

NOMENCLATURE

p_a^*, p_B^*	s.v.p. of components A, B
P_T	total pressure on system
R	gas constant J mole ⁻¹ K ⁻¹
T	temperature
W	ideal work of separation, J mole ⁻¹
x_A, x_B	mole fraction of A, B in liquid
η	(1st law) efficiency of separation
ΔH	heat given up in cooling and condensing overhead vapour
W'	work done by compressor <input type="checkbox"/>

ChE book reviews

SCALEUP OF CHEMICAL PROCESSES

By Attilio Bisio and Robert L. Kabel
John Wiley and Sons, New York (1985) 18 Chapters,
699 Pages, \$69.95

Reviewed by
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This is an impressive book and one that should be on the desk of everyone who teaches transport phenomena to chemical engineering students. The reasons are well stated in the first and last chapters of the book. From the first chapter, "Introduction to Scaleup," we have the quote defining scaleup as "The successful startup and operation of a commercial size unit whose design and operating procedures are *in part* based upon experimentation and demonstration at a smaller scale of operation." From the last chapter, "Scaleup: Overview, Closing Remarks, and Cautions," there is a classic line, "Indeed, to a very significant extent, scaleup *is* chemical engineering." The book does, in fact, describe what chemical engineers *do* and, for that reason, it will also be valuable to industrial people involved with developing and even troubleshooting processes and to those striving to teach potential chemical engineers how to design chemical processes and plants.

The subject matter is introduced by describing several processes and the pertinent experiences involved in developing a concept to commercial reality. This is followed by a general and well thought out treatise on the use and utility of mathematical models in the description of chemical processes. The core chapters cover the basic subjects of reactor design and development, flow and mixing, and mass transfer and separations. All of these chapters begin with a discussion of major issues pertinent to the topic. This

is followed by a discussion of fundamentals and the chapters conclude with practical issues covering commercial equipment, scaleup and uncertainties.

The last chapters cover practical matters, including a necessary chapter on environmental problems and the issues facing our industry today. People doing commercial process development acquire various "rules of thumb" from years of experience and Chapter 17, in this book, has several pages of these "rules of thumb." They make delightful reading.

The final chapter brings the book together with a discussion of the realities that are present in scaleup/chemical engineering.

The book had its genesis in a short course, taught by the authors over several years, and it is the only modern book on the subject. The 18 chapters were written by some 17 different practitioners of the art, but it reads as though it was written by an individual. The authors have done a remarkable job of organizing and integrating the chapters into a unified whole, while allowing each chapter to stand on its own.

The chapters and authors are:

1. Introduction to Scaleup, *A. Bisio*
2. Mathematical Modeling, *D. M. Himmelblau*
3. Reaction Kinetics, *R. L. Kabel*
4. Homogeneous Reaction Systems, *R. L. Kabel*
5. Reactors for Fluid-Phase Processes Catalyzed by Solids, *G. F. Froment*
6. Fluid-Fluid Reactors, *Y. T. Shah and W. D. Deckwer*
7. Selection of Reactor Types, *R. L. Kabel*
8. Flow Patterns and Residence Time Distributions, *E. B. Nauman*
9. Mixing Processes, *J. Y. Oldshue*
10. Fluidized Beds, *J. M. Matsen*
11. Laminar Flow Processes, *E. B. Nauman*
12. Stagewise Mass Transfer Processes, *J. R. Fair*
13. Continuous Mass Transfer Processes, *J. R. Fair*
14. Solid-Liquid Separation Processes, *L. Svarovsky*
15. The Environmental Challenges of Scaleup, *P. B. Lederman*
16. Evaluating Materials of Construction in Pilot Plant Corrosion Tests, *P. E. Krystow*
17. Gaining Experience Through Pilot Plants and Demonstration Units, *F. G. Aerstin, L. A. Robbins, A. J. Vogel*
18. Scaleup: Overview, Closing Remarks and Cautions, *G. Astarita*

This work should be a part of a chemical engineers training and while I would not suggest that it be a required text because of its cost, some way should be found to introduce young engineers to its contents.