

contributions are of high quality, and much new information is presented. Most of the papers originated in laboratories in the United Kingdom, but a few present work conducted in the Netherlands, Canada, the United States, France, Czechoslovakia, New Zealand, and Hungary. Fundamental aspects of gas chromatography, including thermodynamic treatment, and factors affecting efficiency and choice of solvents are the main themes in six of the papers. Another half-dozen papers are devoted to experimental evaluation of new supports, liquid phases, detectors, and the like.

Operation of columns at high temperatures has been very effective in extending the scope of gas chromatography to separation of mixtures of high-boiling compounds. Two papers on this subject are included. Other papers describe experimental work dealing with continuous large-scale (semiworks) separation of nearly pure acetylene from partially burned methane, use of the process to study kinetics of reactions, separation of the isotopic modifications of hydrogen, control of refinery processes, separation of fatty acids and alcohols, chlorinated and fluorinated compounds, and determination of isopropyl nitrate in heavy oil. Two papers review the relative merits of the several methods of detection, another describes use of a gas-density balance for detection, and two are concerned with the hydrogen-flare detector.

Much useful information appears in the prepared and extemporaneous discussions. Included are descriptions of a new pipette for sample introduction, separation of alkylated diphenyls, and improvements in the use of a hydrogen-flare detector.

I found an extraordinarily small number of typographic errors. The illustrations are uniformly good, and the printing is clean and sharp. Good quality coated paper was used, and the book is sturdily bound.

This volume can hardly be classified as simply a textbook on gas chromatography. It is an excellent presentation of recent researches in the field, at several prominent laboratories.

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Handbuch der Physik. vol. XX, *Electrical Conductivity II*. S. Flügge, Ed. Springer, Berlin, 1957. 491 pp. Illus. DM. 112.

Volume XX of the *Handbuch der Physik* deals with electric conductivity in semiconductors, in ionic crystals, in glasses, and during electrolysis in liquids. The subjects dealt with are very different, but, in general, the articles are well

written and give an excellent account of the present status of the field described.

The article on semiconductors, by O. Madelung, is the longest (245 pages) and the most complex. It is well organized and well written. The article is good in that it is self-contained; for example, the behavior of semiconductors having isotropic Fermi surfaces and under conditions of isotropic electron scattering is considered first. Then the situation which occurs when the constant energy surfaces are anisotropic and the scattering is anisotropic are considered. Similarly, one first considers problems in which the electron and the hole distributions are in local equilibrium and only later are problems considered in which local deviations from the equilibrium state are important. There is, however, one section which I believe is out of its proper place. The article ends with a section on special semiconductors. In many ways this would be useful at the beginning, since one would then see, at the beginning, that many semiconductors—in fact, probably most—have a rather complicated band structure for an understanding of which the complex treatment given for conductivity is useful and indeed necessary. The literature cited is very completely surveyed through 1955, and references for the first few months in 1956 are given. The discussion of the various subjects is, in general, full and careful, and all possible subjects are considered. The description of the cyclotron resonance experiments is perhaps a bit brief, but the references are complete. This review appears at a good time, since one has the feeling that most of the important phenomena in the field are at least qualitatively understood.

The second article, by A. B. Lidiard, is an excellent survey of the present status of ionic conductivity. The article gives careful theoretical consideration to the types of defect which are responsible for ionic conductivity in the alkali halides and the silver halides. If one compares the article with the book of Mott and Gurney (*Electronic Processes in Ionic Crystals*, Oxford University Press, 1940) it is clear, first, that the theoretical calculations in the field have been carried a good deal further, in a quantitative sense, than they had been before World War II; in addition, certain phenomena are discussed and treated theoretically which were not considered before the war; for example, the alternating-current phenomena and the deviations from the Einstein relation connecting the ionic conductivity and the diffusion constants. It is also clear that the quantity and quality of experimental data have increased greatly, so that the improved theoretical treatment is justified. The description of all these changes

is given by Lidiard in a very clear and concise fashion. The article confines itself mainly to the alkali halides and the silver halides, whereas a brief mention of the extent of the present knowledge concerning other materials, such as oxides and sulfides, would be welcome. The article is carefully and clearly written and will be useful both for those who have followed recent developments and for the uninitiated.

The third article, by J. M. Stevels, is on the electric properties of glass; both the direct- and alternating-current properties are described. It is clear that in this field, in contrast to the two cases considered in preceding paragraphs, the theoretical development is at a very early stage. The experimental situation is clearly presented, and various qualitative ideas concerning interpretation are discussed.

The last article, by E. Darmon, is a survey of electrochemistry. It considers the phenomena which occur in electrolytic solutions. The major new developments in this field since 1935 are the development of polarographic analysis, by Heyrovsky, and the increasing use of electrolytic polishing and etching. These developments are rather briefly discussed.

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The Theory of Groups. vols. 1 and 2. A. G. Kurosh. Chelsea, New York, 1955. 272 pp.; 308 pp. \$4.95 per volume.

The Theory of Groups (in two volumes) is a translation by K. A. Hirsch of the second Russian edition of *Teoriya Grupp*. A German translation of the first edition was published in 1953 by the Akademie-Verlag, Berlin. However, the second edition differs so much from the first that it is virtually a new book.

The theory of groups is one of the most active areas of modern mathematical research, and an up-to-date textbook has been needed for some time. This book fulfills that purpose admirably. Approximately one-quarter of the book deals with the elements of the subject and does this from the modern point of view, without unnecessary assumptions of finiteness. In fact, the theory of finite groups is deliberately omitted from the whole book, and the author mentions the need for a separate textbook on the subject. The translation is excellent, and the translator has added many useful appendixes in addition to extending the bibliography to include relevant research work of the last few years.

Each volume is in two parts. Part I of volume I consists of chapters I, II,