Gas Phase Inorganic Chemistry

Edited by David H. Russel, published by Plenum, New York, 1989.

The book belongs to the Series, edited by J.P. Fackler, Jr., 'Modern Inorganic Chemistry'. As observed in many fields of modern chemistry, the growth of gas phase inorganic chemistry has required the development of sophisticated instrumentation and new experimental methods. By such an approach a wide range of experiments on different ionic systems and a detailed study of the chemistry has become possible.

Gas Phase Inorganic Chemistry focuses on the reactions of metal ions and metal clusters, and on the study of these species using modern spectroscopic methods.

It consists of twelve chapters produced by worldwide experts in the field. Three of them are devoted to the gas phase chemistry of ionic monometal transition metal ions and their reactivity with small diatomics and model organics. Two chapters focus on the study of the chemico-physical properties of transition metal clusters, reviewing also the experimental methods and their capabilities, while two further chapters deal with the chemistry of such clusters. The other chapters are concerned with the photochemistry of transition metal species, time-resolved vibrational spectroscopy of organometallic species, collisional activation studies and photoelectron spectroscopy.

Consequently the book can be considered an important and valid report on the state-of-the-art of gas phase inorganic chemistry, giving the reader a general view of the on-going research in the field.

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Metals in Biological Systems

By Maureen J. Kendrick, Michael T. May, Martin J. Plishka and Kerry D. Robinson, published by Ellis Horwood, New York, London, Toronto, Sydney, Tokyo, Singapore, 1992, ISBN 0-13-577727-5, 183 pp.

When I got the above book on my desk I was quite excited noting the close similarity of its title with the series *Metal Ions in Biological Systems*, of which I am co-editor, and I began to read with enthusiasm, especially as this book of 183 pages seemed of just the right size for students in bioinorganic courses. In the Preface I learned that ..."Since the earliest discovery of the first metalloenzyme jack bean urease by Sumner, many chemists and biochemists have devoted a part of their research efforts to the interdisciplinary field of bioinorganic chemistry". I was somewhat stunned because I recalled (from my own lectures) that Sumner in 1926 had crystallized urease, but that only in 1975 had Zerner and co-workers shown that it was a nickel-metalloenzyme. My second thought was that a better example for the authors emphasis would have been Keilin and Mann's observation (*Biochem. J., 34* (1940) 1163) that carbonic anhydrase (an enzyme essential for respiration in mammals) contains zinc which is necessary for its action. However, then I continued reading and after finishing the four-page Chapter 1, which focusses on the 'Transition and Alkali Metals in Nature' (what about the alkaline earth ions Mg^{2+} and Ca^{2+}?) and the 'Entatic State Hypothesis', I discovered with satisfaction that the Sumner-urease–Zerner-Ni issue was straightened out in the second paragraph of Chapter 2, which is devoted to 'Structural and Physical Methods of Characterizing Metal Centers in Nature'.

This brought back to my mind the above mentioned second thought and I switched to 'Zinc in Biological Systems', and indeed this Chapter 14 opens with "Zinc occurs naturally as the metal ion in carbonic anhydrase, carboxypeptidase A, ... In all there are about 18 zinc metalloenzymes and about 15 Zn^{2+} ion-protonated (-promoted/?!) enzymes". ... Unfortunately, this revelation was a disappointment! I recalled that Galdes and Vallee had pointed out already in 1983 (*Met. Ions Biol. Syst., 15* (1983), 1–54, see p. 2) that ... "over 20 functionally distinct zinc-containing proteins have been identified, representing a total of about 160 enzymes from different species"; in fact, in 1990 the number had grown already to 300 (B.L. Vallee and D.S. Auld, *Biochemistry, 29* (1990) 5647). Why this discrepancy? A look to the reference list given with this Chapter 14 showed two entries, one from 1979 and one from 1983!!

After this excursion I went back to the regular order in the book and started to read Chapter 3, 'Calcium in Biological Systems'. On turning to the second page my eye hit the structure of the $Ca(ATP)^{2-}$ complex: here Ca^{2+} is coordinated to the α-phosphate group, the N-7 nitrogen and the amino group at C-6 (HIC!!); the most basic site of ATP^{4-}, the terminal γ-phosphate group is not involved in metal ion-binding nor is the β-phosphate group! This structure published in 1992 is more misleading than the one proposed by Szent-Györgyi in 1956, at a time when evidence for the actual binding sites at ATP was largely missing. There are three references with Chapter 3: one each from 1980, 1977 and 1968!

At this point I took a quick look through Chapter 4, 'Magnesium in Biological Systems' to discover for Mg^{2+}–ATP^{4-} that ... "the structures in Fig. 4.3 are based upon current spectroscopic and some X-ray structural determinations" ...; as *current* (according to