neers in general and specifically for metallurgists so engaged. It has the points of a good textbook and is eminently suited for postgraduate work.

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Seventy-five years of progress in the mineral industry (1871-1946). A. B. Parsons. (Ed.) New York: American Institute of Mining and Metallurgical Engineers, 1947. Pp. xii + 817. (Illustrated.) $6.00.

The rising curve of production and scientific development in this country has ascended far above the levels prevailing in May 1871, when the American Institute of Mining and Metallurgical Engineers was founded in Wilkes-Barre, Pennsylvania. Annual mineral production in the United States has increased 10 times during this 75-year period. With only about one-sixteenth of the world's people, the United States now consumes nearly half of the world's mineral output. The heavy drain on the mineral resources of this country during the recent war made the World Conference on Mineral Resources, which was held in celebration of the 75th Founder's Day of the AIME, particularly timely. This is the anniversary volume commemorating this significant event. It is composed of historical papers wherein experts in the fields of mining and metallurgy have reviewed significant developments in mining geology (L. C. Graton), metal mining (Lucie-Eaton), ore dressing (A. F. Taggart), smelting and leaching of ores (F. Leist), iron and steel (C. D. King), nonferrous metallurgy (W. M. Pierce), bituminous coal mining (H. N. Eaverson), anthracite industry (C. Evans, *et al.*), petroleum (E. L. DeGolyer), nonmetallics (Oliver Bowles), and in mineral industry education (T. T. Read). These chapters are not mere rehearsals of historical fact. They are, as the editor, who is executive secretary of the AIME, states, "99 percent fact, with just enough fancy to season it to the taste of the average engineer."

Considering the scientific and industrial developments of the period covered by this volume and the dependence which these have had on mineral raw materials, it is remarkable that this amazing amount of material could be so adequately covered in a single volume, even one of 800 pages. The value of such a volume, however, rests not so much on the quantity of the material presented as it does upon the ability of its authors to sift the significant from the unimportant. In this respect the volume doubtless sets a new high, for probably a more imposing galaxy of authorities could not have been assembled. This comment holds also for the second part of the volume, which contains the proceedings of the World Conference on Mineral Resources. Particularly significant are the articles on "The Mineral Position of the United States," by the Secretary of the Interior, J. A. Krug, "Iron Ore and the Steel Industry" (Charles M. White), "International Aspects of the Petroleum Industry" (Sir William Fraser), "The Future of Gold in World Economy" (P. M. Anderson), "World Coal Resources" (C. Augustus Carlow), "The Role of the Engineer in the Development of Atomic Energy" (P. C. Keith), "Application of Atomic Energy to Industry" (H. A. Winne and B. R. Prentice), and "Metals and Alloys" (Zoy Jeffries), to mention only a few.

The volume is not overburdened with statistics, but in a chapter by E. W. Pehrson, chief of the Mineral Economics Branch, U. S. Bureau of Mines, one finds the entire 75-year statistical record presented in neat, easily digested capsules, each containing one mineral commodity. Pehrson reminds us that in the 75 years covered by this volume total mineral production in this country has increased in value from less than $500,000,000 in 1880 to over $8,500,000,000 in 1945. "In 1870 mineral fuels comprised 38 percent of the total value of all mineral products, metals 52%, and non-metallic minerals 10%." In 1946 the fuels had increased to 64%, metals had decreased to 21%, and nonmetals to 15%.

The World Mineral Conference reports, comprising approximately 50% of the volume, present the most up-to-date review of the international mineral situation available. In the volume, as during the Conference itself, the discussions of atomic power and new sources of gasoline attracted greatest attention. The principles of the nuclear reactor as a source of power are outlined, and a diagram of an atomic power plant is shown (p. 710). The hope of obtaining usable electric power directly from an atomic pile, however, is dispelled. It is concluded that "the atomic energy will appear as heat, which, when converted into steam or hot gas, will feed conventional turbo generators" (p. 714). The use of ". . . atomic power plants for large naval and commercial ocean vessels looks definitely possible, and attractive from the standpoint of making refueling extremely infrequent. This may well be the first real commercial application" (p. 716).

This valuable volume should serve as a reliable reference book for all persons interested in the vast mineral industry. Physically, the volume maintains the same high standard characteristic of all publications of the AIME. Written by more than 25 authors, the volume has remarkable continuity of subject matter. This is a tribute to the editor and his staff.

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Angewandte Hydraulik. Robert Dubs. Zurich, Switzerland: Rascher Verlag, 1947. Pp. viii + 408. (Illustrated.)

The author, at present professor at the Federal Technical Institute (E.T.H.), Zurich, Switzerland, has set the aim of writing a book which would embrace "possibly all of the hydraulic problems" facing the engineer practicing in the mechanical field. It may be assumed that the book reflects also the character of instruction offered on the subject at the Zurich Polytechnicum.

As a matter of fact, the principal interest of the book for the American reader lies in comparing the manner of approach followed by Prof. Dubs's text with the trends prevailing in American engineering. It has become customary in this country to supply the engineer with a broad knowledge of fundamental principles and facts

governing the behavior of fluids, with proper emphasis on the more recent advances in the domain of so-called fluid mechanics. Scarcely any of these novel concepts are used or referred to in the book under review. In fact, after an introductory chapter which sets forth in a very clear, although somewhat elementary, manner the basis of old-fashioned hydraulic theory, the volume concentrates on a detailed treatment of certain engineering applications. There again the title *Applied hydraulics* appears to be broader than the actual contents of the volume. In fact, the selection of the subject matter is substantially limited to the requirements of the mechanical engineer specializing in water power. Open channel flow, weirs, and hydraulic structures are omitted. The emphasis is laid on pipe hydraulics, water hammer, and surge tanks, with a closing chapter on hydrometry. In his treatment of these subjects Prof. Dubs avoids general principles and follows mostly what may be termed a semiempirical course, gradually building up his presentation from the most elementary concepts. The author has succeeded well in his limited task. Also, the usefulness of the book is enhanced by the disclosure of valuable experimental data obtained in the Institute for Hydraulics and Hydraulic Machinery of the Zurich Polytechnicum, of which Prof. Dubs is director.

The eventual difference between the modes of apprenticing the engineer for professional work in different countries offers useful material for thought and comparison. Switzerland, with the preponderant role of water power, naturally requires much of its engineering talent to be specially trained for that field. The country, with its highly competitive position, may naturally prefer early and narrow specialization. By concentrating instruction on certain selected fields, a substantial level of professional competence may be reached at the school level, making the graduating engineer ready to perform responsible technical work of a kind which, in other countries, may require years of practical apprenticeship in industry or in the field.

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Heat. Archie G. Worthing and David Halliday. New York: John Wiley; London: Chapman & Hall, 1948. Pp. xii + 522. (Illustrated.) $6.00.

This book, as stated in the preface, is intended as a text for second-year work in physics and for an advance course for college seniors and early graduate students. Unless this reviewer has entirely forgotten his experience in a second-year course in physics, present-day juniors are much better prepared than they were a generation or more ago!

In the 522 pages of this book the authors have covered the field generally considered under "Heat." The subjects treated, with a chapter devoted to each are: Temperature, Thermal Expansion, Theory of Heat, Calorimetry, Specific Heats, Thermal Conduction, Thermal Properties of Gases, Elementary Thermodynamics, Change of Phase, Heat Engines and Refrigerators, Convection, and Radiant Energy. The first chapter is concerned with Laboratory Procedure and might well be a first chapter in any (or all) advanced books on physics. This chapter seems to show some of the experiences of the senior author with younger men in his earlier work in an industrial laboratory.

Each chapter is followed by a number of problems—over 200 in all—that well illustrate some of the principles discussed.

As a help to the student there are four appendices. The first gives a derivation of the Maxwell velocity distribution law for gases, the second consists of a number of tables of data, the third is made up of tables of both natural and common logarithms, and the fourth is a discussion of the properties of determinants.

The authors make their statements exact and precise in order to avoid, as far as possible, the loose usage sometimes found. Following this idea, they have employed, as far as possible, the standard nomenclature that has been adopted by the American Standards Association. In this they are careful to use terms and endings that distinguish between the properties of a body and of a material. However, when they think the gain in ease of understanding and freedom from confusion warrants, they do not hesitate to introduce new terms. An example of this is their use of the word "massing" for weighing for a determination of the mass of a body. Also, since the word pound is used in two senses, *i.e.* as a unit of mass and as a unit of force, they use the abbreviation pd for the mass and lb for the force.

A valuable feature of the book is the combination of theory, practical examples, and methods of measuring the various characteristics. There are many illustrations—about 250 in all—in this well-printed book which is remarkably free from errors.

This book promises to fill a need in the field of second-year physics.

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Chemical process principles. Pt. II: ***Thermodynamics***; Pt. III: ***Kinetics and catalysis.*** Olaf A. Hougen and Kenneth M. Watson. New York: John Wiley; London: Chapman & Hall, 1947. Pt. II: Pp. xv + 437–804 + xlviii. $5.00. Pt. III: Pp. xv + 805–1107 + xlviii. $4.50.

The problems of the chemical engineer fall broadly into three classes: first, developing the process; second, planning the equipment for carrying it out; and third, designing a coordinated plant. The two latter problems are essentially physical and mechanical, but the first involves a thorough understanding of chemical and, in particular, physicochemical principles. The purpose of the work under review is to give "an intensive quantitative training in the practical applications of the principles of physical chemistry to the solution of complicated industrial problems" and, through recent developments in thermodynamics and kinetics, to integrate these principles "into procedures for process design and analysis."

The first part of *Chemical process principles,* published in 1943, deals with material and energy balances; the second and third parts, recently issued, cover various