

Chemical Reviews

Volume 87, Number 3

June 1987

Mass Spectrometry and Negative Gas-Phase Ions: Introduction

A vigorously expanding field, gas-phase ion chemistry, is the subject of the review articles assembled in this issue. The two aspects that have been selected as particularly suitable for comprehensive reviews are the properties of gas-phase negative ions and new developments in mass spectrometry.

Among the properties of negative ions, few are more fundamental than total energy, and three of the reviews deal with the determination of electron affinities. Wetzel and Brauman discuss electron detachment spectroscopy of trapped negative ions, particularly well suited for the determination of positive vertical electron affinities, while Kebarle and Chowdhury treat gas-phase electron-transfer reactions, which yield information on positive adiabatic electron affinities. Temporary anions of hydrocarbons and the associated negative electron affinities are discussed in a review by Jordan and Burrow. In addition to electron affinities, which provide a common thread for the three articles, other aspects of anion chemistry and spectroscopy are covered as well.

The knowledge of gas-phase ion reactivity is in a state of considerable flux and we intend to attempt a comprehensive coverage at a future time. In the present issue, Squires reviews an important subdiscipline, the chemistry of transition-metal negative ions.

Very important contributions to the understanding of negative gas-phase ions have been made by *ab initio* computational methods, and this area is analyzed in the review written by Simons and Jordan.

Of the recent developments in mass spectrometry, few have generated as much excitement as the use of fast particle bombardment for the desorption of ions from involatile and thermally labile materials. These are secondary ion mass spectrometry (SIMS), ordinarily performed on solids, and fast atom bombardment (FAB), ordinarily performed on solutions. The mechanistic aspects of SIMS are reviewed by Pachuta and Cooks and the chemical aspects of FAB are dealt with by Fenselau and Cotter. The use of mass spectrometric techniques for the study of intermolecular interactions involving nucleic acid bases is discussed by Sukhodub.

Last, but certainly not least, an exciting new development, neutralization-reionization mass spectrometry, is treated by McLafferty and Wesdemiotis. Although the field is in its early development and even some quite fundamental issues may still need to be settled, it was felt that a review at this stage would provide stimulation for further development.

All in all, I feel that the nine articles provide a good feeling for the current excitement in the field of negative gas-phase ions and mass spectrometry and will be of interest even to nonspecialists.

Josef Michl
Editor