

Preface

In the six chapters of the present book are considered both theoretical problems of the functioning of homogeneous catalysts, including the role of transition metal ions (mainly, iron, copper, and manganese) and their complex compounds, and practical aspects of such catalysis in various fields, involving normal biochemical and pathological (diseases) processes, oxyacids and natural polyphenols oxidation, in environmental processes (atmosphere, water), in the chemical industry, and in food chemistry. Naturally, the description of the homogeneous catalysis role in these applied fields does not pretend to be comprehensive. The purpose is different—to show, using certain examples, the influence, role, and mechanisms of catalytic reactions with metal complexes participation, in the processes taking place in the most important applied fields.

Another aim was to attract attention and raise the interest in scientific research in this rapidly developing field of catalysis (homogeneous catalysis with metal complexes) in various fields and to show the unlimited possibilities in both theoretical and applied aspects.

The third intention was to illustrate the possibilities of a rapidly developing new chemical concept—evolution catalysis, on model systems as the examples (mimetic method), and to reveal the practicability and prospect of such an approach in many applied fields.

It is an important task, in order to comprehend and to outline, from the enormous amount of experimental and theoretic material, certain basic principles of redox homogeneous catalysis, and especially, the mechanisms of processes, as soon as their understanding makes it possible to control and manage them, changing their direction, rate, selectivity, etc., within the required parameters.

In addition, in this book (in certain cases, deliberately) contradictory affirmations and conclusions are often given and compared, with the aim of bringing about the vivid perception of critical attitude of readers regarding the explanation of results, proposed by one or other researcher (or author). It was also considered desirable to show, very briefly, in certain cases (Chap. 1) some methodical approaches to the clarification of the mechanisms of catalytic processes. These approaches are often

used by researchers but are rarely described. This part would seem to be useful for young researchers beginning work in the field.

The old proverb says that “a lot of knowledge brings a lot of grief.” Grief, because it was impossible to explain everything in detail, that process mechanisms can be treated in a different way, and, very often, they have been revealed, at best, only at a satisfactory qualitative level, and that model systems cannot always explain real processes in the environment, in the human organism, or in real technologies. But this grief inspires action and encourages the researchers to penetrate deeper into the essence of the studied processes to put their knowledge at the service of practical activities, not just to satisfy their curiosity.

I cannot say often enough that this book has appeared as a result of long-term and successful collaboration with Prof. Yu. Scurlatov from Russia.

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