Walling goes on to discuss Free Radical Polymerizations in the next three chapters which are called, respectively, Free Radical Polymerizations; The Kinetics of Radical Chain Processes (Chapter 3); Copolymerization, Chain Transfer, and Inhibition in Polymerization (Chapter 4); Some Further Characteristics of Radical Polymerizations (Chapter 5). These are superb accounts of the whole field of free radical polymerizations. The treatment is very detailed, but most lucid. All the important work in this vast field is summarized succinctly and the reference coverage is remarkable for its inclusiveness. There are excellent compilations of data in tabular form. Here great care has obviously been taken in selecting reliable information and in assembling it in a manner as to make it easily accessible. Here again I felt compelled to compare Professor Walling's account with that given in a standard work, namely, "The Mechanism of Polymer Reactions" by G. M. Burnett, and this certainly indicates just how thorough and up-to-date is the account of this field which Professor Walling has given.

After this very excellent and complete account of free radical polymerizations, Professor Walling proceeds to discuss in turn Radical Addition Reactions Yielding Small Molecules (Chapter 6); Radical Addition Reactions Involving Atoms Other than Carbon (Chapter 7); and Halogen Substitution Reactions (Chapter 8). In these the same high standard is maintained and important stereochemical aspects of free radical reactions are stressed throughout. Kinetic details of the various reactions are also carefully and critically discussed.

The book then continues with a really outstandingly well-written and complete account of Autoxidations (Chapter 9). In the reviewer's opinion, this is by far the best review of the chemistry of autoxidation which has appeared in the literature. The literature coverage is excellent and the subject matter most judiciously selected. There then follow two very good chapters on Radical Formation by Thermal Cleavage of Covalent Bonds (Chapter 10) and Radical Production by Photochemical, High-Energy Radiation, and Oxidation–Reduction Processes.

Throughout the book the literature seems to be very completely covered right up to about the middle of 1956. It is also pleasing to note that Professor Walling has included a large number of references to important relevant Russian work. The book has two good indexes, and it is interesting to note that the Author Index is twice as large as the Subject Index; this is an indication of how extensively the literature has been covered.

This then is a major work of scholarship and it will obviously be the standard monograph on the Chemistry of Free Radicals in Solution for some considerable time. It will appeal to all chemists, and no physical or physical-organic chemist who wishes to keep informed of the advances in free radical chemistry can afford to be without a copy.

In closing, one might note that the book is dedicated to Morris S. Kharasch and Frank R. Mayo, pioneers of free radical chemistry, who first aroused and then maintained Professor Walling's interest in the subject. Regrettably, Professor Kharasch died recently. This book would be a fitting memorial to this great chemist who laid the foundations of much of the work described in its pages.

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Ion-Exchange Resins. By J. A. KITCHENER, University Reader in Physical Chemistry, Imperial College of Science and Technology, University of London. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. vii + 109 pp. 11 × 17 cm. Price, $2.00.

Although the ion-exchange process was discovered more than a hundred years ago, synthetic organic ion-exchange materials were not invented until 1935. As a matter of fact, the currently popular sulfonated styrene–divinylbenzene cation-exchange copolymers did not make an appearance until 1944 and the strongly basic quaternary ammonium type anion-exchange resins were unknown until 1948. With the advent of stable, high capacity ion-exchangers which possessed a single functional group, it became possible to understand the behavior and properties of ion-exchange media. Many thorough investigations of ion-exchange equilibria have cast light on the mechanisms involved and have expedited the exploitation of sorption and elution processes by industry. Uses of ion-exchange resins are becoming so numerous and in some instances are so elegant that it behooves the chemist and chemical engineer to acquaint himself with the fundamental principles involved in ion-exchange processes.

Kitchener has not tried to justify all the theories concerning ion exchange, but instead has attempted to sift out the main, well established principles from those which are controversial in a formidable amount of original literature. Considering the versatility and complexity of the process, he has done an excellent job of organizing and condensing the pertinent details into a minimum number of pages.

The book is interesting and written in such a manner that anyone with a rudimentary knowledge of physical chemistry can understand its contents. It appears that the information contained would be valuable supplementary material for a standard course in physical chemistry and should by all means be included in the course on unit processes offered to chemical engineers.

Only one discrepancy is apparent in the entire book. It occurs in the elution sequence for divalent ions on page 29. The appearance of Ba^{++} as the first and last member of the sequence will cause some consternation among those who read the book.

The author has covered the important applications of ion exchange rather well, in general, except that he has apparently not kept up with the most recent developments in the separation of rare earths by this method. The most recent reference cited on this subject is more than ten years old and citric acid is not the complexing agent used for the commercial production of pure rare earths. Citric acid has been replaced by the more efficient chelating agents such as ethylenediaminetetraacetic acid and N-hydroxyethylethylenediaminetriacetic acid.

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The Physical Chemistry of Electrolytic Solutions. Third Edition. ACS Monograph No. 137. By HERBERT S. HARNED, Professor of Chemistry, Yale University Emeritus, and BENTON B. OWEN, Professor of Chemistry, Yale University. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, New York, 1958. xxxiii + 803 pp. 16.5 × 23.5 cm. Price, $20.00.

Although not truly "a drastic revision," the Third Edition of Harned and Owen's "The Physical Chemistry of Electrolytic Solutions" is much bigger and better than the earlier editions. This book has grown from 643 pages in 1943 and 681 in 1950 to 836 pages in 1958.

The numerical values in Chapter V and in the equations throughout the book are now up-to-date except that 1.858 instead of 1.860 persists for the freezing point constant of water. Of course the authors have not revised all the experimental results which depend upon these values because they are mortal and have only two lives to give to their science. Otherwise the first edition is reprinted almost unchanged except that the material in the 37 pages of Appendix B of the second edition and much new material is incorporated at the ends of the appropriate sections or as new sections at the ends of the appropriate chapters. The first five theoretical chapters have been increased by 60 pages, and the experimental chapters and appendix by 120 pages.

The important additions are discussions of "Irreversible Thermodynamics" (25 pages), of the Fuoss–Onsager treatment of the conductance of moderately concentrated solutions (25 pages), of the Onsager–Kim treatment of the Wien effect, the effect of high field strengths on conductance (10 pages), of the Mayer treatment of chemical potentials (3 pages), of the Glueckauf–McKay cross-differentiation methods (10 pages), and the presentation of new experimental material (about 100 pages). The authors have made a noble effort to give clear discussions, but the nature of the material necessarily makes the reading of the first four chapters even more difficult than before, and pushes the first presentation of an experimental result back to page 197.