Book Reviews

Optics. Bruno Rossi. Addison-Wesley, Reading, Mass., 1957. 510 pp. Illus. $8.50.

This is a textbook for the advanced undergraduate student. A familiarity with the calculus is assumed, and some simple differential equations are developed and solved.

By basing the book on the wave model of light, Rossi has achieved a high degree of logical unity and consistency. Huygens' principle is discussed in unusually great detail in the first chapter, where it is shown that rectilinear propagation follows logically from a consideration of light waves as pulses of short duration. With this foundation, the subject of geometric optics is developed in the second chapter. The wave model is extended from pulses to sinusoidal waves in the third and fourth chapters, which deal with interference and diffraction. The transverse nature of the waves is introduced in the sixth chapter, to account for polarization and double refraction. In the seventh chapter, light waves are identified as electromagnetic waves, and Maxwell's theory is developed. The optical properties of matter are interpreted in the eighth chapter, by considering interactions between electromagnetic waves and atomic oscillators. This theory is entirely classical, with no discussion of the quantum-mechanical treatment and its results. The final chapter reveals the limitations of classical theory and illustrates the complementary character of waves and particles in the theory of light.

The strength of this book is its logical and rigorous development of the consequences of the classical wave model of light. A weakness, as a textbook, is its beginning with a chapter that will be difficult for the student. Another obvious weakness is that there is no recognition of quantum theory until the very end of the book.

The problems that are associated with each chapter are an important extension of the text material. They often disclose practical applications of the preceding theory; for example, low-reflectance films and interference filters are not discussed in the text but are assigned as problems. Such topics are often not listed in the index.

Some conspicuous omissions are Abbe's sine law, the theory of stops, aberrations of optical systems, a criticism of the Fresnel-Kirchhoff theory of diffraction, and radiation theory. On the other hand, noteworthy inclusions are Abbe's theory of image formation, the phase-contrast microscope, a very good treatment of mechanical waves, and a development of the electromagnetic field of a moving charge. Chapter 9, on light quanta, is excellent.

The many line drawings are well done, but the halftones are flat and muddy. There are very few errors. The book is a very well-written and scholarly work and is an important addition to optical literature.

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Advances in Food Research. vol. VII. E. M. Mrak and G. F. Stewart, Eds. Academic Press, New York, 1957. 404 pp. Illus. $8.50.

Volume VII of *Advances in Food Research* contains seven articles, each concerned with a facet of research in food processing.

Three of the contributions deal with specific food products. Fish spoilage and preservation is discussed by Yukio Tomiyasu and Buhei Zenitani. The authors render a service in that much of the material reviewed in the section is Japanese and, according to the editors, has not been generally available outside of Japan. Under the title "Gelatin," Bernard Idson and Emory Braswell describe the technology of gelatin manufacture, the chemical and physical properties of gelatin and collagen, and some applications of gelatin in the food, pharmaceutical, and industrial fields. C. Nieman presents, in a similar article, the technology of licorice manufacture and the chemistry and pharmacology of licorice and some of its components.

Three of the articles are concerned with problems that are encountered in food processing and marketing in general. The discussion of "Water relations of food spoilage microorganisms," by W. J. Scott, reviews some basic physical and biological concepts of these relations, the information on water requirements for growth of the organisms, and applications of knowledge of the relations in food preservation. Walter A. Mercer and Ira I. Somers describe the use of chlorine in sanitation of food-processing plants. The history of the use of chlorine, the technology of application, and the effects of chlorine in plant sanitation are discussed. Jean F. Caul's article, "The profile method of flavor analysis," recounts the development of this method of analyzing and classifying flavor. The selection and training of panels and their procedure in developing "flavor profiles" are described.

The seventh article, "Freeze-drying of food products," by J. C. Harper and A. L. Tappel, describes in detail the status of development and the fundamentals of the freeze-drying process. The authors discuss methods and equipment used in freeze-drying as well as present and prospective applications of the process. The process is, essentially, still in the research stage of development. Areas in which additional research is needed are listed.

Each of the articles includes an extensive bibliography, and the volume contains author and subject indexes.

The purpose of a work of this kind is, of course, to bring together information for the use, primarily, of persons in the specified field of endeavor. If the information available is adequately reviewed and is set forth in usable form, as it seems to be in the present case, the objective of the volume has been attained. The reader, however, might wish for improvement in literary style in some of the articles in this volume. At the least, such improvement would add to the pleasure with which the material is read. In some cases, the ease and perhaps the accuracy with which the information is transmitted to the reader would be enhanced.

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Science and Economic Development: New Patterns of Living. Richard L. Meirer. Technology Press, Cambridge; Wiley, New York; Chapman and Hall, London, 1956. 266 pp. $6.

Although the present world scene is overshadowed by political tensions and their economic and strategic concomitants, much greater concern should be felt about the ever-widening gap between the rapid progress of contemporary sci-