <i>D.L. McCorkle and L.G. Christophorou</i> .....	83
Thermal Electron Attachment to van der Waals Molecules (O <sub>2</sub> , N <sub>2</sub> ) <i>Minoru Toriumi and Yoshihiko Hatano</i> .....	85

Time-Resolved Measurements of Thermalization Processes of Subexcitation Electrons in Rare Gases <i>Etsuhito Suzuki, Yoshinori Hirako and Yoshihiko Hatano</i> .....	87
Electron Swarm Study in Nitrogen–Rare-Gas Mixtures and Vibrational Excitation in Nitrogen <i>Yoshiharu Nakamura</i> .....	89
Excited-State Quenching Phenomena in Weakly Ionized Nitrogen <i>M.T. Elford, A. Ernest and S.C. Haydon</i> .....	91
Electron Drift Velocity and Attachment and Ionization Coefficients in CH <sub>4</sub> , CF <sub>4</sub> , C <sub>2</sub> F <sub>6</sub> , C <sub>3</sub> F <sub>8</sub> and n-C <sub>4</sub> F <sub>10</sub> <i>S.R. Hunter, J.G. Carter and L.G. Christophorou</i> .....	93
Comparison of Calculated and Experimental Thermal Attachment Rate Constants for SF <sub>6</sub> in the Temperature Range 200-600K <i>O.J. Orient and A. Chutjian</i> .....	95
Measurements of Electron and Ion Transport Data in SF <sub>6</sub> and SF <sub>6</sub> /N <sub>2</sub> Mixtures <i>T. Aschwanden</i> .....	97
Common Parameterizations of Swarm and Breakdown Data for Binary Electronegative–Nonelectronegative Gas Mixtures <i>R.H. Van Brunt and M.C. Siddagangappa</i> .....	99
Boltzmann Equation Analysis of the Synergism of Uniform Field Breakdown Voltage for SF <sub>6</sub> -CCL <sub>2</sub> F <sub>2</sub> and SF <sub>6</sub> -SO <sub>2</sub> Mixtures <i>Makoto Hayashi</i> .....	101
Effect of Gas Impurity for the Electron Drift Velocities in Inert Gases by Boltzmann Equation Analysis <i>Makoto Hayashi</i> .....	103
Spatial Variations in the Energy Distribution Function for Steady State Townsend Discharges <i>H.A. Blevin, J. Fletcher, L.J. Kelly and A.B. Wedding</i> .....	105
Excitation and Ionization Rates in Hydrogen at Very High E/n <i>G.N. Hays, L.C. Pitchford, J.B. Gerardo, J.T. Verdeyen, and Y.M. Li</i> ..	107
Evolution Equation and Transport Coefficients of Swarms in Short Time Development of Initial Relaxation Processes <i>Keiichi Kondo</i> .....	109
Transient Hot Electron Mobility in Ethene and Cyclopropane <i>Bernie Shizgal</i> .....	111
Nonequilibrium Behavior of Electrons in Strong Electric Fields <i>B.M. Jelenkovic and A.V. Phelps</i> .....	113

Steady-State, Spatially Dependent Electron Transport and Rate Coefficients

*L.C. Pitchford, T.J. Moratz, P. Segur and M. Yousfi* ..... 115

Transport Coefficients of Electron Swarms in Gases in the Presence of Nonconservative Collisions

*K.F. Ness and R.E. Robson* ..... 117

Convenient Expressions of Diffusion Coefficients for Free Electrons in Gases in Presence of Ramsauer Effects

*G. Cavalleri and G. Mingari Scarpello* ..... 119

The Approach to Equilibrium of Electron Swarms in Non-Planar Geometries

*M.J. Kushner* ..... 121

Magnetic Control of Low Pressure Diffuse Discharges

*J.R. Cooper, K. Schoenbach and G. Schaefer* ..... 123

Part IV. Relations between Single and Multicollision Phenomena

Relations between Electron-Molecule Scattering and Swarm Experiments and Analysis

*A.V. Phelps* ..... 127

Experimental and Theoretical Investigation of Near-Threshold e-H<sub>2</sub> Collisions

*Robert W. Crompton and Michael A. Morrison* ..... 143

Electron Collision Cross-Sections for Molecules Determined from Beam and Swarm Data

*Makoto Hayashi* ..... 167

Part V. Studies of Single-Collision Phenomena

Low-Energy, High-Resolution Electron-Molecule Collision Studies

*H. Ehrhardt* ..... 191

Threshold Phenomena in Electron-Molecule Collisions

*W. Domcke* ..... 205

Rotational and Vibrational Excitation of Molecules by Low-Energy Electrons

*David W. Norcross* ..... 217

Studies of Elastic and Electronically Inelastic Electron-Molecule Collisions

*Marco A.P. Lima, Thomas L. Gibson, Luiz M. Brescansin, Vincent McKoy and Winifred M. Huo* ..... 239

Inelastic Electron Molecule Scattering Using the R-Matrix Method <i>P.G. Burke and C.J. Noble</i> .....	265
<b>Part VI. Single and Multicollision Phenomena: Dissociation, Internally Excited Targets and Clusters</b>	
Fragmentation Dynamics and Energy Partitioning in Dissociative Attachment on Triatomic Molecules <i>Michel Tronc</i> .....	287
Effects of Temperature on Dissociative and Nondissociative Electron Attachment <i>L.G. Christophorou, S.R. Hunter, J.G. Carter and S.M. Spyrou</i> .....	303
Electron Impact Ionization Cross-Sections for Atoms, Radicals, and Metastables <i>Robert S. Freund</i> .....	329
Total Dissociation Cross-Sections of Fluoroalkanes for Electron Impact: Their Usefulness for Understanding Plasma-Assisted Etching Environments <i>Harold F. Winters</i> .....	347
Electron–Cluster Interactions <i>R.G. Keesee, A.W. Castleman, Jr. and T.D. Mark</i> .....	351
<b>Part VII. Microscopic Models: Data Needs and Outlook</b>	
Discharge Modeling <i>J.P. Boeuf and E.E. Kunhardt</i> .....	369
Boltzmann Equation in Vibrationally and Electronically Excited Molecular Plasmas <i>M. Capitelli and C. Gorse</i> .....	385
Applications of Cross-Sections for Electron–Molecule Collision Processes <i>David C. Cartwright</i> .....	401
Current Applications and Opportunities in Swarm Studies <i>Alan Garscadden</i> .....	409