

sion of the use of perturbation theory in the analysis of nonlinear systems. Examples are presented for lumped parameter and distributed parameter systems.

The book was designed for undergraduate and graduate level courses. At the end of each chapter a large number of problems are given with an indication of their level of difficulty. That portion of the text concerned primarily with lumped parameter systems has been designated as suitable for an undergraduate course. Since some type of chemical reactor is used as the basic example in many discussions, students should have a reactor design course as part of their preparation.

ROBERT L. NICKELSON
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA

Chemical Technology: An Encyclopedic Treatment. The Economic Application of Modern Technological Developments, Barnes and Noble, New York. 8 volumes.

The encyclopedia (8 volumes) is prepared in such a way that the information is accessible to a large number of readers whose knowledge of science and technology is limited. A nonspecialist in need of brief accurate data about materials and processes can refer to a single reference work that correlates technical facts with economic and financial data in a simple yet highly organized and readily understandable fashion. This encyclopedia is a comprehensive guide, broad enough in scope to include information about all the world's raw materials. The primary manufacturing and agricultural processes involved, world output prices, and other related information are all presented in such a way that the reader can rapidly gain an overall view of a subject or a variety of subjects.

The wealth of economic information presented in these volumes should be immense value to those engaged in business, manufacturing, finance, economics, journalism, public relations, research, analysis, government, and indeed to everyone involved in commercial applications in marketing of raw materials. This work may be considered a successor to Dr. J. V. van Oss's *Systematic Encyclopedia of Technology* (Warenkennis en Technologie). The present encyclopedia, however, has been thoroughly updated and comprises an entirely new work that is in every way a far more ambitious and elaborate project than its predecessor.

The first three volumes are now available with five volumes in preparation (\$40.00 single copy, \$35.00 per copy to subscribers):

Vol. I. Air, Water, Inorganic Chemicals and Nucleonics. 1968. 703 pages.

Vol. II. Non-Metallic Ores, Silicate Industries and Solid Mineral Fuels. 1971. 828 pages.

Vol. III. Metals and Ores. 1971. 918 pages.

Vol. IV. Petroleum, Organic Chemicals and Plastics.

Vol. V. Natural Organic Materials and Related Synthetic Products.

Vol. VI. Wood, Paper, Textiles and Photographic Materials.

Vol. VII. Vegetable Food Products and Luxuries.

Vol. VIII. Edible Oils and Fats, and Animal Food Products.

JOHN J. MCKETTA
DEPARTMENT OF CHEMICAL
ENGINEERING
THE UNIVERSITY OF TEXAS
AUSTIN, TEXAS 78712

Cryogenic Fundamentals, G. G. Haselden, Ed., Academic Press, New York (1972). 757 pages.

The publisher's description of this book as "the first comprehensive source book covering the full cryogenic temperature range from liquid methane down to the lowest temperatures reached by physicists" is justified by its 12 chapters, each written by one or more experts. The longest 3 chapters, Heat Transfer, Expanders and Pumps, and Superconductivity stand out. Heat transfer as it relates to low temperatures is treated in depth, with an impressive 6 pages of supporting references. Both fluid dynamic and mechanical aspects of the design and operation of expanders and pumps (both centrifugal and reciprocating) are summarized in a way that should be useful as an introduction to design or as a primer for users of this type of equipment. The phenomenon of superconductivity is described in basic terms (with a minimum of mathematics), practical materials are discussed, and the dynamic behavior of superconductors is given extensive coverage.

The chapters on Refrigeration and Liquefaction Cycles and Materials of Construction and Techniques of Fabrication also excel. The thermodynamics of refrigeration and liquefaction cycles is effectively explained, and comprehensive descriptions of cooling methods (even the vortex tube), liquefaction cycles, practical liquefiers (including methane cycles), and closed-

cycle refrigerators are presented. The discussion of materials and fabrication techniques is incisive, with emphasis on fundamentals. Other chapters deal with Insulation, Fluid Dynamics, Adsorption, Instrumentation, Safety, and Thermophysical Data.

The salient features of the book are its diversity of subject matter, extensive references, and a healthy mixture of theory and practice. It will be valuable both to those already working in cryogenics and related fields, and to newcomers. Specialists will inevitably find omissions in areas of their interest, probably in recent developments; but even the specialist may find the book useful as a source of information in areas outside his specialty.

RAYMOND W. MOORE, JR.
ARTHUR D. LITTLE, INC.
CAMBRIDGE, MASS.

Process Control, Alan Pollard, American Elsevier Publ. Co., New York (1972). 393 pages. \$14.00.

The author, a Senior Lecturer at the University of Leeds, has covered thoroughly and clearly the fundamental aspects of process dynamics and control. The book seems to be designed adequately for a reader with a background of differential equations and basic unit operations, or as the author states, a knowledge "compatible with the penultimate-year honours course." A knowledge of Laplace techniques would be very helpful as there is a minimum of material included on these techniques. This book appears to be one of the better books available for self-study in process control for a person with some knowledge of Laplace transforms because in general it is thorough, clear, and includes numerous examples. It covers most of the usual undergraduate material in this field, process dynamics, control functions, closed-loop analysis, root-locus, frequency response and some discussions and examples of controller mechanisms and complex control loops. It does not appear to be intended for advanced courses or reading in dynamics or control. It does not go deeply into instrument mechanics, valve characteristics, or the selection and location of process instrumentation. The units used may be somewhat unfamiliar to American engineers, but this should not be a significant problem.

The desired contents of a book such as this depend to a large degree on the individual reader or instructor preferences. My preferences would be for