encumbered by theory. The second part (Polarographische Bestimmungen) outlines the scope of polarography by means of a variety of examples of the polarographic behavior of diverse inorganic and organic substances. The text is richly and very effectively illustrated by typical polarograms. The booklet concludes with some abridged tables of "depolarization potentials" and half-wave potentials of common inorganic and organic substances.

The treatment may seem to be parochial in the sense that the techniques originally developed by the author and his collaborators are described in minute detail, and scant mention is made of subsequent developments by other investigators. The fact is, however, that most of the basic principles and techniques of polarography do indeed stem from Dr. Heyrovsky's Czech school. The booklet should be appreciated for what it is, *i.e.*, a primer written by a master.

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Technique of Organic Chemistry. Volume I. Part II. Physical Methods of Organic Chemistry. Third Completely Revised and Augmented Edition. Editor, ARNOLD WEISSBERGER. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. xii + pages 895–1797. 16 × 23.5 cm. Price, $24.50.

The title of this volume, as is also the case with others in the series, is inexact. Certainly the subject of these books is not the technique of organic chemistry in the usual sense. These volumes contain, rather, fairly detailed descriptions of the principles and practice of physical methods which have been applied to the solution of chemical problems; these techniques can be used in organic chemistry, though not in every case have they been so applied. But this shortcoming is not a serious one. The "Technique of Organic Chemistry" has become so well known during its relatively short existence that every practicing organic chemist must be familiar with its content.

These books are necessarily more mathematical than is usual in treatises on organic chemistry, but it is hoped that the organic chemist with an innate fear of mathematics is disappearing.

The present volume contains descriptions of some of the most powerful tools for structure determination available to the chemist today. Recently publicized research leaves no doubt concerning the value of neutron, electron and especially X-ray diffraction methods; the use of high speed computing techniques promises to make these methods even more widely applicable in the near future. X-Ray microscopy is a new field which, though as yet untried in organic chemistry, holds considerable promise because of the advantages it offers over ordinary light microscopy and electron microscopy. Microspectroscopy is not only important to the natural products chemist who deals with very small quantities, but it has already shown its worth in the location of chemical constituents of biological systems. The modern organic chemist usually will not have all these techniques at his disposal, but he should know that they exist and where they can be applied. He must, therefore, be familiar with the principles by which they operate.

In addition to these newer techniques, the present volume discusses older methods, some of which have ceased to be very important. Crystallochemical analysis and molar refraction are certainly not as useful in the identification of organic substances as is infrared spectroscopy. This is not to say that a knowledge of these methods is no longer valuable, but in the interest of keeping a treatise such as this to a reasonable size (Volume I in its present revision will consist of four parts containing roughly 3500 pages; at a cost of $24.50 a part, this comes to $98.00 for the volume), these could have been left out as newer techniques were added. This seems especially reasonable in view of the fact that the chapters discussing these older techniques appear in essentially the same form in earlier editions of the work.

This brings up the only serious fault of the present volume: it is meant to be a completely revised and augmented edition, and yet few changes have been made. Only one of the twelve chapters, that on X-ray microscopy by W. C. Nixon is new; the rest all have counterparts in the second edition. Of these, that on X-ray crystallography by W. N. Lipscomb has been rewritten completely and bears no resemblance to the earlier chapter on X-ray diffraction by I. Fankuchen. It is perhaps the best chapter in the book. The chapter on electron diffraction was done by L. O. Brockway in both the second edition and the present volume; though the format has been kept the same, the exposition has been freshened by the choice of a new example to explain the method. The other chapters, "Determination of Diffusivity" (A. L. Geddes and R. B. Pontius), "Determinations with the Ultracentrifuge" (J. B. Nichols and E. D. Bailey), "Refractometry" (N. Bauer, K. Fajans and S. Z. Lewin), "Determination of Crystal Morphology" (the late M. A. Peacock, J. D. H. Donnay and G. Donnay), "Crystallochemical Analysis" (J. D. H. Donnay and G. Donnay), "Light Microscopy" (E. E. Jelley), "Microspectroscopy" (E. R. Blout), "Electron Microscopy" (F. A. Hamm), and "Neutron Diffraction" (J. M. Hastings and L. M. Corliss), are virtually identical with the corresponding ones in the previous edition. This similarity ranges from the addition of a few sections on diffusivity and the ultracentrifuge, through the addition of several references on microspectroscopy, to exact identity in the case of neutron diffraction. The latter is especially to be deplored when, in these authors own laboratory, neutron diffraction is yielding very useful information about hydrogen bonding in organic systems.

It seems pointless to issue a new edition which contains so little new work. A much less expensive way to modernize the treatise would have been to do what has already been done once before: to publish a supplement to the second edition. Though this book is decidedly valuable to chemists, its purchase can, unfortunately, be recommended only to those who do not have the second edition.

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Physical Chemistry of Surfaces. By ARTHUR W. ADAMSON, Department of Chemistry, University of Southern California, Los Angeles, California. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. xiv + 629 pp. 16.5 × 23 cm. Price, $12.75.

Interest in the broad field of surface chemistry has increased so rapidly in recent years that conscientious efforts to assemble and clarify material in this area are most welcome. Certainly in few, if any, areas of physics and chemistry can one afford to ignore the properties of surfaces or interfaces and the films that form at interfaces. In a very readable book, Professor Adamson has organized and interpreted much of the current as well as the classical work on surfaces. The discussions clearly reflect the author's strong background in surface chemistry at the University of Chicago, where he was greatly influenced by the breadth and depth of Professor W. D. Harkins' interests and by the thoroughness and care of Dr. G. E. Boyd's counsel.

Although the "Physical Chemistry of Surfaces" was designed primarily as a textbook for college seniors and graduate students, both theory and practice are covered more fully than is customary in texts. The comprehensive nature of the book and the relative emphasis on the topics discussed can be gained from a list of the chapters with the number of pages in each: Capillarity (42); The Nature and Thermodynamics of Liquid–Gas Interfaces (46); Surface Films on Liquid Substrates (68); Electrical Aspects of Surface Chemistry (45); Surfaces of Solids (72); Long-Range Forces (11); Friction and Lubrication (27); Wetting, Flotation, and Detergency (29); Emulsions and Foams (31); The Surface Area of Solids and an Introduction to Adsorption (28); Adsorption of Gases and Vapors on Solids; the Surface Area of Solids (65); Chemisorption and Catalysis (37); Adsorption from Solution (22).

Solid surfaces and adsorption on solids are justifiably given much space. However, one of the longest chapters concerns surface films on liquids—a subject that continues to grow rapidly because it is basic to such divergent areas as molecular structure and orientation, polymer behavior, water evaporation, emulsions, foams, and biological membranes. The discussion of surface films on liquids is subdivided into forty-two sections.

An unexpected entire chapter on long-range forces indicates the courage and vigor with which the author attacks his problems. Although well-qualified men have speculated intensively on long-range forces, the validity of the basic concept is open to question. As pointed out, a chain-like coupling of short-range forces may explain many so-called long-range effects. By presenting both sides of the argument in an interesting and informative manner, the author demonstrates his skill in handling a difficult topic.

Several features will make this work a useful textbook. A wide variety of fundamental and applied surface chemistry has been carefully organized and is outlined in the detailed Table of Contents. For the most part, discussions are presented in a thorough and rigorous manner. Many graphs, tables, and schematic drawings will aid the student. A clear, informal, yet thought-provoking style of writing makes the reading understandable and pleasant. As a special service to both student and teacher, the first five chapters, dealing with the more basic concepts, contain problems that are ingenious and require careful thought. General references at the end of each chapter are well chosen, and the indexing is commendably thorough.

Research workers will find the "Physical Chemistry of Surfaces" informative and stimulating. The format of the book is most attractive. Errors—principally in proofreading—are few, and most of them are minor. In places, a lack of balance many prove disturbing: certain areas are treated in detail and well-documented (*e.g.*, low-temperature gas adsorption), whereas others receive little or no attention (*e.g.*, infrared studies of adsorption). Furthermore, one of the best modern techniques for measuring adsorption from solution onto solids—the use of radiotracers—is not discussed. The textbook nature of the work, however, may justify some imbalance in space and documentation. Statements that represent the opinions of the author are labeled and add, rather than detract.

In over-all form and organization, the book is somewhat similar to the classical work in the field, N. K. Adam's "The Physics and Chemistry of Surfaces" (1941). However, there has been great activity in surface chemistry during the last twenty years, and most of Adamson's references are to the literature of this period. Because of the many topics covered, some sections may appear too brief or even superficial when compared with certain of Adam's detailed discussions. Nevertheless, most topics of importance are given adequate treatment.

Comparison of Adamson's book with two other well-known works in the field will further define its position in the literature. W. D. Harkins' "The Physical Chemistry of Surface Films" (1952) is a detailed treatment of a specific area of surface chemistry—as the title implies. J. J. Bikerman's "Surface Chemistry" (1958) gives more attention to applications.

In perspective, Adamson's book thus seems to combine much of the scope, organization, and readability of Adam; the detail of Harkins; and the many applications of Bikerman. The book as a whole is an admirable combination of an informative and provocative textbook and a valuable up-to-date reference work in the broad field of surface phenomena.

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Surface Microtopography. By S. TOLANSKY, D.Sc., F.R.S., Professor of Physics, London University. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. viii + 296 pp. 15 × 22.5 cm. Price, $9.00.

This book deals with precision multiple-beam interferometry as developed largely by the author; it makes no attempt to cover other methods of revealing surface contour. The treatment is detailed and authoritative, methods are clearly analyzed, and 359 photographs are shown and interpreted in terms of structure.

Although "resolution" of vertical distance may approach lattice dimensions, lateral resolution is limited by that of the viewing microscope, usually at 100 to 500 ×. Such a discrepancy (involving 3 orders of magnitude) between the "elevation" and "plan" features of the topography, although inherent in the method, emphasizes the need for complementing it with other interpretive techniques of light and electron microscopy. Some space might well have been devoted to these ancillary methods.

Additional applications are suggested by those discussed at some length from the author's studies of thin films, crystal faces on diamonds and quartz, growth spirals on silicon carbide, cleavage surfaces of minerals, indentation hardness of metals, and effects of impact, sparks, etching, erosion and abrasion on various materials.

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Les Mecanismes Reactionnels en Chimie Organique. By BIANCA TCHOUBAR, Maitre de recherches au C.N.R.S. Dunod, Editeur, 92, rue Bonaparte, Paris 6, France. 1960. x + 221 pp. 11 × 16.5 cm. Price, 16 NF.

This little book endeavors to present the most important facts and theories concerning reaction mechanisms in organic chemistry and does it amazingly well. Mademoiselle Tchoubar has succeeded in encompassing in a remarkably short space the quintessence of this sprawling subject in a masterfully clear and logical manner.

The book starts with a sketch of the bases of the electronic theory of organic structures and includes a discussion of types, polarity and polarizability of bonds, inductive and resonance effects as well as the nature of acids and bases. The main body of the book is concerned with reaction mechanisms, summarizing first the determination and significance of the order of a reaction, and the energetic and conformational factors which play a part in determining the course of a given transformation. This is followed by a discussion of nucleophilic displacements, transposition reactions, elimination mechanisms, addition to double bonds, acid-catalyzed isomerizations and carbonyl addition reactions. The book finally ends with an outline of aromatic substitution reactions.

The discussions are not intended for the expert in the field but rather as a survey for the beginner or for one who although quite familiar, through long practice, with the language of organic chemistry, would profit from a study of its grammar.

The attractive presentation of the book and its low price make it an excellent purchase for students who will get the ancillary benefit of practicing chemical French with the particularly lucid example which Mademoiselle Tchoubar has produced.

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