cycle studies, environmental assessment, energy auditing and process integration are clearly related to those topics.

The global structure of the whole volume, as well as the specific arrangement of each chapter, is consistent and enables its use as a reference textbook in basic chemical engineering courses. From the lecturer's point of view, the instructional objectives at the beginning of every chapter are helpful. In addition, the order and complexity grades of the exercises allow adaptation to courses of different scope and level.

For the students, the contents are presented in a modern, attractive way and are properly balanced. The unambiguous theoretical knowledge introduced is straightaway applied to real problem solving. Regarding didactic efficiency, there is a good balance between theory and practice and, with the aid of "test yourself" sections, the book encourages students to consolidate their knowledge step by step. Even more, helpful selected examples are solved with understandable methodology. The excellent problem collection at the end of every chapter also provides a useful reference for the students, who should achieve a global view of different fields within chemical engineering by the end of the course.

A notable aim of the authors is to use some of the key exercises to teach students the importance of an overall methodology for understanding and organising ideas, above and beyond the mere resolution of the particular issue. Especially remarkable in this sense is the section, "General Procedure for Single-unit Process Material Balance Calculations". This summarises some rules and procedural suggestions for a methodical solution of any problem. It is particularly important in such a course for the student to develop intellectual skills to focus analysis and problem solving.

As a conclusion and for use in advanced courses, revamped case studies presenting state-of-the-art problems have been included. Particularly noteworthy is the case of the "steam reforming of natural gas and subsequent synthesis of methanol". The flowcharts of this process challenge the student with the exciting task of integrating as a whole the knowledge acquired throughout the book.

Another interesting feature is the enclosed CD-ROM entitled "Interactive Chemical Process Principles". This is a guide and tool kit for students using the text, and also contains reference materials that should be useful when building the chemical engineering curriculum. Alongside conventional features, such as Physical Properties Database and the easy-to-use equation solving and graphing program E-Z Solve, it contains the Visual Encyclopaedia of Chemical Engineering Equipment. This enables readers to obtain a photograph and/or a cutaway view of common chemical process equipment, such as heat exchangers, pumps, separation process units and chemical reactors by clicking in the relevant section.

Summarising, this book, printed on acid-free paper, presents a meticulous layout including clear charts and graphics, is user friendly and can therefore be recommended as a textbook for basic chemical engineering purposes.

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Coulson & Richardson's Chemical Engineering — Vol. 1, Fluid Flow, Heat Transfer and Mass Transfer — 6th edition

J.M. Coulson, J.F. Richardson, with J.R. Backhurst and J.H. Harker, Butterworth-Heinemann 1999, 895 pp., Price £29.99 (paperback), ISBN 0-7506-4444-3

This invaluable six volume classic series has been a very useful tool for chemical engineering students and graduate engineers alike since its inception in the early 1950s. It has received regular updates over that period of time, with J.R. Backhurst and J.H. Harker joining the original team of Coulson and Richardson 20 years ago. This volume represents the fifth update/new edition in the last 10 years, reflecting the pace of change in the chemical engineering environment at the turn of the century. This has been done over the years with the necessary doubling in length since the 3rd edition.

Each of the six volumes is broken down into a number of coherent themes, with the main basic science behind practical transport phenomena (fluid flow, heat transfer and mass transfer) and dimensional analysis being covered in this volume (Volume 1). Additional information, from unit operations (e.g. particle technology, reaction engineering, separations) and design are available in Volumes 2, 3 and 6.

As has been the practice with this series over the years the style, examples and layout have been specifically focused at providing a good practical background to the aforementioned core areas of chemical engineering. A book of this nature, by covering a wider range of topics, does lose some detail that books with a narrower focus can and do cover. However the reference lists at the end of each chapter provide further (deeper) reading suggestions. There has been some limited updating of this list, although a great many older references are still present. Stylistically this series is easier for students to deal with than perhaps the more detailed "reference book" orientation of Perry's Chemical Engineers' Handbook [1].

With chemical engineering evolving into newer areas, updating of the curriculum is required. This text goes some way along this pathway, with important processes such as soft solids, for example, toothpaste and foods being treated in an expanded section on non-Newtonian fluids. In the same vein, an expanded examination of heterogeneous and homogeneous mass transfer with reaction systems is provided, thus providing a useful introduction to catalytic systems.

As one would expect with a series that has been developing over nearly 50 years, the layout and transfer of ideas to

the reader are very well undertaken. The strength of this series has been to provide clear and practical examples, with diagrams and photographs where required. This has continued, and has been improved, in this edition. There are a large number of useful and relevant worked examples throughout the text. In addition, dozens of additional problems are available at the end of the book, with Volume 4 containing the solutions, thus allowing for deeper student practice.

Coulson and Richardson's Volume 1, 6th edition, should continue, in future, to not only be an invaluable tool for the undergraduate chemical engineers and scientists, but also useful for chemical engineering teachers, and those in industry who wish to brush up on fundamental principles.

Reference

[1] R.H. Perry, C.H. Chilton, Perry's Chemical Engineers' Handbook, McGraw-Hill, USA, 1997.

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Surfactants: Fundamentals and Applications in the Petroleum Industry

Cambridge University Press, 2000, pp. 621, £85.00 (US$ 140.00) (hardback), ISBN 0-521-64067-9

This book has the potential to be a useful reference book for researchers in the petroleum industry in the future. As it is presently written, however, the book needs heavy editing because it is verbose and important technical learning points are many times hard to extract. The book is an amalgam of well-demonstrated facts with speculations and it is sometimes difficult to distinguish between them.

Also, there are flaws in its technical content. For example the book omits to mention that emulsion aging affects demulsification treatment. Perhaps more seriously, it also lacks a thought-provoking discussion of the surfactant-screening techniques that were developed for low-tension processes and which are currently being used in bio-remediation studies.

During the past 28 years, I have screened surfactants for many household (cosmetics, detergents, etc) and oil-field applications (low-tension processes, foams, etc.). So far, I have found that a practical way of screening surfactants is by conducting either salinity scans or oil scans [1]. Salinity and oil scans can be tailored by creative researchers to quickly learn about physicochemical behavior of the surfactants being considered. In addition, salinity and oil scans are excellent as quality control tools for surfactant manufacturing. These phase behavior techniques are well described by Shah and Schechter [2].

Since the equivalent carbon number (EACN) concept, mentioned, by Schramm, in Chapter 2, was developed by conducting oil scans and surfactant selection on Chapter 11 was developed according to salinity scans, I suggest that Schramm's book should also contain a chapter somewhat similar to that on phase behavior techniques in Shah and Schechter's book.

In view of the serious reservations I have expressed above, I would hesitate to recommend purchasing this book in its present form.

References

[1] Maura C. Puerto, Ronald L. Reed, A three parameter representation of surfactant–oil–brine interaction, Soc. Petroleum Eng. J., May 1990, pp. 198–204.
[2] D.O. Shah, R.S. Schechter (Eds.), Improved Oil Recovery by Surfactant and Polymer Flooding, Academic Press, New York, 1977.

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Molecular Modelling Applications in Crystallisation

Allan S. Myerson (Ed.); Cambridge University Press, 1999, 354 pp., £70 (US $110) (hardback), ISBN: 0-521-55297-4

This book provides a view of the current state of applications of computer modelling to crystallisation. It includes chapters on computer modelling and the basics of crystallisation, followed by a series of case studies of modelling applications.

The first chapter, An Introduction to Molecular Modelling, includes a detailed account of statistical mechanics and its relation to thermodynamics, before proceeding to intermolecular forces, potential functions and the techniques of Monte Carlo, molecular mechanics and molecular dynamics. The treatment is detailed and rigorous, but this may be a potential deterrent to someone just wanting to get a feel for the techniques available. At the same time the chapter has two significant omissions — it neglects to explain how electrostatic interactions are computed (of significance when modelling ionic materials), and it does not describe the techniques based on lattice energy minimisation which are widely used in the simulation of crystal structures and morphology. I will return to these points later when considering applications.

The chapter on crystallisation basics provides a useful summary of crystallographic concepts (structures, space