The article on metals at high temperatures and pressures can be considered to bring the material in Bridgman's book up to date. It includes only equilibrium properties, and excludes shock-wave studies. This article would be valuable as supplemental reading for a good undergraduate class in physical chemistry. In fact the publisher might consider reprinting in paperback four or five such simple and readable articles from recent volumes of this series.

The long and beautifully illustrated review on dislocations in lithium fluoride is the consequence of a happy accident in 1955 which has made the plastic behavior of this crystal probably more completely understood than that of any other. The accidental use of iron tongs to hold a crystal dipped in etchant led to the discovery of the critical concentration of iron ions needed to reveal dislocation etch pits.

The article of Jørgensen suffers somewhat from difficulties of language. He should not be blamed for this since more careful editing would have caught most of the *faux pas*. But "phenomenae" must be just as remarkable in Copenhagen as in Urbana. Most readers would find it helpful to start this article at the end and to read it backwards (section by section, not word by word). The terminal sections on "critical evaluation of modern theories" provide a sardonic commentary on "advanced inorganic chemistry" and the *sang froid* of makers of valence models in the face of dangerous experimental facts. Only the "quanticule" concept of Fajans emerges from the critique unscathed and indeed renovated. Altogether this is a fascinating article for chemists, well worth the struggle with its prose.

Jørgensen is skeptical of band theory and one cannot say whether the article of Blount will help to allay his doubts. It is beyond this reviewer, but appears from the outside to be an extremely competent summary of the mathematical treatment of crystal bands as developed by Wannier, Kohn and Adams. The review on e.s.r. in semiconductors is mainly concerned with silicon as a host material. The interpretations here use band theory with evident success, but the detailed experimental data have left theoretical calculations far behind. Some kind of explanation for the non-specialist of the general purposes and net results of this outpouring of excellent work on silicon would have been welcome.

DEPARTMENT OF CHEMISTRY
INDIANA UNIVERSITY WALTER J. MOORE
BLOOMINGTON, IND.

Alkyd Resin Technology. Formulating Techniques and Allied Calculations. Interscience Manual 8. By T. C. PATTON, Baker Castor Oil Company, Bayonne, New Jersey. Interscience Division, John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1962. ix + 197 pp. 16 × 23.5 cm. Price, $9.75.

As pointed out by the author, paint technology is no longer an art. In recent years the results of many scientific studies dealing with finishes and the manifold ingredients which go into finishes have been reported in the literature. Use of this information has permitted the paint chemist to formulate on the basis of scientific principles and lend less weight to strictly empirical methods.

The purpose of this book is to abstract and analyze many of the articles concerned specifically with alkyd vehicle calculations. Ways of formulating alkyds on the basis of theoretical considerations are presented, thus permitting the inexperienced paint chemist to formulate and assess alkyd resins in a minimum of time. This book should be of value not only to the novice but also to the experienced resin formulator who can benefit from a review of the many recent scientific formulating techniques. The book is well written and gives a wealth of general alkyd resin technology information. Noteworthy are the illustrative problems as well as the list of references. It is unfortunate this book was not available a number of years ago when alkyd resins occupied a position of uniqueness; however, it should still be useful for some time since alkyds offer inexpensive quality finishes.

Chapter I gives a general discussion of alkyd resins. It introduces the reader to the chemical nature of alkyd resins and defines terms and symbols commonly used. Included in this chapter is a tabulation of raw materials used in formulating alkyds. The physical constants contained in this table should be useful as a permanent reference.

Chapter II discusses factors which affect alkyd production. Important aspects such as purity of raw materials, choice of raw materials, reaction conditions—physical and chemical—are covered. Under reaction conditions the author comments on such topics as rate of agitation, type of agitation, temperature of reaction, order of addition, reactivity of primary and secondary carboxyl and hydroxyl groups, type of cook—solution or fusion—and a host of other subjects. The author points out that in spite of the many effects the above factors have on the finished alkyd it is still possible to formulate practical alkyds from theoretical calculations.

Chapter III gives the two different methods for monitoring alkyd cooks. The first and most common method uses plots of log of viscosity *versus* time and acid number *versus* time. The second and lesser known method plots acid number *versus* reciprocal viscosity. The latter method is useful in predicting acid number at gel by extrapolating to infinite viscosity.

Chapter IV gives several illustrative problems for calculating weight composition of alkyds from data abstracted from the literature.

Chapter V presents four different systems for designing alkyds from theoretical considerations. The systems are discussed in detail and illustrated by selected problems. They are as follows:

1. F_{av}, an average over-all functionality for alkyd composition. This method can be used to check the feasibility of a given formulation or to set up an alkyd formulation from scratch. Considered to be the most useful of the four systems, it is covered more fully in Chapter VI.
2. p, the probability of a branch-to-branch connection between molecules at gelation. The percentage completion of the reaction at gelation gives information which can be used to formulate an optimum alkyd. A mathematical technique is given for replacing a polyol by a mixture of polyols or diacid by triacids.
3. AN, the acid number of the alkyd composition at its gel point. This method can be used to calculate acid number at gel. By determining the difference between the actual acid number at gel and the theoretical value, one can calculate an experimental correction factor for formulating subsequent cooks.
4. M_{av}, the average molecular weight of the alkyd at gelation. This method can be used for calculating the average molecular weight at the gel point. It is considered to be the least useful of the four methods for designing alkyd resins because adjustments on a trial and error method are required to arrive at the final composition.

In closing Chapter V, the author uses the four different systems to set up initial alkyd formulations using the same raw materials. Although the resultant compositions are not exactly the same, the author points out that there are at the disposal of the formulator four radically different approaches which can be used to arrive at optimum alkyd compositions based on experimental data.

Chapter VI makes up approximately thirty-five per cent of the book. As indicated above, it is an expansion of the F_{av} method discussed in Chapter V. This system gives a method for formulating on the basis of an alkyd constant. The many problems show how this constant can be used to design, assess, and adjust alkyd compositions. The applicability to alkyds using other raw materials such as maleic anhydride, conjugated oils, isophthalic acid and various other raw materials by adjusting the constant to compensate for these changes is illustrated by selected problems.

Chapter VII discusses modifications of alkyds with other polymers. The author specifically covers styrenated alkyds which use conjugated oils or maleic anhydride/non-conjugated oils. Here again the constant discussed in Chapter VI is used. Formulating alkyds with silicones is discussed; however, as pointed out by the author, these methods do not apply since the assumption of exclusively linear and intermolecular condensation for the silicone intermediate appears to be faulty. A discussion on the modification of phthalic anhydride alkyds with formaldehyde is also discussed.

Chapter VIII gives methods for calculating alkyd properties and performances. Although information in this chapter is interesting, applicability is believed to be limited.

Chapter IX presents several monograms which have appeared in the literature which can be used for graphical calculation of alkyd compositions.

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Mathematical Theory of Sedimentation Analysis. By HIROSHI FUJITA, Department of Polymer Science, Osaka University, Nakanoshima, Osaka, Japan. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1962. xii + 315 pp. 16 × 23.5 cm. Price, $11.00.

At a time when the useful life of many new scientific books is only 2–3 years, Professor Fujita has contributed a work which promises to be the standard reference in this field for 20–30 years, even though most of the material included comes from research done in the past 10 years. This is a treatise on the analysis of results obtained with the ultracentrifuge. It begins with the modern derivation of transport equations for the ultracentrifuge by Hooyman, de Groot and others, from thermodynamics of irreversible processes. Then solutions to the continuity equation are discussed. Today—owing largely to the work of Professor Fujita—practical and rigorous solutions are known for many problems which earlier could be discussed only in qualitative terms: for example, the sharpening of a boundary due to dependence of the sedimentation coefficient on concentration, or