

BOOK REVIEWS

Phase Equilibria and Phase Boundary Phenomena.¹

By A. I. RUSANOV (revised and updated by W. Schirmer). Akademie-Verlag, Berlin, Germany (DDR), 1978. 465pp. DM (East) 90.00 (about \$50). In German.

Table of Contents (main chapters):

1. Fundamental Principles.
2. Application of Thermodynamics on Phase Boundary Layers and Heterogeneous Systems
3. Equilibrium of Two Phases in the Presence of a Plane Discontinuity Boundary
4. Dependence of Surface Tension on Temperature
5. Dependence of Surface Tension on Pressure
6. Dependence of Surface Tension on the Composition of the Coexisting Phases
7. Dependence of Surface Tension on the Main State Parameters
8. Thermodynamics of Material Separations by Enrichment at Phase Boundaries
9. Two-Phase Equilibrium in the Presence of a Curved Discontinuity Boundary
10. Surface Tension of Curved Discontinuity Boundaries
11. Effect of the Curvature of a Discontinuity Boundary on the Main Parameters of the Thermodynamic Equilibrium
12. Composition of Curved Discontinuity Phases
13. Special Examples of Equilibria at Incomplete Component Distribution (Equilibria in Ion Systems)
14. Thermodynamics of Films
15. Phase Boundary Phenomena on Solids
16. Adsorption Films
17. Wetting and Dispersing
18. Energetics of the Formation of New Phases
19. Equilibrium of Two-dimensional Phases
20. Methods for Dealing with Small Objects and Their Application Limits

Based on the fundamental work of J. W. Gibbs, the author develops in a very logical and disciplined fashion (as already can be judged from the Table of Contents) the thermodynamics of phase equilibria of macro- and microsystems, emphasizing surface phenomena. As the Table of Contents shows, the book mainly deals with liquid systems and touches only briefly upon solid surfaces. The extensive revision of the main chapter on solid surfaces, Chapter 15, by W. Schirmer, increased the value of the book. Since it appeared originally in the USSR and since A. I.

Rusanov conducts research in the covered areas, the reader will find numerous references to Russian publications (in Russian). The book should be primarily of interest to those who are dealing with liquid interfaces, as well as to those who would like to see the thermodynamic treatment of solid surface phenomena in perspective with those of liquid interfaces. However, it makes enjoyable reading even for somebody who already has "Surface Tension and Adsorption" by R. Defay, I. Prigogine, A. Bellemans, and D. H. Everett on his bookshelf.

Each chapter has an extensive list of references, which includes publications up to about 1975. A subject index is included.

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Spectroscopy in Heterogeneous Catalysis. By W. N. DELGASS, G. L. HALLER, R. KELLERMAN, AND J. H. LUNSFORD. Academic Press, New York, 1979, 341 pp., \$35.00.

This book is intended to serve as an introduction to the most widely used spectroscopic techniques in heterogeneous catalysis. Teachers of graduate courses in surface chemistry and catalytic researchers seeking initiation into the mysteries of spectroscopy have felt the need for such a text for a long time. Review articles on the individual spectroscopic techniques are readily available in the literature, but the field has lacked a comprehensive monograph which stresses the interrelation of the various techniques and attempts to point out the advantages and drawbacks of each.

The authors have for the most part succeeded in their intention of filling this gap. An excellent introductory chapter discusses in general terms the application of spectroscopic techniques to real catalysts, and illustrates by describing the use of six different spectroscopies to study zeolite catalysts. There follow chapters on infrared (Haller), Raman (Haller), diffuse reflectance and photoacoustic (Kellerman), Mössbauer (Delgass), EPR (Lunsford), NMR (Lunsford), and XPS (Delgass) spectroscopies.

Within each chapter, the subject spectroscopy is introduced through discussion of elementary theory, followed by consideration of experimental techniques and selected examples of applications to catalytic systems. There is inevitably some variation in the level

¹ Original German title: *Phasengleichgewichte und Grenzflächenerscheinungen.*

of presentation in the different chapters. The number of pages devoted to each spectroscopy does not necessarily reflect the importance of that particular technique in the current literature; for example, infrared receives less coverage (38 pp.) than either diffuse reflectance (45 pp.) or Mössbauer (50 pp.). Coverage of the literature in most chapters is selective rather than complete (the XPS chapter is an exception, with over 200 references). This is not the place to look for an up-to-date survey of the literature. The book will serve as a starting point for the researcher wishing to learn about a particular technique, rather than a source

of references. Its major use however will probably be in the classroom, and it is to be recommended as a graduate textbook. The list price of \$35.00 will unfortunately deter many students from purchasing individual copies.

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