Books

Gourmet's Delight

FLUORESCENCE AND PHOSPHORESCENCE. **By Peter Pringsheim. 794 pp. Interscience Publishers, Inc., New York, 1949. $15.00.**

The famine that prevailed in texts on luminescence has turned into a feast within the past few years. Pringsheim's new book may well be considered as the pièce de résistance of the many course banquet that has recently been spread before workers in this field.

The principal aim of the book is to clarify our theoretical understanding of the processes which occur in luminescent systems. To this end the subject matter is drawn almost exclusively from the field of photoluminescence. Practical applications, methods of phosphor synthesis, and luminescence excited by other than "optical" means—including even the technically highly important subject of cathodoluminescence—are not considered in the book, since they do not contribute to its goal.

Basically the book is an extensive revision and manyfold enlargement of Pringsheim's classic treatise of the same title published in 1921. It is distinguished from the rest of the recent monographs on luminescence in giving detailed consideration to systems other than the solid inorganic phosphors which have received the lion's share of attention from researchers in luminescence for the past decade. The first of these topics is the luminescence of gases, which—as Pringsheim puts it—has almost become a closed chapter of classical optics, and as such is only briefly alluded to in most current treatises on luminescence. In Pringsheim's book this subject is reviewed in great detail, starting with the comparatively well understood phenomena in monatomic gases and vapors and progressing to a discussion of the complicated absorption and fluorescence spectra of the polyatomic molecules characteristic of organic dyes. In this intensive summary of the luminescence of gases, occupying roughly one-third of the volume, concepts and definitions are developed which are required for an interpretation of the subject in hand and which are also basic to an understanding of the luminescence of condensed systems.

In the second part of the book the fluorescence and phosphorescence of condensed systems are dealt with. Here again much attention is given to systems that are generally ignored in other works, the luminescence of liquid solutions and the luminescence of organic materials. These two subjects are more or less interwoven throughout the discussion, since the illustrative material bearing on the luminescence of solutions comes mainly from organic systems. Besides a discussion of the luminescence of specific classes of organic compounds, general topics are dealt with, such as the energy transfer from the absorbing to the emitting mechanism, the effect of experimental conditions (concentration, nature of solvent, presence of quenchers) on the luminescence yield, and polarization and angular intensity distribution of fluorescence radiation. The material in this section comprises roughly another one-third of the book.

A short section on the luminescent "pure" inorganic compounds follows, dealing particularly with the rare earth, uranyl, and complex platinous salts both in the crystalline state, in liquid solution, and in glasses.

Impurity-activated "crystal phosphors" are treated in the last 150 pages of the book. Included in this category are such "pure" inorganic compounds as the tungstates and molybdates, whose properties have more in common with the impurity-activated phosphors than with the previously discussed "pure" inorganic materials. The section on crystal phosphors presents first a general discussion of such topics as absorption and emission phenomena, photoconductivity, electron trapping, phosphorescence, stimulation, and quenching by infrared. This is followed by a description of the properties of the most important synthetic crystal phosphors. The book concludes with a short discussion of the luminescence of natural minerals and of crystals discolored by irradiation. The varied phenomena encountered in crystal phosphors have, of course, been dealt with more extensively in other recent monographs devoted exclusively to this phase of luminescence. It is regrettable that much of the wealth of material on these phosphors published after the war became available too late for inclusion in Pringsheim's treatise. On the other hand, only Pringsheim gives some items, such as the impurity-activated alkali halide phosphors, the detailed and comprehensive attention they deserve.

The bibliography includes almost two thousand references covering the literature up to the middle of 1948.

It almost goes without saying that the exposition is scholarly, deliberate, and clear, both in the presentation of experimental data and in the analysis of their theoretical implications. Conflicting experimental data—in which the field of crystal phosphors especially abounds—are generally presented with helpful critical comment by the author. In the theoretical discussion there is a fortunate absence here of the dogmatism and disputatiousness that Seitz, in a previous review, has alluded to as characteristic of much of the recent literature of luminescence.

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Liquid State Theory

A GENERAL KINETIC THEORY OF LIQUIDS. **By M. Born and H. S. Green. 98 pp. Cambridge University Press, New York, 1950. $2.25.**

During the years 1947 and 1948 there appeared in the *Proceedings* of the Royal Society of London a series of articles by M. Born and H. S. Green on the kinetic theory of liquids. The present volume is a collection of the articles of this series, in which the authors develop a general statistical mechanical theory of the liquid state and present certain important applications of the theory. While, as the authors state, the six papers provide but a very general outline of the statistical theory of condensed matter, they are worthy of careful study and attention as