<<相图边界理论及其应用>>

图书基本信息

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前言

The phase diagram is one of the most extensively used disciplines in the AppliedSciences. They are relevant to different areas both in science and engineering, aswell as to the various branches of the national economy. In many scientific andtechnical specialties, such as physics, chemistry, geology, materials science andtechnology, chemical engineering, etc, it is easy to find its application that stronglyshows the importance of phase diagram in the science and technology today.In the early stages of development, phase diagrams were mainly obtained fromexperimental measurements. With the increasing number of the system compo-nents as well as the severe demands placed on experimental materials requiringcorrosion-resistant, heat-resistant, etc, the experimental methods were no longerable to meet these requirements, especially with respect to generating multi-component phase diagrams. The theoretical calculation of phase diagram has nowbecome the principal method for obtaining the desired phase diagrams. This routehas been especially favored by the rapid advance of research and development incomputer science and technology that induced the " art " of phase diagram calcu-lation to a new level. Under these circumstances, the continuing research on thetheory of phase diagrams has recently and naturally becomes the topic of greatand lasting interest, to both applied scientists and engineers alike.

内容概要

The Boundary Theory of Phase Diagrams and Its Application Rules forPhase Diagram Construction with Phase Regions and Their Boundariespresents a novel theory of phase diagrams. Thoroughly revised on the basisof the Chinese edition and rigorously reviewed， this book inspects thegeneral feature and structure of phase diagrams， and reveals that there existactually two categories of boundaries. This innovative boundary theoryhas solved many difficulties in understanding phase diagrams， and alsofinds its application in constructing multi-component phase diagrams orin calculating high-pressure phase diagrams. Researchers and engineers aswell as graduate students in the areas of chemistry， metallurgy and materialsscience will benefit from this book.Prof. Muyu Zhao was the recipient of the 1998 Prize for Progress in Scienceand Technology （for his work on the boundary theory of phase diagrams）awarded by the National Commission of Education， China， and many otherprizes.

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章节摘录

插图：Chapter 1 The Phase Rule, Its Deduction andApplication1.1　Why do We Discuss the Phase Rule at FirstThe Gibbs phase rule is now a long established principle of Chemistry, very wellknown by all physical chemists and materials scientists. So, why do we still need towrite a chapter to discuss this classic, fundamental law of Chemical science, at theoutset of this treatise？
Textbooks, as published for the explanation of physical chemistry and the useof phase diagrams, usually present only a simple method for the "deduction" of thephase rule. However, the original "rule" as deduced by Gibbs himself, is both strictand well thought-out, indeed students can learn much from his method. The Gibbs-Roozebooms method, though simple, is, nevertheless, full of wisdom. The deductionof the phase rule under the circumstance, involving particular chemical reactions,by application of the mathematicM method of Gibbs free energy minimization, istoday, only presented in a few monographs. By means of this method however, boththe phase rule, and the law of mass action used for the chemical equilibrium, aresuccessfully deduced. This is indeed a very interesting circumstance.When applying the phase rule, an important and difficult problem to treat isthe determination of the number of independent components involved. Generally,ordinary Physical Chemistry texts only present Jouguet's method for the deductionof this number and do not discuss either the strengths and or the shortcomings, ofthis method. Here, we present another useful approach, i.e. that of the Brinkley'smethod 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 wewill also address some brief remarks to the resolution of this problem.Usually, we apply the phase rule and then discuss the differences between thephase 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 discussionof the phase rule.

编辑推荐

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