

CONTENTS

Preface	v
List of Contributors	xi
Structures of Molecules and Clusters as determined by Coulomb Explosions by Z. Vager, R. Naamen and E.P. Kanter	
1. Introduction	1
2. Coulomb Explosion Imaging	3
3. Mean Structures	8
4. Correlations and Dynamics	17
5. Future Perspective	21
References	25
Microwave Spectroscopy of Molecular Ions by R.C. Woods	
1. Introduction	27
2. Experimental	30
3. Individual Molecular Ions	32
4. Dynamical Measurements	51
5. Conclusion	53
References	54
Spectroscopic Properties of Polyatomic Cations and Anions from Ab Initio Calculations by P. Botschwina	
1. Introduction	59
2. Methods of Calculations	61
3. Applications	65
4. Conclusions	101
References	104
The Infrared Spectra of Polyatomic Molecular Ions: A Profitable Alliance between Theory and Experiment by H.F. Schaefer III	
1. Introduction	109
2. A Brash Assistant Professor	109
3. NH ₄ ⁺ and Systematic Vibrational Frequencies: The Rosetta Stone	110
4. Higher Level Theoretical Systematic Studies	110
5. Saykally's High Resolution IR Spectrum for H ₃ O ⁺	114
6. Oka and Saykally Independently Identify NH ₄ ⁺	117
7. High Resolution IR Observation of H-CN ⁺	117
8. Amano Joins the Party: Protonated CO ₂	119
9. Identification of the Structure of Protonated Nitrous Oxide	120
10. The First Tetra-Atomic Radical Cation: C ₂ H ₂ ⁺	124
11. Concluding Remarks	126
Literature Citations	127
Infrared Laser Spectroscopy of Molecular Ions by J.V. Coe and R.J. Saykally	
1. Introduction	131
2. The Evolution of High Resolution Molecular Ion Spectroscopy: A Brief Chronology	131
3. Mid-Infrared Spectroscopy of Molecular Ions: New Developments	135
4. Far-Infrared Laser Spectroscopy of Molecular Ions	149
References	152

High Resolution Photodetachment Studies of Molecular Negative Ions
 by D.M. Neumark

1. Introduction	155
2. Experimental Methods	157
3. Direct Photodetachment Experiments	161
4. Autodetachment Spectroscopy	165
5. Summary	179
References	179

Electronic Spectroscopy of Open-Shell Cations
 by J.P. Maier

1. Introduction	181
2. Vibrational Structure of Triatomic Cations	182
3. Rotational Characterization of Polyatomic Cations	184
4. New Approaches	184
5. Spectroscopic Characterization of Fragment Ions	200
References	208

Laser Induced Fluorescence and Mass Spectrometric Detection and Characterization of Ionic Clusters

by R.A. Kennedy, C.-Y. Kung and T.A. Miller

1. Introduction	213
2. Experimental Considerations	213
3. Applications	230
References	239

Photodissociation Dynamics of Small Cluster Ions

by M.T. Bowers

1. Introduction	241
2. Experimental Method	244
3. Statistical Phase Space Theory	246
4. Experimental Systems	247
5. Summary and Prognosis	271
References	272

Structure of Solvated Cluster Ions

by R.G. Keesee and A.W. Castleman Jr.

1. Introduction	275
2. Thermochemistry of Cluster Ions	276
3. Photodissociation Spectroscopy	297
4. Structure Inferences Through Studies of Metastable Dissociation ...	305
References	323

Ion/Molecule Complexes as Central Intermediates in Unimolecular Decompositions of Metastable Radical Cations of Some Keto/Enol Tautomers: Theory and Experiment in Concert

by N. Heinrich and H. Schwarz

1. Introduction	330
2. Results and Discussion	336
3. Summary and Outlook	367
References	370

UPS of Metal and Semiconductor Clusters

by O. Cheshnovsky, C.L. Pettiette and R.E. Smalley

1. Introduction	373
2. Pulsed Supersonic Cluster Beams	375
3. Pulsed UPS Spectrometers	379
4. UPS of Nearly Free Electron Metal Clusters	386
5. UPS of Carbon Clusters	393
6. UPS of Semiconductor Clusters (Silicon and Germanium)	406
7. Outlook	408
References	410

Continuous Beam Photoelectron Spectroscopy of Cluster Anions

by S.T. Arnold, J.G. Eaton, D. Patel-Misra, H.W. Sarkas and K.H. Bowen

1. Introduction	417
2. Experimental Methods	418
3. Ion-Molecule Complexes: Cluster Anions with Localized Excess Charges	425
4. Molecular Cluster Anions Exhibiting Excess Charge Delocalization ..	443
5. Metal Cluster Ions	450
6. Summary	467
References	468
Subject Index	473