

Chemical Process Machinery. 2nd ed. E. Raymond Riegel. New York: Reinhold, 1953. 735 pages. Illus. \$12.50.

Chemical engineers and practicing chemists will welcome the appearance of the new edition of another text of Professor Riegel. This edition has brought the show window of chemical process equipment abreast of current development. Scores of drawings, photographs, and tables are generously given to make the description of machinery readily understandable. Throughout the book there are 597 figures and 92 tables.

New materials have been added in almost every class of process equipment in this edition. In the second chapter on "Devices for the Dry Reduction in Size of Solid Materials," two new crushers manufactured by Allis-Chalmers and a newly developed ball mill are presented. Numerous magnetic separators and related devices using permanent magnets instead of electromagnets are the new features in Chapter 3 on "Screening and Grading Equipment." Other equipment which has been included in subsequent chapters are: "Zipper," a closed belt conveyor; newly developed multisphere for gas storage under high pressure; several new chemical pumps; proportional feeder containing a Pitot tube; the Lapp Pulsafeeder; multiclone; P-A cyclonic scrubber and P-A Venturi scrubber; electromagnetic air filter; the string discharge rotary vacuum drum filter; drum suction filter of panel type; centrifugal filters; continuous operating separators and clarifiers; Conkey integral evaporator which is a long-tube evaporator with natural circulation and is a self-supporting type manufactured by General American Transportation Corp.; Conkey flat heating surface evaporators with the Rosenbled channel switching system; downflow, low-temperature evaporators suitable for handling fruit juices; turbo-drier of rotating shelves; bubble cap and tray construction; continuous crystallizer of Krystal System which also produces a classification of the crystals.

Entirely new treatment is devoted to the fundamentals of distillation and fractionation and the mixing of liquids. The materials included for the first time are molecular distillation, absorption refrigeration, and new methods of measurements and automatic instrumentation. In the chapter on "Devices for Heating and Cooling," Riegel has given a comprehensive introduction to the application of atomic energy to the power generation.

Although descriptions of a few important pieces of processing machinery and notes regarding recent developments are missing in the book, it has fulfilled its purpose as a text of chemical process machinery and it gives a logical treatment from the standpoint of their application. The coverage is comprehensive and up to date. The book is recommended as a text to chemical engineering students. For practicing engineers and manufacturing chemists, the book should prove to be extremely useful in the selection of equipment for processing needs.

For a number of years the selection of a text in processing equipment for chemistry students who are minors in chemical engineering has been a difficult problem. The ordinary text in chemical engineering seems to be too quantitative to stimulate the interest of chemists who are not prepared for equipment design. A satisfactory solution is now provided by Riegel's book which, however, contains just enough numerical illustrations for more insight to the equipment.

In all chemical plants and most petroleum refineries, the most important piece of equipment is the reactor in which chemical reactions are taking place. The initial investment in a reactor usually accounts for a major percentage of the total cost of a plant. The performance of a reactor has been a day-to-day concern to chemical engineers supervising a plant. So far the description of this important chemical processing equipment is missing in texts and books dealing with chemical processing equipment.

In congratulating Professor Riegel on his contribution, this reviewer would like to suggest the inclusion of chemical reactors in the next edition of *Chemical Process Machinery*.

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Speech and Hearing in Communication. 2nd ed. of *Speech and Hearing*. Bell Telephone Laboratories Series. Harvey Fletcher. New York-London: Van Nostrand, 1953. 461 pp. Illus. \$9.75.

This is a highly authoritative and inclusive account of present-day knowledge of speech and hearing—with a little about language as well—in particular application to the operation of communications systems. Dr. Fletcher as a young man had something to do with measuring the charge of the electron, but after he joined the Bell Telephone System in 1916 his work turned to acoustics; he was an early president of the Acoustical Society of America. Since his retirement from the post of Acoustical Research Director of the Bell Telephone Laboratories he has returned to his native Utah to become Director of Scientific Research at Brigham Young University. He is heartily to be congratulated for having organized so well in this book, not only the massive results of 35 years of investigation by agencies of the American Telephone and Telegraph Company, but also the many essential contributions from other laboratories and writers. References to all this work abound, and there are both name and subject indices.

The book is recommended to students and teachers of speech, to audiologists and otologists concerned with hearing, as well as to communications engineers who deal with the multifarious applications of such information. It supplants Fletcher's first book on these subjects, which was published many years ago.

Communications engineers have to make their living out of tiny amounts of energy. "Joe took father's shoe

bench out." "She was waiting at my lawn." These two testing sentences contain all the fundamental sounds which contribute appreciably to the physical power of English speech. Spoken in ordinary tones by a typical voice they represent no more than 1000 ergs of energy in the sound waves. For comparison, a little 25-watt light bulb uses up energy at the rate of $2\frac{1}{2}$ billion ergs every 10 seconds—so it would take the continuous chatter of $2\frac{1}{2}$ million people to keep even. When speech must be transported by wire or radio to great distances the layman should not accept the matter so casually. (Too bad that so much of what people have to say is less wonderful than the machinery which permits them to say it.)

Chapter 14 entitled "Space-Time Pattern of Hearing" is especially significant. Fletcher presented this first in 1930, and now considers that "the experimental data that have accumulated since then indicate that the main parts of the theory are correct." He regards the observations of Békésy as having left "no doubt as to the general mechanical behavior of the cochlea."

The book is handsomely printed, with many mathematical equations and diagrams.

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The Science of Color. Committee on Colorimetry of the Optical Society of America. New York: Crowell, 1953. 385 pp. Illus. + plates. \$7.00.

In 1922 a Committee on Colorimetry, under the chairmanship of Leonard T. Troland, published a report on colorimetry in the *Journal of the Optical Society of America and Review of Scientific Instruments*. That report defined a clear and consistent terminology in the field of colorimetry; summarized the available physical, psychophysical, and psychological data relating color to its stimulus conditions; and outlined the principal methods of color measurement. At the time of its publication, the 1922 report was the most complete and authoritative compilation of material in the field of colorimetry. It stood for years as the outstanding reference source on this subject.

Some years ago the Optical Society recognized that the 1922 report was in need of revision and, in 1933, a new committee, under the chairmanship of Loyd A. Jones, was appointed to revise the earlier work. This newer committee comprising 23 of the most distinguished names in color science, has been at work since 1933. The present volume represents the results of their efforts.

The Science of Color contains nine chapters: From the Art of Coloring to the Science of Color; The Concept of Color; Anatomy and Physiology of Color Vision; Psychological Concepts: Sensory Aspects of Color; Psychological Concepts: Perceptual and Affective Aspects of Color; Physical Concepts: Radiant Energy and Its Measurement; Psychophysics of Color; Quantitative Data and Methods for Colorimetry; and Colorimeters and Color Standards. There follow some 600 references and 22 pages of an un-

usual Glossary-Index. Terms are not only listed and indexed; they are also defined.

No review would be complete if it failed to mention the wealth of illustrative and tabular material in the book. There are 25 handsome color plates, over 100 black-and-white illustrations, and 40 tables. As in the 1922 report, the great amount of quantitative material presented in the tables and in some of the illustrations guarantees that this will be a standard reference on colorimetry for many years to come.

For all that, *The Science of Color* is likely to leave the expert a little disappointed in ways of varying importance, some small, some large. The first chapter, for example, devotes a considerable amount of space to some archeological findings and to the use of color in prehistoric and ancient art. This is all very interesting, but one wonders if the space should not have been more suitably devoted to a better coverage of quantitative data on the sensory aspects of color, or even to a fuller discussion of the scientific beginnings of the study of color (accorded a scant 4 pages of the 29 comprising the first chapter).

Then there is the matter of the references which, despite their impressive number, are limited in value because they are not indexed. At the very least, they might have been listed alphabetically by author.

One might go on and list a number of more minor annoyances, inaccuracies, and the like, but to do so might only be an indication of the reviewer's perfectionistic expectations. This is an outstanding book in the field of color. Of that there can be no doubt. If you work with color or want to study it scientifically, you cannot afford to miss it.

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Scientific Book Register

Atomic Weapons in Land Combat. G. C. Reinhardt and W. R. Kintner. Harrisburg, Pa.: Military Service Pub., 1953. 182 pp. Illus. \$3.95.

Tables of Normal Probability Functions. (Reissue of *Mathematical Table 14*, with corrections.) National Bureau of Standards Applied Mathematics Series 23, 1953. Prepared by New York Mathematical Tables Project. Order from Government Printing Office, Washington, D. C. 344 pp. \$2.75.

Medical Schools in the United States at Mid-Century. John E. Deitrick and Robert C. Berson. New York-London: McGraw-Hill, 1953. 380 pp. Illus. \$4.50.

The Green and Red Planet. A physiological study of the possibility of life on Mars. Hubertus Strughold with assistance of Green Peyton. Albuquerque: Univ. New Mexico Press, 1953. 107 pp. Illus. + plates. \$4.00.

Mathematical Aspects of the Quantum Theory of Fields. (Pub. from N.Y.U. journal *Communications on Pure and Applied Mathematics*, 1952-53.) K. O. Friedrichs. New York-London: Interscience, 1953. 272 pp. \$5.00.

Motivation and Morale in Industry. Morris S. Viteles. New York: Norton, 1953. 510 pp. Illus. \$9.50.