

Contents

LIST OF CONTRIBUTORS	v
FOREWORD	vii
CONTENTS OF PREVIOUS VOLUMES	xiii

Flowing Afterglow Measurements of Ion-Neutral Reactions

E. E. Ferguson, F. C. Fehsenfeld, and A. L. Schmeltekopf

I. Historical Introduction	1
II. General Experimental Aspects of the Flowing Afterglow Technique	4
III. The Flow Analysis	14
IV. Data Reduction	35
V. Production of Reactant Species	36
VI. Optical Spectroscopic Studies	46
VII. Temperature-Variable Flowing Afterglow Studies	46
VIII. Some Miscellaneous Results	50
IX. Summary	52
References	55

Experiments with Merging Beams

Roy H. Neynaber

I. Introduction	57
II. General Principles	59
III. Ion-Neutral Reactions	62
IV. Ion-Ion Reactions	80
V. Neutral-Neutral Reactions	89
VI. Electron-Ion Reactions	100
VII. Current or Very Recent Studies	105
VIII. Concluding Remarks	106
References	107

Radiofrequency Spectroscopy of Stored Ions

II: Spectroscopy

H. G. Dehmelt

3. Manipulation and Investigation of Stored Charge	109
4. Spectroscopic Experiments Relying on Spin Exchange with Polarized Atomic Beam	124
5. Spectroscopic Experiments Based on other Collision Reactions	142
6. Spectroscopic Line-Shifts and -Broadening	149

7. Conclusion	152
Errata for Part I	153
References	153

The Spectra of Molecular Solids

O. Schnepf

I. Lattice Vibrational Spectra	155
II. Intramolecular Vibrational Spectra	176
III. Spectra of Solid Hydrogen	187
References	197

The Meaning of Collision Broadening of Spectral Lines: The Classical-Oscillator Analog

A. Ben-Reuven

I. Introduction	201
II. The Fourier-Transform Method	204
III. Impact Damping	210
IV. Complex Oscillators	217
V. Statistical Broadening	221
VI. Resonance Broadening	228
References	234

The Calculation of Atomic Transition Probabilities

R. J. S. Crossley

I. Introduction	237
II. General Formulas for the Dipole Approximation	243
III. Approximate Wave Functions: General Considerations	248
IV. Criteria for Calculation	255
V. Variational Wave Functions	257
VI. Semiempirical Methods	267
VII. Perturbation Treatments	273
VIII. Sum Rules, Bounds, and Variational Principles	279
IX. Summary	281
References	288

Tables of One- and Two-Particle Coefficients of Fractional Parentage for Configurations $s^{\lambda} s'^{\mu} p^{\alpha}$

C. D. H. Chisholm, A. Dalgarno, and F. R. Innes

I. Introduction	297
II. The Calculation of cfp	301
III. Applications of Two-Particle cfp	308
IV. Description of Tables	309
References	334

Relativistic Z -Dependent Corrections to Atomic Energy Levels*Holly Thomis Doyle*

I. Introduction	337
II. The Relativistic Z -Dependent Theory	342
III. Irreducible Tensor Expansions of the Electrostatic and Breit Interaction Operators	352
IV. Antisymmetrization	357
V. Reduction of Matrix Elements to Matrix Elements between One- and Two-Electron States	363
VI. Results, Comparisons, and Conclusions	369
References	412
AUTHOR INDEX	415
SUBJECT INDEX	425