other forms of light emission in the first chapter, the summary of the band theory of solids as applied to luminescence in the third, and the treatment of decay laws of phosphorescence in the fourth have considerable pedagogic value. The survey of the history of luminescence in the second chapter suffers from an almost exclusive concentration on decay laws of phosphorescence. Important topics such as the glow-curve work of Urbach, Randall & Wilkins, and Garlick, or the chemical concentration studies of the Eindhoven group are omitted. In the field of decay curves, however, there is extensive reference to (and criticism of) the work of others.

The more advanced reader will find worth-while material in the chapters on radiationless transitions in crystal phosphors.

The absence of an index is regrettable.

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The Theory of Cohesion. By M. A. Jaswon. Pp. viii+245 with 42 figs. London: Pergamon Press; New York and London: Interscience Publishers. 1954. Price 37*s*.6*d*; $5·75.

The author has intended this book as an outline of the principal ideas and physical concepts underlying the various approaches to the problems of cohesion rather than as a practical guide on the detailed application of any one method. The emphasis is on pointing out the logical construction of the theoretical methods and on delineating clearly the nature and limitations of the approximations involved.

The theory of cohesion—the term is used in its most general sense by Jaswon—deals with the determination of the stable states, and particularly of the energy of the ground state, of many-body systems. Since exact solutions cannot be obtained, the main concern of the theory is the construction of suitable procedures of approximation. In particular, these are developed around two major problems, namely, the interaction between electrons, and the motion of a single electron under the influence of many centers of force. The importance of these two problems stems from the attempt to replace the exact forces acting on the electrons during the passage of time by suitable average interactions of the rest of the system with independent particles. Clearly, this is most successful in situations of high symmetry and large number of particles. In dealing with systems of intermediate size and complex structure, as well as in the study of the more refined properties of the more symmetrical systems, such approximations are less satisfactory.

In order to make the book self-contained, three chapters on wave mechanics, the hydrogen atom and perturbation methods precede the discussion of the main topics. The framework of cohesion theory is then developed by treating thoroughly those simple systems which have served as the starting point of the formulation of its main concepts. Thus, the helium atom exemplifies atomic cohesion. The chapter devoted to it is concerned at length with the problem of electron interactions, discussing the significance of the one-electron approximations of the Hartree and Hartree–Fock equations. In the following chapter the H_2^+ molecule illustrates the problem of many equivalent force centers, and subsequently both parts of the many-particle problem are combined in the treatment of H_2. This leads directly into a critical examination of the physical content of the molecular orbital and Heitler–London approximations, and some of the refinements of these theories, either by formal mathematical procedure or by physical argument, are pointed out.

In terms of the same concepts two other chapters deal with the principles of constructing molecular orbitals in solids, and the wave functions of co-valent structures. An additional chapter is concerned entirely with metals, emphasizing the construction of self-consistent one-electron wave functions by the cellular method, and the importance of the resulting nearly-free character of the conduction electrons in the explanation of metallic properties. Refinements of the basic approach, which are needed to deal with the transition metals and alloys, are explained in terms of various specialized approximations. Here attention is often drawn to more recent contributions, mostly from the British literature.

The presentation is very clear and, while concise, never hurried. Though mostly qualitative, the book gives a useful survey of the mathematical techniques of the many-body problem. The beginning chapters, in particular, contain good explanations of a large number of minor—but sometimes troublesome—points arising in the construction of acceptable wave functions which are usually glossed over.

Because of the nature of its approach, this book should attract a rather large audience. Workers in many fields in which new experimental techniques and a shift of emphasis to fundamental problems have made the understanding of cohesion a matter of considerable interest will find it an excellent, self-contained introduction not requiring very special preparation.

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