

Foreword to the Second Edition

Since the publication of the first edition of this Handbook (in 1963) a large amount of material on thermophysical properties of different substances have been published. The following changes and additions have been incorporated in the present edition:

1. New, detailed data are given for two types of hydrogen, both in the liquid and in the gaseous states. The present tables contain data up to $6,000^{\circ}\text{K}$ and 1,000 bar, that is, the data include the region of high temperatures where hydrogen exists in a dissociated state. New tables of transport properties of hydrogen have been provided for both the liquid and the gaseous states at different pressures up to a temperature of $2,000^{\circ}\text{K}$.

2. The thermophysical properties of nitrogen, oxygen, air and argon are given over a much wider range of parameters. Detailed new data at high temperatures are given for these substances, for both the liquid as well as for the gaseous states, ranging from extremely low to very high pressures (up to 1,000 bar).

3. The tables of thermophysical properties of carbon dioxide (CO_2) have been reworked, expanded and rendered more accurate. This section contains new detailed data for liquid carbon dioxide at high temperatures (up to $4,000^{\circ}\text{K}$) in the critical region, where it exists in the dissociated state.

4. More detailed tables are given for alkali metals and mercury. Thermodynamic properties have been determined on the basis of new, more accurate data on the dissociation energy of diatomic molecules of alkali metals. The thermodynamic properties tables have been expanded to $3,000^{\circ}\text{K}$, taking into account both dissociation and ionization. Thermodynamic properties for ionized lithium at high temperatures are given in a separate set of tables. Viscosity and thermal conductivity of alkali metals in the gas phase are reported here for the first time.

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5. Information on thermophysical properties of monatomic substances has been significantly expanded. In particular, new tables for helium include data for both liquid and gas phases at extremely low and high temperatures (up to 3,000°K) at different pressures. Thermophysical properties of neon, krypton and xenon are given for a wide range of temperatures and pressures.

6. Thermophysical properties of water and steam are given here on the basis of new international tables adapted in 1963—1964. For dissociated steam, data are given up to 6,000°K and 1,000 bar taking into account true properties of dissociated steam.

7. New data are given on diffusion in binary gas mixtures, on viscosity and thermal conductivity of mixtures and solutions; data at different pressures are included.

8. The majority of tables for the remaining substances cite more accurate and newer data over a wider range of parameters.

9. The editors have not included in the present edition data on thermophysical properties of compounds of boron, nitrogen oxide, gallium, deuterium and individual hydrocarbons, due to the fact that almost no new information for these substances has been published since the appearance of the original edition of the Handbook.

10. All thermophysical properties are given in SI units, with the exception of the data for ionized lithium, argon and nitrogen.

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