

Landolt-Börnstein

Numerical Data and Functional Relationships in Science and Technology

New Series / Editor in Chief: W. Martienssen

Group IV: Physical Chemistry

Volume 19

Thermodynamic Properties of Inorganic Materials

compiled by SGTE

Subvolume B

Binary Systems

Phase Diagrams, Phase Transition Data,
Integral and Partial Quantities of Alloys

Part 4

Binary Systems from Mn-Mo to Y-Zr

Editor

Lehrstuhl für Werkstoffchemie,

Rheinisch-Westfälische Technische Hochschule Aachen

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Scientific Group Thermodata Europe (SGTE)



Springer

ISSN 1615-2018 (Physical Chemistry)

ISBN-10 3-540-25024-7 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-25024-1 Springer Berlin Heidelberg New York

Library of Congress Cataloging in Publication Data

Zahlenwerte und Funktionen aus Naturwissenschaften und Technik, Neue Serie

Editor in Chief: W. Martienssen

Vol. IV/19B4: Editor: Lehrstuhl für Werkstoffchemie, Rheinisch-Westfälische Technische Hochschule Aachen

At head of title: Landolt-Börnstein. Added t.p.: Numerical data and functional relationships in science and technology.

Tables chiefly in English.

Intended to supersede the Physikalisch-chemische Tabellen by H. Landolt and R. Börnstein of which the 6th ed. began publication in 1950 under title: Zahlenwerte und Funktionen aus Physik, Chemie, Astronomie, Geophysik und Technik.

Vols. published after v. 1 of group I have imprint: Berlin, New York, Springer-Verlag

Includes bibliographies.

1. Physics--Tables. 2. Chemistry--Tables. 3. Engineering--Tables.

I. Börnstein, R. (Richard), 1852-1913. II. Landolt, H. (Hans), 1831-1910.

III. Physikalisch-chemische Tabellen. IV. Title: Numerical data and functional relationships in science and technology.

QC61.23 502'.12 62-53136

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springeronline.com

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Printed in Germany

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Cover layout: Erich Kirchner, Heidelberg

Typesetting: Authors and Redaktion Landolt-Börnstein, Darmstadt

Printing and binding: AZ-Druck, Kempten

SPIN: 1075 7285 63/3020 - 5 4 3 2 1 0 – Printed on acid-free paper

Editors

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In preparing the data for publication in this series, the editors have been assisted particularly by:

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Dedication to Ibrahim Ansara

This series of volumes, presenting thermodynamic properties of binary alloys, is dedicated to the memory of Ibrahim Ansara – better known to his friends as Himo. Himo was a member of SGTE from the time of its origin as a CNRS research project in 1967, through the time of its constitution as a European, non-profit-making company under French law in 1979, until his sudden, unexpected death in 2001.

Through all those years, Himo missed scarcely a single SGTE meeting and his continual cheerfulness and enthusiasm, as well as his scientific understanding, were an inspiration to his colleagues both in their joint work of SGTE database development as well as in their individual research projects in their home laboratories. He was a friend to everyone in SGTE, and it is the spirit of friendship and warmth that he promoted that has been largely responsible for the continued close collaboration and achievements of this diverse international group as a whole.

It is very appropriate to dedicate the Landolt-Börnstein handbooks on binary alloy systems to Himo. In the preparation of the previous volumes on pure substances, Himo made substantial contributions both as database manager and as advisor. The present series of volumes on binary alloys has benefited considerably from his contributions to the review and selection of available assessments during the initial stages of the work. It is a sad coincidence that it was during a meeting to prepare the first of these volumes that Himo died.

Philip Spencer

Preface

Thermodynamic data, in conjunction with appropriate software for calculation of complex chemical equilibria, are finding wide application in many areas of materials design and development. In particular, the last 25 years have seen enormous advances in the thermodynamic modelling of alloy solution phases, whereby a knowledge of the underlying crystallographic structure of each phase is fundamental to a reliable representation of the thermodynamic properties and phase equilibria of a particular system of interest. With the aid of thermodynamic calculations, considerable time and costs can and are being saved in producing a material of the required composition and phase constitution required for a particular application.

SGTE has been at the forefront in providing critically assessed thermodynamic data for alloy systems and has provided guidelines for the modelling of alloy phases of different types. Major advantages of the SGTE data are their self-consistency, the fact that they are produced with careful attention to a well-defined quality procedure and that the expertise of SGTE members in various areas of inorganic chemistry and materials science allows review of the numbers by highly qualified scientists in the fields concerned.

Following the publication of a first set of four volumes of SGTE compiled thermodynamic properties of inorganic substances, which dealt with pure substances (Subvolume A), this second set of four volumes presents selected thermodynamic data for binary alloy systems (Subvolume B). The possibility to continue to ternary and multi-component systems is also foreseen. The data in the latter would be so presented as to correspond to potential application themes (steels, light alloys, nickel-base alloys, etc.). The fundamental equations used in evaluating the data are given in the introduction to the volumes and the models used in representing the data are also described.

Each book in this binary alloys series is accompanied by a CD, which allows computer calculation of a range of solution properties for selected temperature and phase composition ranges for the systems presented in that particular volume. Graphical representations, including the calculated phase diagram for each system, are also possible. Information on more comprehensive software, allowing complex equilibrium calculations involving both pure substances and solution phases of different types (e.g. slags, salt systems, aqueous solutions, etc.), can be obtained from SGTE members. A list of the SGTE membership is presented in the cover pages of this volume.

Very many scientists, in addition to those currently participating in SGTE activities, have contributed to the development of the SGTE databases. Their names have become too numerous to list and we respectfully ask them to accept this acknowledgement of their efforts. However, special recognition is given here to the late Himo Ansara, who was SGTE Pure Substances Database manager from the beginning and who made major contributions to these binary alloy volumes. His dedicated work and friendship were an inspiration to all of his colleagues. We remember him with deep affection and gratitude.

Dr. P.J. Spencer
Chairman of SGTE, 1992 – 2002

Ithaca, April 2002

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CD-ROM: Software for the calculation of phase diagrams and thermodynamic data of binary systems