

Handbook of
INORGANIC
COMPOUNDS

无机化合物手册

Edited by
Dale L. Perry
Sidney L. Phillips

世界图书出版公司

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PREFACE

Over the past five decades a large number of new compounds have been synthesized and their basic properties obtained by laboratory measurements. At the same time, new uses for older products have emerged and new methods have been developed to synthesize and manufacture inorganic compounds. The objective of this work is to provide an information resource to the reader who uses numerical values of the basic chemistry properties of inorganic compounds for various applications.

The compounds in the *Handbook* were selected for several reasons. For example, many are now commercially important, and the data can be used to assist those who are looking at potential uses for new compounds, and wish to compare key data of the current commercial product with their new compound. Other compounds have been included because they are or can be precursors in processes for commercially preparing important materials. Examples are use of the precursors in sol-gel, vacuum-deposition and hydrothermal crystallization as steps in a larger preparative procedure. A third reason for inclusion is to provide completeness to a family of compounds such as oxides and halides.

It is not possible to include either all inorganic compounds or all the important data. The *Handbook of Inorganic Compounds* consists of data for 3326 selected gas, liquid and solid compounds. The selection was based on considerations such as inclusion of the compounds in various handbooks of laboratory chemicals, discussion in recent research publications, and from comments of the Advisory Committee for this work.

The material in this work includes mainly the chemical elements, binary compounds of the elements with anions such as sulfate and chloride, and metal salts of some simple organic acids. If a compound has more than one form, then each form may be listed individually. One example is separate listings for an anhydrous compound and its hydrates. A second example is the separate listing of the three calcium carbonates. With some exceptions, minerals, organometallic compounds, the metal alloys, noncrystalline materials, and nonstoichiometric materials are not included in this *Handbook*.

The format for presenting information has both numerical data and descriptive information. The data are solubility, melting point, boiling point, density, thermal conductivity and thermal expansion coefficient. Other data may also be included, e.g., vapor pressure, viscosity, hardness, lattice parameters, electrical resistivity, Poisson's ratio, and dielectric constant. There may also be thermodynamic values, mainly enthalpy of vaporization, fusion and sublimation. However, thermodynamic values for the individual compounds such as enthalpy of formation are not covered by this work. Descriptive information for the various compounds are organized into the three categories: form, e.g., color and particle size; preparation or manufacturing procedure; and commercial or other uses.

A significant effort has been made to tabulate numerical values for each compound. Thus, the reader is saved considerable time in looking for the basic properties from many sources. The *Handbook* is intended to be useful to chemists, chemical engineers, and materials scientists who need:

1. Property data for compounds which they wish to use in their research, development, and applications work.
2. CAS RN numbers for computer and other searches. An effort has been made to include CAS RN numbers for hydrates, as well as for compounds with no waters of crystallization.
3. A consistent tabulation of molecular weights. In this work, molecular weights have been calculated to three decimal places in all cases.
4. To synthesize inorganic materials on a laboratory scale.
5. Information on commercial and other uses for many compounds, which can be used for teaching purposes in a chemistry course.

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Additional numerical data for inorganic compounds are found in the 75th edition of the *Handbook of Chemistry and Physics*, the *Encyclopedia of Chemical Technology*, the *Merck Index*, *Comprehensive Inorganic Chemistry*, *Gmelin*, *Lange's Handbook of Chemistry*, and *Hawley's Comprehensive Chemical Dictionary*. Some of these sources are also available by computer access. More recent information and data can be found in research journals such as the *Journal of Material Research*, *Journal of the American Ceramic Society*, *Chemistry of Materials*, *Chemical Reviews*, *Material Research Bulletin*, *Journal of the Electrochemical Society*, and *Solid-State Ionics*.

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Handbook of Inorganic Compounds

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ORGANIZATION OF DATA FOR THE COMPOUNDS

References to sources of the data are given in the form [XXXYY].

Compound: Commonly used name of inorganic compound.

Formula: Commonly used chemical formula.

Molecular Formula: Modified Hill system in which carbon is always listed first, followed by hydrogen (if any), then other elements in alphabetical order. If there is no carbon, then the elements are given in alphabetical order. Stoichiometry is always shown in the usual subscript form.

Molecular Weight: Consistently calculated from the stoichiometry of the formula to three decimal places, using atomic weights from *Pure & Applied Chemistry*, 1992, 64, pages 1522—1523. Significant figures are not taken into account.

CAS RN: Chemical Abstracts Service Registry Number. Where possible, the CAS RN for the compound with hydrated waters is given, as well as that for the anhydrous compound.

Properties: Consists of all or some of the following basic chemical data: crystalline form with lattice parameters; color; gas, liquid, or solid; vapor pressure; hardness; viscosity; dielectric constant; electrical resistivity; Poisson's ratio; enthalpy of vaporization; enthalpy of fusion; preparation; uses.

Solubility: Concentration of compound in solvent under the stated conditions. The solvent is usually water; effort has been made to include the equilibrium solid phase.

Density: Density of the solid, liquid, or gas.

Melting Point: Temperature at which the pure solid becomes liquid.

Boiling Point: Temperature at which the pure liquid becomes a gas.

Reactions: Limited generally to phase changes, decomposition, and hydrolytic reactions.

Thermal Conductivity: Property of the compound which attributes a numerical value to its capability to transmit heat.

Thermal Expansion Coefficient: Change in volume or length per degree change in temperature. This is an important property for ceramics.

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