

# BOOKS

**Process Engineering Economics.** Herbert E. Schweyer. McGraw-Hill Book Company, Inc., New York (1955). 409 pages. \$7.50.

The first five chapters of the text, covering economic principles and elementary accounting procedures, are intended to provide a background for the application of economic principles to engineering problems, which constitutes the subject of the remaining seven chapters.

After a short introductory chapter the time value of money is discussed as a function of its use, and some basic equations frequently used in process engineering economics are derived. The principle of the equivalence of different methods of paying back capital with interest is considered and illustrated. The subject of amortization is then examined, thus furnishing an application of the principle of equivalence to a practical, recurrent case. Depreciation and depletion are presented along with various ways for including them in the accounting system.

Capital requirements for process plants are considered in relation to the nature of the operation, the size of the plant, and the prevailing economic conditions. Cost indexes, equipment costs, and sources of capital are concisely reviewed. The balance sheet is introduced and explained. The author then goes on to explore the costs of plant operation and the selling of the product to the consumer. The relations among profits, sales, cost of sales, plant production, and selling price are graphically illustrated.

The remainder of the text is devoted to applications of economic principles in the process industries. The selection of alternates is treated as an economic problem and is amply illustrated, four different methods of comparison being discussed. Rate of return and payout time are then introduced as guides for the valuation of proposals. The economics of replacement of existing facilities is discussed, "irreducible factors" receiving brief attention. The economic balance first is introduced as a general problem and then is applied to problems concerning insulation, evaporation, reactor vessels, fluid flow, heat transfer, and mass transfer. Economic balance with two (or more) independent variables is treated, and combined operations are considered from the economic-balance viewpoint. Cyclic operations and yield and recovery each receive special treatment in a separate chapter, as does inventory as an economic problem in the process industries. Economic analysis of a complete process is the subject of the summarized discussion of the last chapter.

Professor Schweyer has apparently intended his book to be primarily a text for engineering students. In addition, it is designed to be of use to the practicing engineer. A great instruction advantage is gained by means of the seventy illustrative problems that are worked out in detail in the text. Also a total of 189 problem statements are given at the ends of chapters, enabling the student to apply the subject matter to concrete examples.

"Process Engineering Economics" provides the essentials of economics and accounting as applied in the process industries and, in addition, supplies a thorough grounding in the principles and applications of the economic balance.

ROBERT M. SECOR

**Principles of Industrial Waste Treatment.** C. Fred Gurnham. John Wiley and Sons, Inc., New York (1955). 392 pages. \$9.50.

Professor Gurnham's basic idea in writing this book is an excellent one. It is his feeling that closer cooperation and understanding between chemical engineers and sanitary engineers would be to the advantage of both groups and should lead to fruitful results in the cause of industrial waste disposal. A unique feature of the book is the presentation of the subject matter of industrial waste disposal in the framework of the chemical engineer's unit operations and unit processes.

The first few chapters are devoted to a discussion of the waste picture in terms of the effects of pollution on streams and sewerage systems. There follows a presentation of the unit operation of sedimentation, filtration, and heat transfer and of the unit processes of pH adjustment, oxidation and reduction, coagulation, ion exchange, and biological treatments. To the sanitary engineer the book should be of importance because of the interesting and logical organization of subject matter which results. The chemical engineer will be interested in seeing his familiar classification applied in this case and extended to include biological treatments.

The book has been written for use primarily as a text for students in either chemical engineering or sanitary engineering. The subject matter is largely qualitative in nature and should be readily grasped by students in either group. The engineer practicing in the field of waste disposal will be interested in the book not as a reference source but as a basis for orienting his thinking on problems. The engineer practicing in other fields will find it most useful

in developing an appreciation of the complexity of waste disposal problems in terms of their effects on streams and sewer systems and their bearing on the design and operation of industrial plants. The exposition is in general clear and logical. The discussion could have been simplified in several places by more effective use of flow sheets and diagrams.

C. A. WALKER

**The Chemistry of the Petroleum Hydrocarbons. Volumes 2 and 3.** Edited by Benjamin T. Brooks, Cecil E. Boord, Stewart S. Kurtz, and Louis Schmerling. Reinhold Publishing Corporation, New York (1955). Volume 2, 448 pages, \$13.50. Volume 3, 690 pages, \$18.00.

Like the first volume in this series, these volumes help to fill the need for reference books containing the scientific fundamentals that are applied in the hydrocarbon industry. These volumes are a compilation of information written by outstanding contributors in the field of hydrocarbon chemistry.

Most of the articles include a discussion of the relevant reactions and operational techniques involving the hydrocarbons; derivatives of the hydrocarbons have been excluded for the sake of brevity. Much emphasis is placed on theoretical considerations, such as probable mechanisms of reactions; kinetics of reactions; role of catalysts; thermodynamic equilibria of reactions; and structural, physical, and chemical comparisons of reactants and products. Other applied problems are considered: the uses of hydrocarbon products, special reactions of hydrocarbons, commercial operation, and many others. Again because of the limited space many problems of this type have been omitted, such as problems of apparatus design, process engineering, and analytical testing methods.

The volumes are lucidly written and necessary information is neatly condensed in the form of tables and graphs. Mention should be made of the badly drawn graphs in Chapter 45, "Vinyl Polymerisation." Such figures are out of place in this article.

FRANK BARR-DAVID

**The Roger Adams Symposium: Papers Presented at a Symposium in Honor of Roger Adams at the University of Illinois, September 3-4, 1954.** W. R. Brode, T. R. Johnson, S. M. McElvain, R. L. Shriner, W. M. Stanley, and E. H. Volwiler. John Wiley and Sons, Inc., New York (1955). 140 pages. \$3.75.

This book is a collection of papers presented at a symposium honoring Roger Adams on the occasion of his retirement from the chairmanship of the Chemistry Department at the University of Illinois on September

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1, 1954. The volume includes the following topics: steric effects in dyes, the structure of glyotoxin, the structure of nepetalic acid, the chemistry of flavilium salts, and some chemical studies on viruses. All the papers, as well as the opening remarks reviewing Dr. Adams's career, are presented by persons who took their Ph.D. degrees under Dr. Adams. The variety in the topics chosen for the symposium reflects the varied research activity in which Dr. Adams himself has been engaged throughout his long scientific career.

The chapters all give a good, well-written coverage of their special topics. Dr. Brode's paper gives an excellent review of current theory on dyes; his writing has a personal flavor and makes very enjoyable reading. Dr. Johnson's discussion of the structure of glyotoxin communicates some of the excitement involved in determining the structure of a very complicated natural product, and both the glyotoxin and the nepetalic acid chapter nicely illustrate the importance of infrared spectroscopy in modern structural work.

The book is a fitting tribute to an outstanding chemist and a great teacher; in addition, it should prove enjoyable reading to those interested in the application of ultraviolet absorption spectroscopy to problems in organic chemistry, in the chemistry

of "ylium" salts and related colored products, and in a concise review of Stanley's classical chemical studies on viruses.

HARRY H. WASSERMAN

**Production of Heavy Water. National Nuclear Energy Series. Edited by George M. Murphy. McGraw-Hill Book Company, Inc., New York (1955). -394 pages. \$5.25.**

The production of heavy water in tonnage quantities was one of the serious problems with which the Manhattan Project was confronted. The effort expended on the solution of this problem brought into existence a considerable amount of basic data and engineering information. The present volume of the National Nuclear Energy Series (III-4F) makes this information available to those interested in separation processes in a comprehensive and convenient form.

It would seem that Part II of this volume is the more logical as a beginning of the volume and of this review because it deals with the fundamental laboratory data, techniques for obtaining these data, and the underlying theoretical considerations of the various separation processes envisaged for the industrial production of heavy water. The six chapters of this part consider the water-distillation process, the catalytic-exchange process (with a detailed account of the development and

characteristics of the various catalysts) and the dual-temperature processes (mercaptan-water, ammonia-water-hydrogen, and cyclohexane-benzene-hydrogen systems). In this part the short Chapter 8 ("Catalytic Exchange: General" by H. S. Taylor) is an outstanding example of a concise and clear presentation. The discussion of the dual-temperature processes (Chapter 12) is, in the opinion of this reviewer, somewhat lacking in an adequate treatment of the fundamental theory involved in this group of processes.

Part I of the volume is devoted almost entirely to a summary of actual engineering experience as obtained in the Trail, B.C., catalytic-exchange-electrolytic plant and the water-distillation plant at Morgantown, W. Va. The information given, though somewhat sketchy in parts, is definitely useful as a general guide for design and operational variables. Chapter 4 summarizes design considerations for the untried but promising hydrogen-distillation process.

An excellent bibliography following each chapter is a very valuable feature and, together with the subject matter treated, makes this volume a most valuable contribution to the literature of separation processes in general and isotope separation in particular.

ALLEN M. ESHAYA