PREFACE

Inorganic chemistry comprises several hundreds of thousands of compounds. This Handbook includes the data about more than 7000 substances, chosen because of their scientific and technological importance.

Today, the number of chemical elements amounts to 111. The Handbook includes the elements of the Periodic System with the numbers from 1 to 105, their conventional chemical symbols, reactivity, and properties studied to a higher or lower degree.

The most universal, stable, and simple characteristic of a chemical substance is its *composition* reflected by the corresponding chemical *formula*. All the substances in the Handbook are entered in alphabetical order of chemical formulas from Ac to $Zr(WO_4)_2$.

The list of substances is divided into several *chapters* describing the chemical properties of a single element, *viz.*, the reactions undergone by a simple substance and various compounds of this element. The chapters consist of *entries* describing individual substances whose formulas begin with the symbol of the title element. Each Chapter is preceded by a list of the formulas of substances that include the title element but are considered in other chapters.

Each entry provides the chemical *name* of the substance adequate to its formula and uniquely reflecting its composition followed by a concise *verbal characteristic* of the substance including its color, aggregate state, thermal stability, specific features of its structure, existence of crystal hydrates, its solubility in water and organic solvents, the degree of its reactivity, propensity to hydrolysis, relation to most widely used reagents (acids, alkalies, ammonia hydrate, hydrogen, oxygen, etc.), specific properties, and its qualitative detection.

Then the methods of the substance *synthesis* on an industrial scale and under the laboratory conditions are given (as references to the corresponding chemical reactions considered in other entries) together with the most important substance *constants* necessary for correct interpretation of the chemical properties and everyday practical use of the reactions (molar mass, density, melting, boiling, and decomposition points, coefficient or product of solubility, etc.). Some additional constants are indicated directly in the reaction equations.

Finally, the numbered *reaction equations* are given in which the substance under question plays the part of a reactant (for the detailed description of the reaction types, *see*

the Introduction). The entry is completed with the list of references to equations of other entries, in which the formula of the substance under question also participates as a reactant. Altogether, there are more than 1200 such entries containing rather complete substance characteristics.

In addition, there are *concise data* on the substances not considered in their own entries. These data include the names, most important constants, relation to water, and the methods of substance preparation (in the form of references). The total number of substances with such concise characteristics is ca. 1000. Moreover, there are *cross references* on the substances (more than 3600) not considered in the entries and concise data. The references provide the necessary information about some chemical properties of the substances, as a rule, the data on their reactions with water, acids, and alkalies.

The chemical formulas and the names of substances are given in accordance with the nomenclature recommended by the International Union of Pure and Applied Chemistry (IUPAC), *see*, e.g. R. A. Lidin, L. L. Andreeva, V. A. Molochko. Constants of Inorganic Substances, Handbook. Begell House Inc., New York, 1995.

The formulas of the compounds with complex anions are written in the inverted order (anion, cation) to make them closer to the chemistry of the title element. Thus the entry describing the potassium dicyanoargentate(I) is in the chapter devoted to silver compounds in accordance with its inverted formula $[Ag(CN)_2]$,K. Various formulas not recommended for use but still encountered in the literature are also given in references. Thus for the old-fashioned Fe_3O_4 formula we refer the reader to the nomenclature formula $(Fe^{II}Fe_2^{III})O_4$.

When preparing this Handbook, my co-authors, D. Sc., V. A. Molochko and L. L. Andreeva, and I myself used our many years of experience in research work and university-level teaching. I express my cordial gratitude to our colleagues who helped us with their valuable advises and consultations; an important contribution was made by the students of our Academy who participated in discussions of individual reactions and their practical verification. The people who contributed to this work are too many to be mentioned here, but the merits of this book, if any, are due to their valuable help.

Of course, we realize that this Handbook is not free of shortcomings as well, and I am the only person responsible for them. Therefore I should be grateful for all the remarks, notes, and suggestions that would improve this book.

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Editor