SCIENTIFIC BOOKS

COAL UTILIZATION

Chemistry of Coal Utilization. By H. H. LOWRY, editor, and a staff of 35 contributors. 2 volumes—Volume 1, pages 1–920; Volume II, pages 921–1868. New York: John Wiley and Sons, Inc. 1945. The set, $20.00.

No reviewer could be fully competent to review the two-volume treatise on coal and its utilization which the present work comprises. It was prepared under the auspices of a committee of the National Research Council over a period of eight years. The committee outlined the proposed review in 1938–1939, drew up a list of competent collaborators, collected all the contributions, sent these (until 1942) to two reviewers for criticism, thence to the author for reconsideration. Since 1942, the editor himself appears to have shouldered much of the responsibility for review of the texts as they were received, the reading of galley and page proof, preparation of the extensive book, name and subject indexes, corrections of incomplete or incorrect references, and the changes necessary to secure greater uniformity of style. The contract between the National Research Council and the publishers was drawn up with no royalties either to the council or the contributors to secure the lowest possible price for the report, and the costs of preparation of manuscript and illustrations were borne by the publishers and by a generous contribution from the Koppers Company. There results from these unselfish efforts on the part of all concerned a unique, comprehensive and critical review of the vast literature of coal and its utilization, never hitherto available in any language. Scientists and technologists in every phase of modern industry are under deep obligation to all those who have contributed to this outstanding effort.

Twenty-five years ago the writer made a picayune attempt to formulate the scientific aspects of fuel production and utilization in a small volume intended to cover the ground which has here been so comprehensively covered. To read from the finished product which these two volumes represent the current state of the science and technology of coal makes one realize two things: one, the temerity of a youthful author in 1920, and, secondly, the tremendous strides that have been taken in the intervening years to place the whole subject of coal utilization on a permanent, sound, scientific basis.

The first volume deals with the origin and classification of coal, its physical properties, such as hardness, strength, plastic swelling and other properties, its constitution as determined by halogenation, oxidation, reduction, hydrolysis reactions, the sulfur, nitrogen and mineral contents, the cleaning, water content and storage changes of coal and the action of solvents and temperature on the coal substance. Here are 24 chapters occupying nearly 900 pages of double columns with hundreds of diagrams and tables of data.

The second volume deals in 16 contributions with the gases, sulfur and nitrogen compounds, light oils and tar that result from coal carbonization, together with the combustion process in fuel beds, in pulverized coal, in the manufacture of producer and water gas. Direct generation of electricity from coal and gas (fuel cells) is reviewed with mainly pessimistic conclusions. The final three contributions deal with hydrogenation of coal and tar, synthesis of hydrocarbons and of alcohols from water gas.

A reviewer has to be eclectic in a survey of such size unless he has to spend several months in a detailed reading of such a work. He naturally turns to those phases of the work in which he himself is most interested and conversant with the subject-matter treated. The 15 to 20 per cent. sample that this reviewer has thus made gives him complete confidence that readers in the other areas will be completely convinced that, through the efforts of editor, contributors, publishers and the National Research Council, the science and technology of coal have here been accorded that outstandingly authoritative and comprehensive treatment that the Committee on Coal Utilization set before themselves as a goal. We are all, I repeat, deeply in their debt.

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METEOROLOGY

Descriptive Meteorology. By HURD C. WILLETT. Illustrated. viii + 310 pp. Academic Press, Inc. 1944. $4.00.

DESCRIPTIVE METEOROLOGY is an elementary text-book designed for an undergraduate course in meteorology, where the students have a knowledge of calculus and general physics. The author's main purpose in writing the book was to provide a text-book for his own course, and he has purposely omitted or given little attention to a number of topics which he believed unimportant in a course of this type.

The book begins with a general outline of the topics which are to be presented; this is followed with a set of definitions of various meteorological elements. With the foregoing as an introduction, it then takes up the eleven general topics which, as indicated in

the preface, include the material that the author thinks should form the basis for an elementary descriptive course in meteorology. These can best be summarized by listing the chapter headings and adding a few comments where the chapter headings need to be supplemented.

The first five topics are concerned with the basic principles of meteorology and provide the background for the descriptive material presented in the remaining portion of the book. These five topics are: (1) "The Composition and the Vertical Extent of the Atmosphere," in which the hydrostatic equation is also introduced and integrated; (2) "Adiabatic Processes and the Vertical Stability of the Atmosphere," which also includes a discussion of adiabatic diagrams; (3) "The Heat Balance of the Atmosphere and the Explanation of the Observed Temperature Distribution"; (4) Evaporation and Condensation in the Atmosphere"; (5) "Wind Velocity in the Atmosphere."

The latter half of the book is given over to the remaining six topics, which fall into a class generally referred to as synoptic meteorology. These six topics are: (1) "The General Circulation of the Earth's Atmosphere," which also includes a discussion of "high and low index" conditions; (2) "The Secondary Circulations of the Thermal Direct Type," where a detailed description of hurricanes is also given; (3) "Air Mass Characteristics"; (4) "Secondary Circulations of the Dynamic Type," which mainly discusses fronts and wave cyclones; (5) "The Tertiary Circulations"; and (6) "The Synoptic Representation of Current Weather and the Forecasting of the Future Weather," where the author gives a few examples of weather analysis and merely surveys the field of weather forecasting.

For the most part, the equations presented are derived from first principles. No derivations, however, are given for the formulas for specific humidity and mixing ratio. In the case of mean molecular weight of air, the method by which the value is determined is not given. It is believed that the addition of the foregoing would be very useful to the reader in understanding these concepts.

Some material has been omitted which most meteorologists would probably want included in a text of this nature. No mention is made, for instance, of wet-bulb temperature, equivalent-potential temperature, snow pellets and small hail. Occasionally technical terms with which the beginning student would not be familiar are introduced with insufficient discussion. These include such terms as front, frontogenesis, entropy, convergence and divergence.

The description of a hypothesis for the development of hurricanes and the material on air mass characteristics are given in great detail, probably in greater detail than is necessary in an elementary book, but little mention is made of the weather and the causes of weather in the tropics. The intertropical front, or convergence zone, and wave disturbances in the easterlies are given no attention. In describing the characteristics of occluding wave disturbances, a large amount of material is included concerning the developments at the surface, but completely lacking is a description of developments aloft except for that which concerns frontal structure. These are considered to be important omissions.

One might object to the phrase, "the capacity of air to hold water vapor," as it is misleading; to the rather unusual integration of the hydrostatic equation; or to the statement, "the particle rises along its own particular dry adiabat," instead of, the particle cools at the dry adiabatic rate. Some would probably consider these to be rather minor objections.

In spite of the above criticisms, it is believed that this text is of much value, as it is one of the few meteorological texts designed for use in undergraduate courses where the students have had preparation in college mathematics and physics. The author has purposely not attempted to cover the field of weather forecasting in a chapter or two, as has been done in numerous elementary texts, and for this he is to be complimented. The subject-matter is well integrated, giving the book good continuity.

The book as a whole gives the impression that the author has published it only after much thought and careful preparation, and it is indeed a welcome contribution from the standpoint of those concerned with meteorological education. It should prove very useful to people giving courses on the level for which the book has been prepared.

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PLANT GROWTH

Plant Growth. By L. EDWIN YOCUM. 192 pages. 16 plates. Cloth. Lancaster, Pa.: The Jaques Cattell Press. 1945. $3.00.

IN the words of the author, "This book has been written in an attempt to bring together the knowledge necessary to answer (as far as possible) the many technical questions which the plant lover may ask about growing plants. It is an attempt to make clear the 'how and why' of plant growth. The principles of the laws of nature as applied to plants growing in the soil are stressed. Many of the newer theories used in plant culture are described; others, not so well established, are suggested as possible future developments.