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Foreword

Gas phase metal ion chemistry: From fundamentals to biological interactions

During the past decade, the field of mass spectrometry has grown significantly. Whereas applications of mass spectrometry in the area of physical chemistry have always been abundant, much of this recent growth can be attributed to the increased visibility of mass spectrometric techniques in the biological chemistry community. Over this same time span, studies of metal ion chemistry in the gas phase have also burgeoned. The combination of mass spectrometry and metal ion chemistry presents a unique and rich area of research that challenges us to understand the details of bonding, spin-orbit interactions, and relativistic effects while still holding exceptional promise of insight into organometallic, catalytic, and biological chemistries.

Gas phase metal ion chemistry is clearly a field where there is a very broad range of research possibilities. It is with this thought in mind that we asked our colleagues to contribute their research results in order to demarcate the comprehensive scope of metal ion chemistry in mass spectrometry. In this special issue, authors have responded by providing research studies that span the broad range of metal systems now accessible. These areas include measurements of the bond dissociation energies of triatomic molecules, organometallic complexes, clusters of metals, and electrospray ionization of high molecular weight metal coordinated proteins. The breadth of modern mass spectrometric techniques is also represented and includes high-resolution spectroscopy, the implementation of ion mobility techniques, and the applications of important ionization techniques such as ESI and MALDI. As such, this special issue demonstrates how the field of metal ion chemistry and mass spectrometry can encompass studies involving all aspects of fundamental processes, methods development, and applications.

As we enter into a new millenium, it is evident that mass spectrometry plays a very important role in many areas of chemical research. This ranges from determination of fundamental physical constants (e.g., bond energies, rate constants, spectroscopy), to overviews of the reaction chemistry of organometallic complexes and metallic clusters, as well as delineation of structure and function relationships in highly complex biological systems. The use of metal ions in helping to achieve this level of comprehension resides on the frontier of mass spectrometry research as evidenced by the studies provided herein.

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