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Thermodynamic Properties of Inorganic Materials
compiled by SGTE

Subvolume B
Binary Systems
Phase Diagrams, Phase Transition Data,
Integral and Partial Quantities of Alloys

Part 5
Binary Systems Supplement 1

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The present series of books is the result of a collective work carried out during many years by many individuals. Since a complete list of all contributors is an impossible task, only a contact person is mentioned under each member organisation.

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The reviews in the present volume of selected binary systems have been prepared by:

P.-Y. Chevalier, E. Fischer, P. Franke, K. Hack and T. Jantzen.

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

A.T. Dinsdale (Data Manager for Elements), I. Ansara (Data Manager for Pure Substances), B. Sundman (Data Manager for Solutions), S.G. Fries (Solution Database Coordinator) and A. Hovmark (SGTEbin software).

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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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