Shilov, A.E.: **Metal Complexes in Biomimetic Chemical Reactions. N_2 Fixation in Solution, Activation and Oxidation of Alkanes, Chemical Models of Photosynthesis.** – CRC Press, Boca Raton – New York 1997. ISBN 0-8493-4953-2. 302 pp., DM 290.00, GBP 111.50, USD 139.95, FF 1093.00, Lit 320.280, öS 2117.00, sFr 261.00.

Why are many simple-looking reactions of global importance difficult to realize in the laboratory? Can we reproduce processes of photosynthesis, nitrogen fixation, or methane oxidation? These are just few of the many questions that are addressed in the book written by director of the Institute of Biochemical Physics of the Russian Academy of Sciences. Dr. Shilov has devoted his career to active research in biomimetics – the development and improvement of chemical reactions that are analogues to their highly efficient biological counterparts.

For a long time the efforts to mimic in the laboratory the fundamental chemical processes of life were unsuccessful and frustrating. Reactions of simple stoichiometry, such as biological nitrogen fixation or photosynthetic photo-oxidation of water do not proceed in solution under standard conditions, while in the living organisms they are performed with high yields. As the name of the book suggests, the key to success is in the catalytic role of metals that form active centers of important biological enzymes.

The book summarizes the current knowledge (the most recent references are from the first half of 1990s) about fundamentals of three types of enzymatic processes of global importance that all involve interaction with complexes of transition metals in enzyme's active centre: nitrogen fixation, oxidation of alkanes, and water photooxidation in photosynthesis. Each of the three types of reactions is dealt within separate chapters of approximately equal size. Each part begins with general introduction to the biological role and mechanism of the process it is describing, with summary of what is known about the organization and structure of the involved enzymes *in vivo*. This is followed by a general physicochemical view of the underlying process. The core of each of the chapters is devoted to description of current status of modelling and engineering of synthetic analogues to the natural systems.

Of special interest to the reader of this journal is the last chapter about chemical models of plant photosynthesis. The brief introduction to plant photosynthesis, Z scheme, and carbon assimilation is followed first by description of general physicochemical principles of photoseparation and stabilization of charges. In detail are described classical model systems for simple photochemical reactions in self-organized lipid assemblies, such as vesicles. The factors that improve the efficiency of charge separation are discussed. Enough space is devoted to recent advances in the field of artificial photosynthesis: electron transfer in photoactive supramolecules (chains of molecules that serve as donors, photosensitisers, or acceptors) and first applications of hybrid photovoltaic systems using ruthenium-based photosensitisers and nanocrystalline solar cells. The next part deals in detail with photovoltaic dihydrogen evolution: bacterial hydrogenases are described followed by their artificial metal-containing photocatalytic systems. Finally, the last part is devoted to models of catalytic oxygen evolution from water. Here, the thermodynamics of oxidation of water is considered, followed by description of oxygen evolving cluster in photosystem 2 discussing possible arrangement of manganese atoms, the role of cofactors, and the enigmatic mechanism of dioxygen evolution. The examples of artificial systems for water oxidation using manganese and non-manganese metal complexes as catalysts are shown.

To summarize, this book provides a good source of information about the underying principles of familiar biological processes, about the role of transition metals in biology, and about current status of man's pursue to master and use the secrets of Nature.

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