

BOOKS

Water Quality Engineering for Practicing Engineers, W. W. Eckenfelder, Professional Engineering Career Development Series, Barnes and Noble, Inc. New York (1970). 328 pages. \$4.95.

Drawing from his many books, notes, and course manuals, the author has compiled a concise summary of present principles and theories on water pollution control. Design procedures are presented for the most commonly used treatment processes. A definite strength of the book is that in many cases, methods for experimental determination of necessary design data are outlined instead of relying on published values of coefficients or constants. However, certain of the design procedures are presented in a very condensed form. This condensation, together with too few worked problems, will require a reference to other sources in some cases. Fortunately, the author has provided a very adequate bibliography after each topic and additional selected readings at the end of the book.

The material falls essentially under four distinct topics: water-quality management, characterization and analyses of wastewaters, wastewater-treatment processes, and economics of wastewater treatment. The introductory chapter illustrates the development of an effective water-quality management program to meet specific water needs through establishment of water-quality criteria and treatment considerations.

Eckenfelder begins the section on characterization and analyses of wastewaters by defining the parameters of special significance in municipal and industrial wastewaters. A valuable discussion is presented on the merits and limitations of methods for evaluating organic pollution. The degree of treatment required for existing or future sources of pollution to meet specified dissolved-oxygen levels in natural waters is then considered. The author reviews the sources and sinks of oxygen in natural waters, develops an oxygen-sag model for streams and estuaries, outlines a procedure for conducting a stream survey, and discusses how the survey data should be developed to calculate the assimilative capacity of a stream.

The author discusses briefly characteristics of municipal sewage and supplies numerous tables on the ranges of characteristics and an extensive table of the expected daily per capita volume and BOD loads from services such as airports and schools. For industrial wastes, waste surveys and waste-reduc-

tion practices are discussed generally followed by a specific discussion of waste sources, water-reuse and waste-recovery practices and general treatment schemes for each major industry.

Wastewater-treatment processes, along with applicable design criteria, are considered in the flow sequence for a waste-treatment plant. The operations covered under pretreatment and primary treatment are screening, sedimentation, oil separation, flotation, equalization and neutralization. The theory of oxygen transfer is briefly presented followed by an extremely valuable discussion of turbine, surface, and diffused aerators. Major design variables are considered and a general design procedure for each type presented.

The extensive coverage of biological waste treatment begins by considering basic system parameters such as yield, the kinetics of substrate removal, growth rate, sludge age, and other concepts necessary to understand the workings of any biological unit. These basic parameters are then used, where possible, to develop models and provide a unified approach to design of the standard aerobic and anaerobic treatment processes.

The major tertiary-treatment processes for removal of nutrients, suspended solids, and organic and inorganic materials are reviewed. Although no attempt is made to go into design, useful process and operating data is supplied. Then, a chapter on sludge handling and disposal includes sections on heat treatment, land disposal and comparative sludge-handling costs with an important discussion of thickening, vacuum filtration, sand-bed drying and centrifugation. The section on wastewater-treatment processes is concluded with a consideration of four miscellaneous topics: chemical coagulation, deep-well disposal, and precipitation and chlorination.

The final topic, the economics of wastewater treatment, provides a wealth of information, mostly in graphical form. The inclusion of both capital and operating and maintenance costs allows a rough cost comparison between various process steps as well as information on cost versus effluent quality.

In developing mathematical equations, Eckenfelder fails in some cases to define symbols immediately after they are used and switches symbols or definitions of a symbol within a chapter. Using some intelligence, the

average engineer should not be bothered by this.

This book would serve as an excellent introductory text for engineers in the water quality field and a good general reference book for practicing water quality engineers. The prolific writing experience of Eckenfelder comes through to make the subject matter readily comprehensible and easy to follow.

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Polymers in the Engineering Curriculum, Hershel Markowitz, ed., Carnegie Press, Pittsburgh, Pa. 311 pages. \$4.95.

This book contains the proceedings of the Third Buhl International Conference on Materials held in Pittsburgh in October, 1968. The book is divided into two parts: the first part (216 pages) is a collection of lectures on specific aspects of polymer science; while the second one (95 pages) contains those contributions at the conference which were specifically concerned with the teaching of polymer science in universities.

Most of the lectures in the first part are critical reviews of such aspects of polymer science as outstanding research problems, applicability of available knowledge to the design of industrial processes, and structural and phenomenological theories of polymer behavior. The conference audience was presumably diversified so that most of the authors presented their viewpoints in a refreshingly clear way, with little use of specialists' jargon. Even a subject such as modern continuum theories, which is traditionally very obscure to nonspecialists, is presented very readably by C. Truesdell.

The reader can thus acquire a well-organized idea (although no detailed knowledge) of the whole spectrum of modern polymer science, as well as some clearly stated though not universally accepted views about its ap-