FOREWORD

The present book has evolved from the well-known Handbook of Physical Properties of Liquids and Gases that has been published in four editions in USSR, USA, and Japan within a period between 1963 and 1975.

Since the last edition, both the scope of the experimental material and the methods of processing and compilation of data have undergone considerable changes. The experimentally studied regions of the reference parameters have been expanded to cover higher pressures as well as the regions of both high and very low temperatures, including the extreme states. Taking these changes into account, the book has been substantially revised. In some cases, in an effort to avoid excessive increase in the volume, a new approach to selection and presentation of the data was used.

The present edition contains about 60% of new data and has the following modifications:

- The list of the substances and the regions of the state parameters covered in the Handbook have been extended.
- For a number of substances the property tables have been totally replaced
- In addition to the tabular material, the book includes extensive information in the form of correlation equations.
- In order to update the reference data we have used the results obtained by such authoritative scientific groups as the Institute for High Temperatures of Russian Academy of Sciences, Moscow Aviation Institute, Moscow Power Institute, Central Aerohydrodynamic Institute (TsAGI), Khar'kov Physical and Technical Institute, Sankt-Petersburg Technological Institute.

This edition incorporates the State Bureau of Standard and Reference Data of USSR (GSSSD) tables and other materials issued by the State Standard and Reference Data Service of Russia.

The improved system of data presentation allowed us to include the following new features in this edition:

- the Handbook covers a number of new substances such as deuterium and other isocompounds of hydrogen, helium-3, lithium hydride, sulfur hexafluoride, iodine, alkaline-earth and rare-earth metals liquid and gas, deutero-containing compounds;
- the thermodynamic data for ionized states of a number of substances are given;
- the thermodynamic and transport property data for the critical region of a large number of substances were replaced or updated;
- the property tabulations for noble gases, water substance, deuterium oxide, nitrogen, oxygen, a few organic compounds, halogens, CO, CO_2, alkali metals and other substances were substantially enlarged;
- new experimental thermodynamic tables for potassium, rubidium, and cesium are given, which allowed us to extend the pressure range of the tabulations from 1 to 10 MPa. The thermodynamic property tabulations for lithium and sodium were based on the theoretical estimates made in accordance with the recent quantum mechanical techniques;
- the Handbook incorporates an expanded coverage of diffusion and thermodiffusion;
- where available, the accuracy estimates for the tabulated values are specified.

The Handbook gives the data both in the form of the detailed tables and correlation equations demonstrating the temperature and pressure dependences of the properties. In some regions extrapolated values are given which, as a rule, are indicated in the text. In a few extreme regions the property values were estimated theoretically.

The scope of the material included in the Handbook and its presentation make it a valuable tool for engineers, designers, and technologists engaged in the field of power engineering, nuclear and space technology, chemical and mechanical engineering, and instrument manufacturing industries. The book can be also recommended for scientists, post-graduate students, and students dealing with applied sciences.

We would like to acknowledge the staff of the Chair of Physics of Moscow Aviation Institute for valuable help in preparing the manuscript of the Handbook.

N.B. Vargaftik
Yu.K. Vinogradov
V.S. Yargin

Moscow Aviation Institute
Moscow, Russia