

# BOOKS

**The Principles of Chemical Equilibrium, 4th Ed.** by K. G. Denbigh, Cambridge University Press, 1981, 494 pages, \$59.50

This is the fourth edition of a classical text on thermodynamics which has in many ways set the norm for such texts. Those who have copies of the third edition need not rush to purchase this one, however, as most of the changes (which are few in number) are essentially cosmetic.

The primary changes in this edition are updated references in the footnotes. Section 1.18 has a clearer explanation of the relationship between molecules and the second law (avoiding the information theory trap this time). The sections covering lambda transitions and excess Gibbs energy formulations are more nearly up-to-date. Finally, the section on fugacity receives a more-than-cursory treatment, although the subject is still in a very minor role.

The most disturbing feature of the text for a chemical engineer is the tortuous path taken to arrive at the practical application relationships for phase equilibrium. For example, activity coefficient finds its introduction after all chemical equilibrium and in the last half of the last chapter on phase equilibrium.

On the positive side, this is an excellent reference text. Virtually all important aspects of chemical thermodynamics appear with correct equations. The text skillfully combines classical and statistical thermodynamics (although the coverage of statistical thermodynamics ignores many topics of current interest). Reference states, often a confusing topic, receive a clear and concise treatment.

The chemical engineering community will find this book most useful as a reference source or a graduate level text. Certainly those with graduate degrees will find the material enriching, but others will find it intimidating.

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**Anodic Protection**, by Olen L. Riggs, Jr. and Carl E. Locke, Plenum Press, New York, 1981, 284 pages \$39.50

The co-authors of this book represent both industrial (Kerr-McGee Technical Center)

and academic (University of Oklahoma) backgrounds, and the scope and level of the book reflects an excellent combination of both points of view. It is clear that the authors have had extensive practical experience in both laboratory research and applications of anodic protection, and the book represents a very good balance between principles and practice. The level is basic and very practical, assuming no significant expertise on the part of the reader in the fields of corrosion or electrochemistry, and the style is clear, concise, and very readable.

The first five chapters are largely qualitative, covering general uses for anodic protection, advantages and disadvantages of the process, examples of industrial application (largely devoted to sulfuric acid processes, with some information on fertilizer and pulp and paper processes), a description of equipment required for anodic protection, design and operation of systems, and economic evaluation. The figures are clear and detailed, many with actual dimensions. The principles of anodic protection are covered in chapter 6 in an abbreviated, but lucid, form with a minimum of equations and detailed theory. Chapter 7 is devoted to the potentiostat, with a qualitative description as well as circuit diagrams for several instruments. Although equipment details rapidly become obsolete, the principles are valid and the descriptions quite useful. Chapter 8 is devoted to laboratory tests and procedures, with helpful and useful details, but not overly belabored. Chapter 9 includes examples of test results, and Chapter 10 discusses future applications. Five appendices include Electrochemical Principles, a Glossary, Historical Development, a list of Patents, and a Bibliography containing over 40 pages of references, listed by year through 1979.

The organization of the material may be appropriate for the reader with a background in corrosion, but would be more logical in progression if the material on Electrochemical Principles were moved from the appendix to near the beginning, followed by Principles of Anodic Protection (Chapter 6). However, this is a minor point, as the necessary information is all included.

This book is an excellent introduction to the principles and practice of corrosion control by anodic protection. It is clear, well written, and unencumbered by a lot of detail or complex theory, and is eminently practical. The extensive bibliography, as well as references after each chapter, provide ample source of information for those seeking ad-

ditional details. It is valuable reference for the practicing corrosion engineer or researcher, as well as an excellent introduction to basic principles.

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## Heat Exchangers—Theory and Practice

J. Taborek, G. F. Hewitt, and N. Afgan, Editors  
Hemisphere Publishing Corp., Washington, D.C., 1983  
992 pages, \$69.95

This volume is comprised of the invited lectures and general papers given at the 1981 Seminar of the International Center for Heat and Mass Transfer in Dubrovnik, Yugoslavia. There are 11 sections: Evaporation and Condensation, Heat Transfer and Pressure Drop In Tube Banks, Heat Exchanger Tube Vibration, Air Cooled Heat Exchangers, Compact Heat Exchangers, Fluidized Bed Systems, Regenerative Heat Exchangers, Heat Exchanger Design, Heat Exchangers in Power Generation Systems, Fouling in Heat Exchangers, and Performance of Enhancement Devices. Each section with the exception of the third, sixth, and eleventh begins with one or two invited lectures for a total of eleven. The 50 plus general papers are unevenly distributed throughout.

The format of this volume should be familiar by now: authors prepared camera-ready papers collected into an "omnibus" volume. This one is carefully prepared: all figures and tables are quite legible and an index is included. As heat exchangers and their critical design to reduce energy consumption through energy conservation are at the heart of the chemical process industry, this sector of chemical engineers should benefit from such a state-of-the-art tome. Is it a timely tome? The papers are probably on the order of three years. Is it a useful tome? Probably, but most engineers and scientists will want the collection for reference purposes or just to touch bases on research and applications directions rather than for design purposes.

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