

Book Reviews

Ions in Biological Systems. Volume 39. Molybdenum and Tungsten: Their Roles in Biological Processes. Edited by Astrid Sigel and Helmut Sigel. Marcel Dekker, New York. 2002. lix + 810 pp. 16 × 23.5 cm. ISBN 0-8247-0765-6. \$250.00.

This extremely well-assembled book with a binding that stood up well to a complete reading speaks to the quality of this publication. The present volume of this highly regarded series constitutes yet another timely state-of-understanding presentation of essential metalloelement-dependent enzymes containing primarily mononuclear Mo- and W-enedithiolene pterin active sites and multinuclear S-Fe-homocitrate clusters, which provide or accept reducing equivalents for the reduction or oxidative reactions that these electron-transfer enzymes catalyze. It is impressive that nitrogen-fixing microorganisms have enzymes that utilize these cofactors to activate nitrogen and enable its reduction to ammonia at biological temperatures and pressures, a transformation that can be accomplished by chemical means only at very high temperatures and pressures. It is remarkable that nature has fashioned proteins and small molecular mass ligands capable of increasing the rate of essential metalloelement-dependent catalytic reactivity by many orders of magnitude and that these ligands protect biochemical systems from undesirable chemical consequences associated with the presence of "free" ionic bonded metalloelements. These enzymes are also capable of reducing protons to hydrogen gas and acetylene to ethylene. Recent discoveries include the presence of mononuclear Cu and V sites having cooperative roles in these enzymatic transformations. Medicinal chemists will find the sulfide/sulfite and xan-

thine oxidoreductases of particular interest with regard to their role in catalyzing the oxidation of sulfides and the conversion of hypoxanthine to uric acid in inflammatory disease states. Medicinal chemists will also find research directed toward the synthesis of small molecular mass mimetic chelates as an approach to gaining a mechanistic understanding of these essential metalloelement-dependent enzymes to be of particular interest with regard to synthesis of new drugs and synthesis of small molecular mass chelates as bioavailable agents capable of promoting tissue distribution and utilization of essential metalloelements. This volume constitutes a further bringing together of medicinal chemists and biochemists with organic chemists, coordination chemists, physical inorganic chemists, bioinorganic chemists, and those interested in essential metalloelement requirements from a nutritional perspective.

The preferred use of metalloelement oxidation state is employed throughout the book. However, it would provide clarity to use an arrow rather than a double bond to indicate a coordinate covalent bond. Another distraction is the use of the words "bind", "binding", and "bound" for some form of the preferred word "bond", whether or not the exact character of the electronic bonding interaction is known.

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