reasonable size, an effort should be made to keep a balance between comprehensiveness and thoroughness. The authors apparently have not paid special attention to this type of consideration. For instance, the topic of flow at low Reynolds number has been ignored (even the Stokes law of drag of a slowly moving sphere appears nowhere in the text) while other topics, such as flow separation and flow of non-Newtonian fluids, have not been adequately treated. On the other hand, more than ten pages have been devoted to tables of compressible flow data.

The system of references does not seem to make up for deficiencies in the presentation. Actually the authors frequently refrain from discussing a topic, indicate that it is treated in more advanced texts, but fail to cite an appropriate reference (see for example pp. 132, 252, 264, 286, 355).

In general the authors have presented the basic equations and discussed many techniques and analytical procedures to solve fluid mechanical problems but have provided very little information about the conditions under which these techniques should be applied. This lack of emphasis on the relationship between observations and mathematical models is quite evident. For instance, experimental data are presented only in one or two places and the Reynolds number, which is normally used to characterize flow regimes according to their physical significance, is introduced almost at the end (Chapter 8) of the book.

In conclusion, although the book may be useful to teachers of introductory courses, it is doubtful whether it can make fluid mechanics more attractive to students than other textbooks currently available.

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Physicochemical Processes for Water Quality Control, Walter J. Weber, Jr. (with eight contributors), Interscience, New York (1972). 640 pages. $19.95.

The author's preface states that this volume is to be used as a text for a one or two-semester course in physicochemical processes for water and wastewater treatment technology, graduate or upper-division undergraduate level. The book is also intended as a reference for practicing engineers, in which class this reviewer falls. Both of these intents are carried out in a noteworthy manner; however, the principle emphasis of the text is on fundamental principles, and as such, will be of great value in the academic field.

The book is divided into twelve chapters, each chapter written separately by the author and/or other experts. Each section can be used independently of others for study. The first chapter (Process Dynamics, Reactions, and Reactors), gives an adequate review of kinetics, reaction equilibrium considerations, process dynamics, and energy and mass transport, and presents basic theory for the remaining eleven sections.

The remaining eleven chapters (Coagulation and Flocculation, Sedimentation, Filtration, Adsorption, Ion Exchange, Membrane Processes, Chemical Oxidation, Disinfection, Corrosion and Corrosion Control, Aeration and Gas Transfer, Sludge Treatment), cover their respective subjects thoroughly.

These individual sections are presented in a logical and informative manner. Fundamentals and theory are emphasized; however, many useful correlations, descriptions of general categories of equipment used in the subject process of the section, a review of the state of the art, and comparisons of the specific sections process with similar processes make these sections independently useful.

Problems and solutions are provided at the end of each section. It might be more useful for teaching purposes if the problem solutions are presented separately; however, these adequately cover the subject matter of each chapter.

This reviewer felt that the omission of the Zeta Potential concept from the Coagulation and Flocculation chapter deprives the student and engineer of a principle of growing importance in the field of solids/liquid separation. This reviewer was unable to find the identity of all of the parameters shown on Figures 9-3 and 9-4 in the chapter on Disinfection.

The engineer or scientist should find this book of value as a reference for designing and selecting water and wastewater treatment processes in specific problem areas. It should also be helpful in studying existing processes.

With the federal Water Pollution Act amendments of 1972 imposing a hefty burden on industry to further purify industrial wastewater emissions, this text will be useful as a comprehensive reference to many scientists, engineers, and students. This reviewer found many new ideas, as well as several thorough reviews of well-known wastewater treatment concepts.

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Process Dynamics and Control, Vol. 2, Control System Synthesis, J. M. Douglas, Prentice-Hall, Englewood, N. J. (1972). $18.95.

Volume 2 of Professor Douglas' book is a continuation of Volume 1. It discusses the control of a variety of processes of chemical engineering interest. Many of the examples and problems on control are based on process dynamics models derived in the first volume. This book should be of value to the chemical engineering student, the practicing control engineer, and the researcher.

The concept of control is approached from a rather broad viewpoint that includes regulatory control at a fixed set point and controlled cycling that might improve overall system performance. Control of various types of chemical reactors is analyzed throughout the book. Heat exchangers and distillation processes are used as examples in some discussions.

Chapter 7 (the first chapter) discusses regulator control of a single variable, starting with an example of how a controller can make an unstable chemical reactor controllable. Feedback control of simple linear processes with standard control modes is given, followed by a short, but excellent, presentation of criteria for stability. Control system synthesis based on Bode' diagrams and root locus plots is discussed at length for theoretical models. The chapter closes with topics on nonlinear effects, feedforward control, and distributed parameter systems.

The next chapter on multivariable control starts with cascade control and interaction between controllers in feedback systems. After a discussion of controllability and observability of variables, feedforward control systems are analyzed. Some of the practical difficulties encountered when multivariable techniques are applied to a complete chemical plant are given.

Optimal control of fixed set point processes is presented starting with performance criteria and mathematical tools required. Pontryagin's *minimum* principle is then applied to a variety of single variable and multivariable examples. The effect of performance criterion on the optimal control law is examined. The chapter closes with a brief discussion of optimal control of distributed parameter systems.

The last chapter challenges the assumption that an optimum steady state design gives the best plant performance. Examples of processes that demonstrate improved performance with pulsed operation are discussed. The concept of the chemical oscillator is explained with care and the necessary conditions for the existence of such a phenomena are developed.