CONTENTS

INTRODUCTION

Jean H. Futrell 1

PART 1.
THEORETICAL FOUNDATIONS

Chapter 1 Unimolecular Dissociation of Gaseous Ions 7
Austin L. Wahrhaftig

Chapter 2 Collision Theory and Reaction Dynamics 25
Randall B. Shirts

PART 2.
ION FORMATION AND MASS ANALYSIS

Chapter 3 Electron Impact Ionization 61
Tilmann D. Märk

Chapter 4 Photoionization and Multiphoton Ionization 95
James D. Morrison

Chapter 5 Ion Focusing, Mass Analysis, and Detection 107
James D. Morrison

Chapter 6 Ion Cyclotron Resonance 127
Jean H. Futrell

PART 3.
TECHNIQUES FOR STUDYING COLLISION PROCESSES

Chapter 7 Swarm Methods 141
Werner Lindinger

Chapter 8 Beam Methods 155
Jean H. Futrell

PART 4.
APPLICATIONS TO ION CHEMISTRY AND PHYSICS

Chapter 9 **Laser Photodissociation Spectroscopy of Ions in the Gas Phase** 179
James D. Morrison

Chapter 10 **State-to-State Reaction Dynamics** 201
Jean H. Futrell

Chapter 11 **Ion–Molecule Reaction Kinetics in Plasma: Rate Coefficients and Internal-Energy and Translational-Energy Effects** 237
Werner Lindinger

Chapter 12 **Cluster Ions: Their Formation, Properties, and Role in Elucidating the Properties of Matter in the Condensed State** 259
A. Welford Castleman, Jr.
Tilmann D. Märk

Chapter 13 **Biomedical Applications of Mass Spectrometry** 305
David L. Smith

INDEX 325