tural problems. The student will derive much benefit from working through these problems.

DEPARTMENT OF CHEMISTRY
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The Structures and Reactions of the Aromatic Compounds. By G. M. BADGER, D.Sc., Ph.D., F.R.I.C., Reader in Chemistry in the University of Adelaide. Cambridge University Press, American Branch, 32 East 57th Street, New York 22, N. Y. 1954. xii + 456 pp. 15 × 22.5 cm. Price, $11.50.

It is the author's aim in this book to produce "a survey of the whole field of aromatic chemistry." Rather careful reading leaves one with the impression that he has achieved his object quite satisfactorily.

After consideration of the benzene problem and its theoretical solution, there follows a discussion and definition of the term "aromatic compound." The definition of an aromatic substance as "a cyclic compound with a large resonance energy where all the annular atoms take part in a single conjugated system" makes it possible to include such "non-benzenoid aromatic hydrocarbons" as the azulenes, and to consider tropolone and certain heterocyclic substances.

The book is primarily descriptive; it is concerned with the reactions and theory which involve directly the aromatic ring. Thus, addition reactions, the aromatic "double" bond, the effect of substituents, aromatic substitution reactions, the Diels–Alder reaction, photoöxidation and photopolymerization, absorption and fluorescence spectra, and optical activity are treated in successive chapters. As might be expected the space devoted to substitution reactions (97 pp.) is greater by a ratio of about two to one than that devoted to any other chapter. Adequate references to the literature through 1951 will make this work particularly useful to graduate students and research workers.

Clear, lucid writing, and excellent typography in a well bound volume combine to make this new work a very worthwhile addition to the literature of organic chemistry.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF MARYLAND NATHAN L. DRAKE
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Verfahrenstechnik in Einzeldarstellungen. Volume 2. **Die Kristallisation in der Verfahrenstechnik.** By Dr. PHIL. NAT. GUNTHER MATZ. Springer Verlag, Berlin W 35, Reichpietschufer 20, West-Berlin. 1954. viii + 194 pp. 15.5 × 23.5 cm. Ladenpreis: DM 19.50.

This reviewer, like most chemists, occasionally has used crystallization on a small scale in the laboratory but has no specialized knowledge of its theoretical or experimental status nor does he know anything of its application in chemical industry. Reading of this book thus promised to be rewarding, for the author's purpose, as stated in his preface, was to supply such information. Written for the student and the practicing engineer, physicist and chemist, it presupposes little except elementary thermodynamics and a slight acquaintance with calculus.

The book is divided into two main parts: the first, about 70% of the text, deals with the theoretical foundations of the subject; the second part describes briefly various types of crystallizers used in industry. A short appendix on size distribution in crystallites, a bibliography and subject–author indexes complete the book. Presentation of the material is clear and it is logically organized; the German is relatively easy to read, and the technical details appear to be authoritative.

The author believes that the science of crystallization has developed rapidly in the last twenty-five years, stimulated by Madelung's calculations of the lattice energy of salt in 1918, theories of Kossel and Stranski on lattice structure, and the crystal growth theories of Volmer, Beck and others. Technical progress, on the other hand, he believes was slow until the time of the second world war. These conclusions are undoubtedly true but a comparison of the results presented here with those known for distillation, absorption, extraction, or other separation processes used industrially shows that our knowledge of crystallization is quite insignificant. The author recognizes this fact and attempts to explain it. Although the ultimate purpose, in each case, is separation, he believes that there are few similarities between crystallization and the other processes. He offers several thermodynamic arguments to show that crystallization is essentially more difficult in principle than the others.

If this book gives a representative picture of the status of the subject, there may be further reasons for the unsatisfactory situation, for the experimental data quoted are astonishingly meagre. Only nine tables and 58 figures are needed and many of the latter are diagrams of equipment, while others have little, if any, quantitative significance. It follows necessarily that the theories developed from such data, with few exceptions, are expressed in a trivial mathematical form or in one difficult to test experimentally. One suspects that what is needed is a concentrated attack on the problem which would include a laborious, but well-planned, program of accumulating data.

The author states that sublimation is regarded as the stepchild of technical processes. It appears that crystallization is actually this unfortunate relation.

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