

temperature has nothing whatever to do with Stokes's equation. The value of the equation is to transform this velocity into an equivalent particle diameter using a somewhat arbitrary value for the density of the soil particle.

The chapters on soil structure, soil air and soil temperature maintain a high standard, but that of soil water is less satisfactory. There is still a surprising confusion in the minds of most soil workers on the fundamental conceptions of soil water, which is reflected in this chapter by an unfortunate vagueness in some of the fundamental concepts and in particular in some of the consequences of these concepts. As an example, there is quite a good account of the concept of capillary potential or pF of the water in the soil, but the author does not seem to have realized explicitly the necessary connexion between the distribution of pore sizes in a sand or soil and its pF curve, with the consequence that a number of results on soil permeability are given as perhaps unexpected

experimental results instead of obvious deductions from the underlying theory.

The last two chapters deal with the application of soil physics to soil cultivation and to erosion control. The former gives an excellent account of Nichol's work on the plough, and of the conditions one would expect in an ideal seed-bed, without, however, showing how far plants respond to these conditions. It also discusses briefly but adequately the effect of keeping the soil surface mulched. The last chapter discusses briefly such topics as the effect of slope and vegetable on soil and water run-off and on the rate of infiltration of water.

The text is well supplied with the relevant figures and tables needed to illustrate the main points discussed, and the book itself is, needless to say, very well produced. It forms a valuable addition to the very small library of books devoted to soil physics and it will amply repay most research workers and lecturers in soil science the time taken to study it. E. W. RUSSELL.

A PHYSICAL TREATMENT OF THE RAMAN EFFECT

Scattering of Light and the Raman Effect

By Prof. S. Bhagavantam. Pp. x+333+2 plates. (Waltair: Andhra University, 1940.) 15 rupees; 22s. net.

A BOOK on the Raman effect, written from a physical point of view, has been badly needed for some time. Since the discovery of the effect in 1928, there have been several attempts to review and collate the enormous literature which has grown up in the succeeding years. Although there are now several good bibliographies, and Hibben's excellent book on the chemical applications, Professor Bhagavantam is the first to give a general account of this phenomenon in English, with proper emphasis on the physical aspects. Almost half the book is quite properly devoted (as the title indicates) to the general subject of light scattering. In addition to providing a good up-to-date account of the basic phenomenon, this method of treatment helps to make clear the relation of the quantum theory to the classical theory of light scattering, and the extent to which classical ideas (for example, anisotropy and polarizability) may usefully be employed in the interpretation of Raman spectra.

Any treatment of the Raman effect is naturally based on the theory of Raman spectra of diatomic and polyatomic molecules, and this is given with considerable skill, the essentially mathematical parts being relegated to appendixes. Applications of Raman spectra to problems of molecular structure, of crystal structure and to a variety of

problems in physical, inorganic and organic chemistry are presented in five separate chapters. A particularly valuable chapter is included on experimental technique, since Professor Bhagavantam is an outstanding contributor here, and to obtain really satisfactory Raman spectra is not so easy as is generally supposed. In this connexion the description of the gradual discovery of the phenomenon is of considerable interest.

The only serious defect which the reviewer has noticed is the virtual omission of the interpretation of the magnitudes of Raman frequencies in terms of a molecular model with definite restoring forces between the atoms. The knowledge of inter- and intra-molecular forces which has been obtained from the Raman effect by this means is now very considerable. In this connexion the explanation of the breadth of the Raman bands of water given on p. 156 as "due to the existence of polarity and close packing" is not at all adequate. The exposition, while generally very clear, is occasionally marred by careless phrasing. For example, on p. 175 it is stated "that for a Raman line to occur with appreciable intensity either $\left(\frac{\partial\alpha}{\partial q}\right)_0$, or $\left(\frac{\partial\gamma}{\partial q}\right)_0$, or both should not vanish".

On the whole the book can be warmly recommended to anyone wanting an elementary treatment of this rapidly expanding branch of molecular physics.

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