Books

Theory of Electric Polarisation. By C. J. F. Böttcher. 492 pp. Elsevier Publishing Company, Houston, Texas, 1952. $10.00.

In elementary dielectric theory, molecules obey classical laws, are independent, and are in equilibrium. They should obey quantum laws, interact electrostatically, and be subject to thermal agitation. Introduction of just one of these complicating factors leads to a quantum formula for polarizability, to Lorentz's "local field" concept, or to Debye's theory of polar molecules. Simultaneous introduction of the first and third provides the material of Van Vleck's *Electric and Magnetic Susceptibilities;* of the second and third, the material of Böttcher's book. It differs from Fröhlich's *Theory of Dielectrics* by giving more attention to electrostatic details and less to statistical mechanical.

The first five chapters develop the electrostatic concepts and formulas required for the theory. The next five develop the theory of polar and nonpolar fluid dielectrics, with emphasis on liquids. The eleventh chapter briefly surveys the dielectric properties of solids. Four appendixes contain material on vector analysis and spherical harmonics.

The electrostatic theory is developed systematically and soundly. The basic macroscopic concepts are defined with complete generality, by the Kelvin cavity method; linear dielectrics are then treated as a special case. In microscopic theory the emphasis is on dipole moments, with attention also to general multipoles. Special electrostatic problems, of importance in later chapters, are solved. The author has maintained clarity and logic at points where writers on electrostatics often become unclear or illogical. On pages 179–180, however, the proof in fine print could well replace that in the text; and an equation cited as basis for Eq. (2.45) is missing.

The treatment of polar and nonpolar molecules is based mostly on an approximation in which one molecule is treated explicitly and the others are replaced by a continuum. This method was popularized by Onsager. Böttcher also discusses earlier and later contributions to it, including his own improvements. He acknowledges (p. 227) that the statistical mechanical approach is preferable, but in his opinion it has not yet been developed far enough for successful application to liquids. Topics discussed are the low-frequency dielectric constant, the optical refractive index, the determination and interpretation of permanent moments, and dielectric relaxation. The material is organized systematically and presented clearly and logically.

For reasons stated in the preface, the author has limited his discussion to the fields just outlined. At points of contact with related fields, a few criticisms seem justified. On page 244, where the quantum dispersion formula might have been merely quoted, an attempt is made to rationalize it classically; this blurs an otherwise clear discussion. Kirkwood's treatment of nonpolar liquids receives fourteen pages of discussion, yet Yvon's is not mentioned; and Kirkwood's theory of polar liquids receives only two sentences (p. 399). Also, the description of this theory as "an extension of Onsager's theory" hardly does it justice.

Within his field, the author performs admirably. In this book are complete, orderly treatments of several topics previously discussed only disconnectedly in journals. The scope of the book is narrower than the title suggests; but the reader with a genuine interest in its subject matter will find it very valuable.

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Crime Investigation. By Paul L. Kirk. 765 pp. Interscience Publishers, Inc. New York, 1953. $10.00.

This reviewer has followed the literature on scientific crime detection ever since thirty years ago when he learned the rudiments of this art at the University of Amsterdam, from the pioneer police chemist C. J. Van Ledden Hulsebosch. Many books have been written on the subject; the present volume gives a clear view of its wide scope. Almost all scientific techniques can at times be used in criminological investigations. To the simple magnifying glass of Sherlock Holmes we must now add spectrophotometers, polarizing microscopes, diffraction gratings, and I expect next to see Geiger counters used in police stations.

Unfortunately the book is too full of technical details, which are apt to scare off those who need to become thoroughly familiar with the possibilities of scientific crime detection. At the same time these details are insufficient to change the novice into an expert and may rather give rise to amateurish bungling. Anyone who still has to learn all about photography from the 25 pages of Chapter 32 should not be allowed to touch a camera in an actual investigation. An early chapter on probability and statistics is also likely to make the average reader believe that the subject is too learned to be useful. A simplified edition of this book, retaining the wealth of excellent examples, but omitting all academic embellishments, may well help to spread confidence in scientific crime investigation.

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Physics Manpower

Manpower Resources in Physics, 1951, Scientific Manpower Series No. 3, has been published by the National Scientific Register as a 46-page report summariz-