words, the fraction of the book devoted to ideas developed since 1959 is very small.

The style of writing is clear, concise and very readable. It would make an excellent text-book. The printing and paper are of high quality, and it is essentially free from errors. There is a definite, but justifiable, lean to the British work and apparatus, which does not make it any less useful to the American reader. It is highly recommended to the beginning chromatographer or the technician who needs more background.

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Separation of Heavy Metals. By ANIL K. DE, D. Phil., Reader in Chemistry, Jadavpur University, Calcutta, India. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. 308 pp. 16 × 23.5 cm. Price $9.00.

The opening sentence on the inside of the dust jacket is: "This book, the first of its kind, is devoted to liquid–liquid extraction and deals with the theory and practice of this valuable tool for separation of heavy metals." However, it is by no means devoted exclusively to this separations technique, the 91-page section on liquid–liquid extraction being followed by 78-page, 37-page and 27-page sections, respectively, on ion-exchange, analytical procedures (classical) and radiochemical separations procedures.

Of course this diversity of treatment is not, in itself, bad; but the lack of a unifying philosophy of presentation renders the book difficult to read. The resultant disjointed effect is heightened by the presence of an irritatingly large number of "typographical" errors: O_x for Ox (p. 30), making the theoretical treatment difficult indeed; HQEHP for HDEHP (p. 66); Szilard–Chalmer's for Szilard–Chalmers (consistently); misspelling of the names of prominent workers in the field such as Hindman (pp. 106, 189), Maddock (p. 95, 96), Dyrssen (pp. 105, 176), etc.

The theoretical sections on liquid–liquid extraction and ion-exchange are so sketchy as to be of doubtful value; and the "applied" discussions are, in many instances, deficient in detail. For example, pp. 243–249, if the TBP, $(n\text{-}C_4H_9O)_3PO$, has not been freed from acidic phosphates (almost certain to be present in the sample as received), the stripping procedure will be totally ineffectual.

Nevertheless, the major criticisms may be summarized by saying that too much has been attempted in too few pages. With the exception that exceedingly sparse attention has been given to amine "liquid ion exchange" systems, the book constitutes a good survey of both liquid–liquid extraction and ion-exchange in the field of metals separations. Whereas it will be of limited value to the separations specialist, it should prove of very real worth to the research worker wishing to use these techniques as tools and to the analytical chemist faced with unusual separations problems.

CHEMISTRY DIVISION
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Progress in Organic Chemistry. 5. Joint Editors, J. W. COOK, D. Sc., F.R.S. Vice-Chancellor, University of Exeter, Fellow of University College, London, and W. CARRUTHERS, Ph.D., M.R.C. Carcinogenic Substance Research Unit, Washington Singer Laboratories, Exeter. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D.C. 1961. viii + 172 pp. 15 × 24.5 cm. Price, $9.00.

Most books which gather together an extensive literature on one or more topics in the field of organic chemistry are useful and valuable even if they leave something to be desired. However, at a time when chemists depend so heavily on the review as an indispensable instrument for broadening their grasp of the ever-changing and proliferating fields of chemical science, one hopes for an emphasis on quality, for a logical selection of topics to be reviewed and for expert and well-reasoned presentation. The latest in the series of volumes on "Progress in Organic Chemistry," in my opinion, is at best of average quality relative to the various reviews which are currently available in organic chemistry. Its coverage includes chapters on homolytic oxidation processes, hydroxylation of phenols, dextran, diterpenoids and finally tropylium and related compounds. The last of these chapters, written by Professor Nozoe, appeared to me to be of outstanding merit. However, some of the others hardly seemed suitable for inclusion in a series dedicated to "the policy of presenting critical reviews of some of the major topics of organic chemistry which are of present interest." If the chapters do not blend to one man's punch, it is as much due to the unevenness and lack of care in the treatment as to the variety of topics. The book is not inexpensive.

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Molecular Sieves. By CHARLES K. HERSH, Senior Engineering, Armour Research Foundation of Illinois Institute of Technology, Chicago, Illinois. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. vii + 129 pp. 16 × 23 cm. Price, $6.50.

This well-printed but brief volume on the so-called "molecular sieves" will serve a useful purpose, because of the growing importance of the synthetic zeolites in industrial and technical processes such as the drying of gases at both low and high temperatures, gas separations, ion-exchange and gas chromatography. It is the only book on the subject wherein a coherent picture of the applications of molecular sieves can be found in a single source. The principal difficulty with this book is its briefness. However, the reviewer strongly recommends this volume to libraries and to individuals interested in the subject, especially those desiring an introductory approach.

The brief historial introduction is well-presented and accurate. However, the second and fourth chapters on the physical chemistry of adsorption will be or little interest to those familiar with the theory of adsorption or informative to others. Chapters five to seven represent the heart of the book, and justify its publication.

The lack of specific references to the original literature will limit its usefulness to the initiated, but may be justified on the grounds that the book is primarily directed to the novice. The price is high, considering the number of pages.

Despite some of the obvious short-comings of this book, the reviewer believes that it will serve a useful purpose in stimulating interest in the application of molecular sieves to technical problems, and it is recommended on that basis.

DEPARTMENT OF CHEMISTRY
WILLIAM MARSH RICE UNIVERSITY W. O. MILLIGAN
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The Chemical and Biological Action of Radiations. Volume 5. Edited by M. HAÏSSINSKY. I. Mechanism of the Radiolysis of Water by Gamma Rays or Electrons. By A. O. ALLEN. II. Action des Rayons Alpha sur les Solutions Aqueuses. By J. PUCHEAULT. III. Diffusion Kinetics in Radiation Chemistry. By A. KUPPERMANN. IV. Mass Spectrometry and Radiation Chemistry. By D. P. STEVENSON and D. O. SCHISSLER. Academic Press, Inc., (London) Ltd., 17 Old Queen Street, London, S. W. 1, England. 1961. xi + 278 pp. 16.5 × 24.5 cm. Price, $8.00.

The book is prefaced by a seven page introduction by the editor which itself provides an excellent review of the book. He discusses unresolved problems and differences of opinion in a manner not feasible for the individual authors.

No one is better qualified than A. O. Allen to discuss the development of the theories used to explain the action of gamma rays or electrons on aqueous systems and to point out the areas where research work remains to be done. This he does in an interesting and concise manner in the 20 pages of Part I.

In Part II, 53 pages, Pucheault reviews experimental information on the effects in aqueous systems of heavy particles ranging in L.E.T. from high energy protons to low energy alpha particles. He also introduces some new ideas to explain and correlate the yields observed in various

solutions. He proposes that the reactions OH + H_2O_2, OH + H_2 and H + H_2O_2 occur in the neighborhood of the tracks to a significant extent which varies with nature and concentration of solute and must be considered along with the formation of H, OH, H_2 and H_2O_2 in correlating yields.

In the 81 pages of Part III, Kuppermann gives a comprehensive treatment of the application of diffusion kinetics in explaining the action of ionizing radiation in liquid systems. Since the primary chemical entities formed by the radiation are not homogeneously distributed, both time and space variables must be considered in explaining or predicting the reactions of these entities with each other, with solutes present initially and with stable products. Kuppermann and other workers in the field have made much progress in the past few years with the help of electronic computers. The applicability of diffusion kinetics is shown by comparison of calculations with experimental values. The author suggests that in the future a knowledge of track parameters, diffusion coefficients and rate constants will furnish a complete space-time history of the radiolytic process.

In Part IV, 100 pages, Stevenson and Schissler present an excellent discussion of the fundamentals of mass spectrometry with emphasis on information which is useful to radiation chemists. The authors treat in detail the processes of ion formation, unimolecular dissociation of ions and ion-molecule reactions in the mass spectrometer. They are careful to point out the limitations in extrapolating from mass spectrometer data to the effects of ionizing radiation on gases at higher pressures.

Radiation chemistry and the chemical aspects of radiobiology are rapidly moving fields of research in which no one author can become familiar with all of the work appearing in the literature. The Haissinsky series provides an important medium wherein experts in specific areas of radiation chemistry and radiobiology summarize the status of their particular areas. The present volume maintains the high standards of previous volumes and will be especially welcomed by English-speaking readers since all except the contribution by Pucheault is in English.

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BOOKS RECEIVED

May 10, 1962–June 10, 1962

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