UNIT OPERATIONS OF CHEMICAL ENGINEERING

Fifth Edition

Warren L. McCabe
Late R. J. Reynolds Professor in Chemical Engineering
North Carolina State University

Julian C. Smith
Emeritus Professor of Chemical Engineering
Cornell University

Peter Harriott
Fred H. Rhodes Professor of Chemical Engineering
Cornell University

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ABOUT THE AUTHORS

Julian C. Smith (B.Chem., Chem.E., Cornell University) is Professor Emeritus of Chemical Engineering at Cornell University, where he joined the faculty in 1946. He was Director of Continuing Engineering Education at Cornell from 1965 to 1971, and Director of the School of Chemical Engineering from 1975 to 1983. He retired from active teaching in 1986. Before joining the faculty at Cornell, he was employed as a chemical engineer by E.I. duPont de Nemours and Co. He has served as a consultant on process development to Du Pont, American Cyanamid, and many other companies, as well as government agencies. He is a member of the American Chemical Society and a Fellow of the American Institute of Chemical Engineers.

Peter Harriott (B. Chem.E., Cornell University, ScD., Massachusetts Institute of Technology) is the Fred H. Rhodes Professor of Chemical Engineering at Cornell University. Before joining the Cornell faculty in 1953, he worked as a chemical engineer for the E.I. duPont de Nemours and Co. and the General Electric Co. In 1966 he was awarded an NSF Senior Postdoctoral Fellowship for study at the Institute for Catalysis in Lyon, France, and in 1988 he received a DOE fellowship for work at the Pittsburgh Energy Technology Center. Professor Harriott is the author of Process Control and a member of the American Chemical Society and the American Institute of Chemical Engineers. He has been a consultant to the U.S. Department of Energy and several industrial firms on problems of mass transfer, reactor design, and air pollution control.

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PREFACE

This revised edition of the text on the unit operations of chemical engineering contains much updated and new material, reflecting, in part, the broadening of the chemical engineering profession into new areas such as food processing, electronics, and biochemical applications. Its basic structure and general level of treatment, however, remain unchanged from previous editions. It is a beginning text, written for undergraduate students in the junior or senior years who have completed the usual courses in mathematics, physics, chemistry, and an introduction to chemical engineering. An elementary knowledge of material and energy balances and of thermodynamic principles is assumed.

Separate chapters are devoted to each of the principal operations, which are grouped in four main sections: fluid mechanics, heat transfer, equilibrium stages and mass transfer, and operations involving particulate solids. One-semester or one-quarter courses may be based on any of these sections or combinations of them.

In this edition SI units are emphasized much more than in previous editions, but the older cgs and fps systems have not been completely eliminated. Chemical engineers must still be able to use all three systems of units. The great majority of the equations and correlations, it should be noted, are dimensionless and may be used with any set of consistent units.

A new chapter on membrane separations has been added, and the order of the chapters on multicomponent distillation, extraction, drying, and crystallization has been made more logical. The discussion of particulate solids has been shortened and two former chapters on properties and handling of solids and of solids mixing have been combined into one. New material has been added on flow measurement, dispersion operations, supercritical extraction, pressure-swing adsorption, crystallization techniques, crossflow filtration, sedimentation, and many other topics. The treatment of dimensional analysis has been condensed and moved from the appendixes to Chapter 1.

About two-thirds of the problems at the ends of the chapters are new or revised, with a large majority of them expressed in SI units. Nearly all the problems can be solved with the aid of a pocket calculator, although a computer solution may be preferred in some cases.

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The senior author, Dr. Warren L. McCabe, died in August 1982. This book is dedicated to his memory.

Julian C. Smith
Peter Harriott