

《相图边界理论及其应用》

图书基本信息

书名：《相图边界理论及其应用》

13位ISBN编号：9787030244581

10位ISBN编号：7030244583

出版时间：2009-1

出版社：Mu Zhao、Lizhu Song、Xiaobao Fan 科学出版社 (2009-01出版)

页数：238

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前言

The phase diagram is one of the most extensively used disciplines in the Applied Sciences. They are relevant to different areas both in science and engineering, as well as to the various branches of the national economy. In many scientific and technical specialties, such as physics, chemistry, geology, materials science and technology, chemical engineering, etc, it is easy to find its application that strongly shows the importance of phase diagram in the science and technology today. In the early stages of development, phase diagrams were mainly obtained from experimental measurements. With the increasing number of the system components as well as the severe demands placed on experimental materials requiring corrosion-resistant, heat-resistant, etc, the experimental methods were no longer able to meet these requirements, especially with respect to generating multi-component phase diagrams. The theoretical calculation of phase diagram has now become the principal method for obtaining the desired phase diagrams. This route has been especially favored by the rapid advance of research and development in computer science and technology that induced the “art” of phase diagram calculation to a new level. Under these circumstances, the continuing research on the theory of phase diagrams has recently and naturally become the topic of great and lasting interest, to both applied scientists and engineers alike.

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内容概要

《The Boundary Theory of Phase Diagrams and Its Application:相图边界理论及其应用(英文版)》内容简介：
The Boundary Theory of Phase Diagrams and Its Application Rules for Phase Diagram Construction with Phase Regions and Their Boundaries presents a novel theory of phase diagrams. Thoroughly revised on the basis of the Chinese edition and rigorously reviewed, this book inspects the general feature and structure of phase diagrams, and reveals that there exist actually two categories of boundaries. This innovative boundary theory has solved many difficulties in understanding phase diagrams, and also finds its application in constructing multi-component phase diagrams or in calculating high-pressure phase diagrams. Researchers and engineers as well as graduate students in the areas of chemistry, metallurgy and materials science will benefit from this book. Prof. Muyu Zhao was the recipient of the 1998 Prize for Progress in Science and Technology (for his work on the boundary theory of phase diagrams) awarded by the National Commission of Education, China, and many other prizes.

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《相图边界理论及其应用》

书籍目录

Preface
Comment
Introduction
Part One The Phase Rule, Its Deduction and Application
Chapter 1 The Phase Rule, Its Deduction and Application
1.1 Why do We Discuss the Phase Rule at First
1.2 Different Methods for Deducing the Phase Rule: The Method of Gibbs Himself, Gibbs-Roozeboom's Method and the Method of Gibbs Free Energy Minimization
1.3 Determination of the Number of Independent Components by Brinkley's Method
1.4 Some Remarks on the Application of the Phase Rule
References-1
Summary of Part One
Part Two The Boundary Theory of Isobaric Phase Diagrams and Its Application
Chapter 2 The Boundary Theory of Isobaric Phase Diagrams—Rules for Phase Diagram Construction
2.1 Introduction
2.2 Several Basic Concepts for Underlying the Phase Diagram
2.3 The Theorem of the Corresponding Relationship between the Total Number of All the Different Phases in NPRs and the Dimensions of the Phase Boundary R_1 in Phase Diagrams, and Its Theoretical Deduction
2.4 The Theorem of the Corresponding Relationship (TCR) is an Independent Theorem, Not a Variant of the Phase Rule
2.5 Corollaries of TCR for Isobaric Phase Diagrams
2.6 The Relationship between the Dimensions of the Phase Boundary R_1 and the Dimensions of the Boundary R_1' for Isobaric Multicomponent Phase Diagrams
2.7 The Summary of the Boundary Theory of Isobaric Phase Diagrams
References-2
Chapter 3 Application of the Boundary Theory to Unary, Binary and Ternary Phase Diagrams
Comparison of the Boundary Theory Application and Palatnik-Landau's Contact Rule of Phase Regions
3.1 Determination of Phase Assemblages of NPRs and the Characteristics of Their Boundaries by the Boundary Theory
3.2 Application of the Boundary Theory to Unary Phase Diagrams
3.3 Application of the Boundary Theory to Binary Phase Diagrams
3.4 Application of the Boundary Theory to Ternary Phase Diagrams
3.5 Explanation of Rhines' Ten Empirical Rules for Constructing Complicated Ternary Phase Diagrams with the Boundary Theory
3.6 Comparison of the Boundary Theory and the P-L's Contact Rule of Phase Regions
References-3
Chapter 4 The Application of the Boundary Theory of Phase Diagrams to the Quaternary and Higher Number Component Phase Diagrams
4.1 Introduction
4.2 The Relationship among NPRs and their Boundaries in a Typical, Iso-baric, Quaternary Phase Diagram
4.3 During Temperature Decreasing, Some Cases of Variations of the NPRs and their Boundaries, May be Encountered for Several Types of Quaternary Isobaric Phase Diagrams
4.4 The Isobaric Quinary Phase Diagrams
4.5 Conclusion
References-4
Chapter 5 The Boundary Theory in Construction of Multicomponent Isothermal Sections
5.1 The Relationship among Neighboring Phase Regions (NPRs) and Their Boundaries in Isobaric Isothermal Multicomponent Sections
5.2 The Non-Contact Phase Regions and the Boundaries between Them
Contents
5.3 Construction of an Isothermal Quinary Section, with Limited Information
5.4 The Method of Constructing an Isothermal Eight-Component section
5.5 Summary of Part Two
Part Three The Boundary Theory method
References-5
Chapter 6 The Boundary Theory of Multicomponent Isobaric Isoleth Sections
6.1 Introduction
6.2 The Characteristics of Boundaries in Isoleth Sections for the Case of $N=2$ and $R_1=1$
6.3 The Characteristics of Boundaries in the Isoleth Section for the Case of $N=2$, $R_1=0$, there is no Invariant Phase Transition between the two NPRs
6.4 The Case of $N=2$, $R_1=0$, there is an Invariant Phase Transition between the two NPRs. In this Case, there may be a Boundary Line or a Boundary Point between two NPRs
6.5 Example
6.6 The Theory of Two ~ Dimensional Sections of Isobaric Multicomponent Phase Diagrams
References-6
Chapter 7 The Application of the Boundary Theory to Isobaric Phase Diagrams
7.1 Brief Review of the Application for the Boundary Theory
7.2 The Analysis of the Fe-Cr-C Isoleth Section.
7.3 The Application of the Boundary Theory to Phase Diagram Calculation
7.4 The Application of the Boundary Theory to Phase Diagram Assessment.
7.5 The Application of the Boundary Theory to Phase Diagram Determination
7.6 The Application of the Boundary Theory to Phase Diagram Education.
References-7
Summary of part two
Part Three The Boundary Theory and Calculation of High Pressure Phase Diagrams
Chapter 8 The Boundary Theory for p-T-xi Multicomponent Phase Diagrams
8.1 Introduction
8.2 The Theorem of Corresponding Relationship for p-T-xi Multicomponent Phase Diagrams and Its Corollaries
8.3 The Relationship between R_1' and R_1 in p-T-xi Multicomponent Phase Diagrams
8.4 The Relationship among NPRs and Their Boundaries for the p-T-x Binary Phase Diagrams
8.5 Relationship among NPRs and their Boundaries for the p-T-xi Ternary Phase Diagram
8.6 The Application of Boundary Theory for Quaternary p-T-xi Phase Diagrams
8.7 The Reliability of the Boundary Theory of Multicomponent p-T-xi Phase Diagrams
References-8
Chapter 9 The Calculation of Unary

《相图边界理论及其应用》

High-Pressure Phase Diagrams and the Boundary Theory of p-T Phase Diagrams of Multicomponent Systems 9.1
Introduction 9.2 Calculation of Unary p-T Diagrams 9.3 The Boundary Theory of p-T Phase Diagrams of
Multicomponent Systems without Composition Variable References-9 Chapter 10 Calculation of Binary
High-Pressure Phase Diagrams 10.1 Principles for the Calculation of Binary Phase Diagrams at Elevated
Pressures 10.2 Calculation of the Standard Molar Gibbs Free Energy for the Pure Components 10.3 Calculation of
Activity Coefficients $a_i(T, p_0, x_i)$ of the i -th Component in the Equilibrium Phases 10.4 Partial Molar
Volumes 10.5 Some Remarks on the Values of a and V 10.6 Example-Calculation of the Cd-Pb Phase Diagram at
High Pressure References-10 Chapter 11 The Calculation of High-Pressure Ternary Phase Diagrams 11.1 The
Characteristics of the Boundaries of the High-Pressure Ternary Phase Diagrams, and the Basic Equations for Their
Calculation 11.2 The Treatment of Thermodynamic Parameters for Ternary Systems at High Pressure 11.3
Verification of the Estimation Method for the Excess Molar Volume by Experiment 11.4 The Calculation of
High-Pressure Phase Diagrams of Cd-Pb-Sn and Cd-Sn-Zn Systems 11.5 Verification of Calculated High-Pressure
Ternary Phase Diagrams through Experimental Determination 11.6 The Comparison between the Methods of
Experimental Determination and Thermodynamic Calculation of High Pressure Phase
Diagrams References-11 Summary of Part Three References of This Book Important Symbols Index Annex

章节摘录

插图：Chapter 1 The Phase Rule, Its Deduction and Application 1.1

Why do We Discuss the Phase Rule at First? The Gibbs phase rule is now a long established principle of Chemistry, very well known by all physical chemists and materials scientists. So, why do we still need to write a chapter to discuss this classic, fundamental law of Chemical science, at the outset of this treatise? Textbooks, as published for the explanation of physical chemistry and the use of phase diagrams, usually present only a simple method for the "deduction" of the phase rule. However, the original "rule" as deduced by Gibbs himself, is both strict and well thought-out, indeed students can learn much from his method. The Gibbs-Roozebooms method, though simple, is, nevertheless, full of wisdom. The deduction of the phase rule under the circumstance, involving particular chemical reactions, by application of the mathematic method of Gibbs free energy minimization, is today, only presented in a few monographs. By means of this method however, both the phase rule, and the law of mass action used for the chemical equilibrium, are successfully deduced. This is indeed a very interesting circumstance. When applying the phase rule, an important and difficult problem to treat is the determination of the number of independent components involved. Generally, ordinary Physical Chemistry texts only present Jouguet's method for the deduction of this number and do not discuss either the strengths and or the shortcomings, of this method. Here, we present another useful approach, i.e. that of the Brinkley's method and these two methods will be shortly compared in detail. The application of the phase rule is generally not a very easy task, so here we will also address some brief remarks to the resolution of this problem. Usually, we apply the phase rule and then discuss the differences between the phase rule predictions and our theory, as set out in detail in Chapter 2. Therefore, at first, a special introductory chapter is now provided, being devoted to a discussion of the phase rule.

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编辑推荐

《The Boundary Theory of Phase Diagrams and Its Application:相图边界理论及其应用(英文版)》是由科学出版社出版。

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