ever, the result is something which does not so readily appeal to the thoughtful reader; for in order to be in tune with the author he has to supplement the cold logic of mathematical formalism with a kind of faith in the meaningfulness of the concepts. It is necessary to adopt a reasonably sophisticated approach to understand the theory of relativity at all. Yet if one becomes too sophisticated, he is apt to become troubled by such things as clocks and scales as bases for the arguments and wonder how far he can postulate things about these mechanisms. He wonders in what sense the author is thinking of such a concept as an electric field, for example. Also, things often fail to get defined carefully in the elementary books because it is supposed that such sophistication is for the advanced books, and they never get defined in the advanced books because these books seem to be no place for such elementary matters of definition. So one arrives at a kind of community of procedure in which all "in the know" do the same thing, even though it is not always clear as to what is being done.

Of course, one may write his own charter of understanding, and say that scales and clocks are simply symbolic ways of recognizing that we have certain procedures for assigning numbers x, y, z and t to the events, these procedures involving in part measurements and in part calculations which are supposed to correct the measurements for light velocity and so forth, and that the result of all this is symbolized by the statement that the scales and clocks give such and such numbers for the events. If, however, the reader becomes too sophisticated in this matter, he will find that he will depart from the spirit of the author's intent, either because of the unexpressed meaning which it is intended to attach to the concepts, or because the author has purposely tried to avoid what appear to be complexities of exposition. If the reader persists in his heresies, he will become worried by the meanings to be attached to the behavior of clocks and scales when set in motion relatively to one another—even the Michelson and Morley experiment will lose some of its dignity, and he will become conscious of the need of certain other principles to preserve for his scales and clocks a respectable existence in the realms of logic.[1]

Then, in the matter of the general theory, many students of relativity may have squirmed at the apparent importance of "light" in the matter. Indeed, it is possible to regard the famous constant "c" as appearing in another way—a way more in harmony with the astronomical surroundings.[2] If one does this, however, he will find that many relativists will regard the procedure as almost of the nature of desecrating something very "holy."

A rather long discourse of this kind would be quite out of place in a review, particularly of a book by an author so eminent, were it not that the *meaning* of the word "Meaning" is involved. The purpose of this review is not so much to present a criticism in this matter as to emphasize the fact that, in seeking a *meaning* of an author's presentation, more is necessary than an understanding of the mathematics—more is necessary than an ability to reformulate the subject to one's own satisfaction. It is necessary to obtain as clear a picture as possible of the mental attitude of the author and of his various concepts, so that he may immediately know what is meant by such a statement as "From all of these considerations, space and time data have a physical real, and not a mere fictitious, significance" (page 29). Alas, to obtain such a picture is not easy. To each one of us the pictures in the mind are things of his own, and the values which he places on the various elements are things of his own making.

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[1] Some of these matters are discussed in a paper by W. F. G. Swann, *Rev. Mod. Phys.*, 13: 197, 1941.

[2] See, for example, W. F. G. Swann, SCIENCE, 62: 145, 1925. Also *Rev. Mod. Phys.*, 2: 243, 1930.

WOOD CHEMISTRY

Wood Chemistry. Edited by LOUIS E. WISE, of The Institute of Paper Chemistry, Appleton, Wisconsin. A.C.S. Monograph Series No. 97. 900 pp. New York, N. Y.: Reinhold Publishing Corporation. June, 1944. $11.50.

THE general field of wood chemistry has expanded greatly in the last few years as wood has been called upon to fill an increasing role in the needs of our nation. The book, "Wood Chemistry," seeks to bring together the views of some of America's best-known specialists in the field. The book contains 25 chapters and seeks to give as complete a picture as possible of the properties and possibilities of wood as a chemical material.

Part I, "The Growth, Anatomy and Physical Properties of Wood," gives the reader a conception of wood as a complex material of plant origin. The functions of the various parts of the tree, how the tree grows and the differences between hardwoods and softwoods are described. A chapter on the physical properties of wood gives those properties that are of importance in the use of wood as an engineering material.

Part II, "Components and Chemistry of the Cell Wall," deals with the principal components of the cell

wall—cellulose, hemicellulose and lignin—giving their chemical constitution, relative relationships in the cell wall, chemical reactions, changes that occur when subjected to various chemical reactions, physical-chemical properties and the production and properties of derivatives. Comparisons are made frequently to cellulose from cotton to bring out differences and similarities. Information on x-ray studies and methods of molecular weight determination is given for both cellulose and its derivatives. Methods of isolation and study for both hemicellulose and lignin are described. Research on these two wood components has not progressed to the state of that for cellulose, and the authors of the two chapters illustrate that fact by giving the various points of view.

Part III, "The Extraneous Substances," points out the various types of materials that occur in wood as volatile oils, resins, fats, fatty acids, sterols, waxes, dyes, pigments, tannins, free carbohydrates, saponin and other extractives. The author has developed the field very well and, in addition, presents a procedure developed by himself for the isolation of these various extraneous substances.

Part IV, "Surface Properties of Cellulosic Materials," reviews such properties as adsorption by gases, water vapor and liquids, hysteresis, fiber-saturation point, selective adsorption, swelling, shrinking, antishrink treatments, electrical properties, diffusion, drying and solvent seasoning.

Part V, "The Chemical Analysis of Wood," describes various methods employed in analysis of wood and wood components and their significance in the chemistry of wood.

Part VI, "Wood As an Industrial Raw Material," describes the use of wood for fuel, for the production of chemical products through wood distillation, for the production of pulp and paper by chemical pulping, for sugar production by hydrolysis, for the production of oxalic acid by caustic fusion, for liquid products by hydrogenation and for wood plastics after chemical pretreatment.

Chapters 24 and 25 describe the decomposition of wood and wood products as brought about by various organisms and fungi.

Each chapter is supplied with a large list of references that show the scope of the work covered in the book and the thoroughness of the authors in the development of their chapters.

ELWIN E. HARRIS

THE ANALYSIS OF FOODS

The Analysis of Foods. By ANDREW L. WINTON and KATE BARBER WINTON. 999 pp. New York: John Wiley & Sons. 1945. $12.00.

THOSE familiar with the four volumes of "The Structure and Composition of Foods" by the same authors will not be disappointed in the present work, which is a compact but complete handbook on methods employed in food chemistry. The scope of the book is as vast as our knowledge of those aspects of organic and biological chemistry which have any bearing on food analyses. It towers without equal in the field for precision, clarity and breadth of subject-matter. There is hardly a method which is omitted, hardly a reference overlooked. It is a vast and laborious task, but one which will be amply rewarded by the gratitude of all workers who will have recourse to it.

A brief introductory section, describing such basic apparatus as refractometers, colorimeters and photometers, and citing the common reagents employed, is followed by a division of the bulk of the book into two parts. Part I deals with general methods for the analyses of organic elements, constituent groups such as water, protein, fat, nitrogen-free compounds, fiber and ash, as well as alcohol, vitamins, natural and artificial colors and preservatives. Part 2 describes methods adapted to special foods such as cereals, fatty foods, vegetables, fruit, saccharine foods, beverages, dairy products, animal foods, alkaloids, flavors, spices and yeast. There is an abundance of helpful diagrams, photographs and tables and an excellent index. Several descriptions have been put to the test by students who had had no previous knowledge of the methods described. Invariably the results proved that the instructive messages of the texts were fully comprehended and readily followed and that the desired results were obtained. "The Analysis of Foods" is an indispensable tool to all laboratory workers in the field.

MARK A. GRAUBARD

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