

Ion Exchange. A Laboratory Manual

J. E. Salmon, Battersea College of Technology, and D. K. Hale, National Chemical Laboratory, Teddington. Butterworths Scientific Publications. Academic Press, Inc., New York, 1959. vii + 136 pp. 33 figs., 5 tables. 15 × 22 cm. \$5.

This is a short practical textbook with an account of the fundamental principles of ion exchange and detailed procedures for several illustrative examples. Both theory and practice are at a level that can be understood and used by superior high school students or beginning college students. It is intended primarily as a teaching aid, and presumably covers the order of a month's work at the elementary level.

The introduction covers the history of the method, the nature of ion exchange materials, and the principal types of resins and their individual characteristics. The second chapter gives detailed directions for synthesizing several types of resins from commercially available starting materials. A far more useful feature is a detailed table of commercial resins with names, designations, properties, and manufacturers. Another useful table lists equivalent resins which may be substituted for each other.

A chapter on properties treats the swelling phenomenon, penetration, equilibria, factors which determine distribution, orders of affinity in groups of ions, and includes a simplified discussion of kinetics. Column behavior and chromatography are discussed in the next chapter, which includes "break-through," "sharpening" versus "diffusing" boundaries, frontal, displacement and elution techniques, and the theoretical plate concept. A few simple formulae are given, but no derivations.

The experimental part is preceded by some useful general techniques for setting up columns, maintaining and adjusting flow rates, fraction cutters, etc. Detailed, easy-to-follow directions are given to illustrate the theory covered: preparation of washed, air dried resin; determination of resin capacity and rate of exchange; conversion of resin from one form to another; break-through capacity of a column; regeneration of a column; determination of total salt concentration; removal of interfering ions; preparation of an acid from a salt; demineralization of water; separation of iron and copper; and the behavior of cupric and ferric complexes. Conclusions are given at the end of each experiment pointing out the implications of the results.

Literature references follow each chapter and a list of recent monographs is given at the end. In general the text is well written, accurate and free from misprints. This reviewer's criticisms are minor: directions for synthesizing resins seem out of place with the otherwise elementary scope, the terms "Type I" and "Type II" resins are used several times but never defined clearly, and on page 88 it is suggested that copper can be determined by titration with thiosulfate. In view of the otherwise very specific instructions, this latter suggestion needs amplification.

The book can be recommended as an excellent introduction to ion exchange. Its non-mathematical approach will please some and will stimulate others to pursue more advanced works.

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Gmelins Handbuch der Anorganischen Chemie. Special Volume: Alphabetic Series to Systematic Subject Index

Edited by the Gmelin Institute. 8th ed. Verlag Chemie, GmbH, Weinheim/Bergstr., 1959. 109 pp. 17.5 × 25 cm. Paperbound, \$7; cloth bound, \$8.50.

The "Alphabetic Series," with bilingual test in German and English, is a supplement to the "Systematic Subject Index." The classification terms in the alphabetic series carry code numbers—which are likewise listed in the "Systematic Subject Index"—so that the location of a concept within the proper group in the system can be established. The alphabetic series contains over 50% more terms than the systematic index.

Gmelins Handbuch der Anorganischen Chemie. System 15: Silicon, Part C, Organosilicon Compounds

Edited by the Gmelin Institute under the direction of E. H. E. Pietsch. 8th ed. Verlag Chemie, GmbH, Weinheim/Bergstr., 1959. xii + 501 pp. 41 figs. 156 tables. 17.5 × 25 cm. \$67.44.

The Gmelin Silicon C volume deals with the chemistry of the non-mineral compounds of silicon, sometimes called the organosilicon compounds. The surge of new literature concerning these compounds has been prompted by the increase in industrial applications for silicones.

The preparation and properties of silicon-hydrogen compounds forms the main portion of the Silicon C volume. These compounds are arranged according to the following groups: Tetraalkyl-, alkyl-hydrogen-, halogeno-, thio-, amino-, and alkoxy-silanes, silanoles, siloxanes, and silicic acid esters. More than 3000 compounds are either separately described or their characteristics summarized by groups in table form.

An added feature of this volume is the presentation of special manufacturing problems and of the chemical and physical properties which are important for industrial use of silicones. Applications for silicones in oils, pastes, greases, resins, and rubbers are discussed.

Although all German headings and sub-headings are accompanied by English translations, no English subject index is included.

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Gmelins Handbuch der Anorganischen Chemie. System 5. Fluorine Supplement

Edited by the Gmelin Institute under the direction of E. H. E. Pietsch. 8th ed. Verlag Chemie, GmbH, Weinheim/Bergstr., 1959. xviii + 258 pp. 31 figs. 17.5 × 25 cm. \$36.

The increase in the new knowledge of fluorine chemistry during the years 1926 to 1949 is evidenced by the size of the supplement to the fluorine volume. The main volume comprised only 86 pages as compared with the 258 pages in the addendum. This volume deals with the compounds that fluorine forms with nitrogen, hydrogen, and oxygen.

The chapter devoted to the occurrence of fluorine contains a detailed review of the numerous fluorine content determinations of minerals, water, and biological substances. Dental applications of fluorine chemistry have led to extensive investigations in this field.

A chapter is devoted to the manufacture of fluorine by electrolytic means. Details of the most important method of preparation of hydrofluoric acid by the decomposition of fluorite are given. The laboratory preparations of fluorine compounds are discussed. A chapter on Toxicity deals with the hazards in handling fluorine and fluorine compounds, and safety requirements.

The physical properties of fluorine, hydrofluoric acid, and other compounds are thoroughly reviewed.

The use of anhydrous HF as a solvent and its reaction with organic compounds is described and detailed accounts of the chemical reactions of fluorine and hydrofluoric acid are given.

Special analytical methods are presented in the chapter dealing with detection and determination. The compounds of fluorine with nitrogen, hydrogen, and oxygen are thoroughly reviewed.

The innovation of a German-English table of contents enhances the accessibility of the information contained in the volume.

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Theoretical Organic Chemistry

Proceedings and Discussions of the Kekulé Symposium, London, September 15-17, 1958. IUPAC. Butterworths Publications, Ltd., London, 1959. Sole USA distributors, Academic Press Inc., New York. xvii + 298 pp. Figs. and tables. 15 × 22 cm. \$9.50.

This volume represents the full proceedings of the Kekulé Symposium on Theoretical Organic Chemistry held in London in September, 1958, under the auspices of The Chemical Society and the IUPAC. The 19 papers are concerned with structure and chemical bonding, and electrophilic, nucleophilic, and homolytic reactions. These papers provide an excellent review of modern ideas in aromatic

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