

Preface

Inorganic chemistry comprises several dozens of thousands of compounds. This handbook includes the data on more than 4000 substances, ions, and radicals chosen with due regard for their industrial and scientific importance.

The Handbook consists of six sections arranged in the conventional tabulated form. The first Section gives the formulas and the names of substances, their relative molecular masses, and important physical properties such as phase-transition temperature, color, aggregate state, and density along with the data on substance reactivity (chemical properties) with respect to most commonly used solutions and reagents (water, ethanol, hydrochloric, sulfuric, and nitric acids, sodium hydroxide, and ammonia hydrate). The entry that describe naturally occurring substances (minerals) also include their mineralogical names, symmetry, and hardness.

The following sections of the Handbook characterize the atomic, molecular, and thermodynamic properties of atoms, molecules (formula units), radicals, and cations and anions of those inorganic substances that can exist either as individual substances or in aqueous solution. There are also data on relative atomic masses of elements, properties of natural and radioactive isotopes, electronic configurations of atoms, energies of ionization, and affinities to electrons for atoms and molecules, binding energies and bond lengths, structure (geometric form) of constituent molecules and ions of various substances, including coordination compounds. The Handbook also lists thermodynamic constants of the substances in all their aggregate states (gas, liquid, solid state, aqueous solution), redox potentials, acidity and basicity constants, stability constants of complexes in aqueous solution and solubility in water.

The last Section deals with the nomenclature of inorganic substances. The rules to construct systematic chemical formulas of inorganic substances and their names in accordance with the IUPAC recommendations are formulated and exemplified. There are also detailed lists of nonsystematic names of substances and classification names of groups of substances still widely used in chemical literature.

All the tables in all the Sections are composed in accordance with the following principle. The chemical formulas (the first column) are arranged in the alphabetical order of the symbols of constituent elements that constitute these formulas. Each table is preceded by a concise introduction containing modern definitions of chemical terms and notions and all the necessary comments to the data included into the Section.

All the constants cited in the Handbook can be classified as the informative reference data. The values of the constants are taken from the major reference editions. In the cases where such highly reliable data were absent, the preference was given to most consistent of the known data. The numerical values are given without indicating the errors of their determination because they were rounded off within the accuracy necessary for practical calculations and estimations.

All the materials included into the American edition were revised and complemented with modern data; the relative molecular masses were brought into correspondence with the International Table published in 1987. Two new Sections were written specially for the American edition: "Index of Minerals" and "Enthalpy and Entropy of Phase Transitions".

When writing this book, the authors used many years of experience of scientific and pedagogical work at the Lomonosov Academy of Fine Chemical Technology under the guidance of Professors K. V. Astakhov, M. Kh. Karapet'yants, and E. S. Sarkisov. The authors hope that this book will be a worthy tribute to their memory and will pass the test of time.

The authors will be grateful for all the critical remarks and suggestions that can improve this Handbook.

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