New Books

J. F. Gerecht, Book Review Editor

An Introduction to Separation Science, Barry L. Karger, Lloyd R. Snyder, and Csaba Horvath (John Wiley and Sons, New York, N.Y., 1973, 578 p., $19.50)

This book attempts to present a comprehensive treatment of both the fundamental aspects and the practical applications of separation, with major emphasis upon laboratory and analytical separations. The majority of the chapters were composed by the authors, while several others were written by a total of nine outside contributors, each qualified in his particular specialty.

The rapid development of new techniques over the past 20 years has resulted in the elevation of analytical chemistry to a higher position of respect in the scientific community. Of all the areas of analysis, separation is undoubtedly one of the most challenging for the professional chemist. In this compact volume, the authors have brought together and updated all of the various modern techniques of separation which have heretofore been the subject of separate publications. In so doing, the authors have attempted to establish a new branch of analytical chemistry labeled separation science. Realizing that successful application of any procedure depends upon a fundamental understanding of basic principles, the authors have devoted a considerable portion of their work to theoretical fundamentals.

The book is divided into three major sections. Part I deals primarily with the fundamentals involved; in Part II, the authors describe separation methods based upon phase and distribution equilibria. The important principles of distillation, gas liquid chromatography, solvent extraction, liquid liquid chromatography, crystallization, ion exchange processes, and liquid solid adsorption chromatography are described in separate chapters. Discussions of gas solids adsorption, adsorption by molecular sieves, and gel chromatography are combined into two separate chapters. Additional techniques are described in three chapters included in Part III. These include membrane separation, electrophoresis, ultracentrifugation, mass spectrometry, thermal diffusion, and use of enzymes. In the final chapter, the authors describe the combination of the various techniques for the analysis of complex mixtures. This chapter contains several examples of applying the described approaches to actual problems.

The book is excellently organized and is of high technical caliber. Adequate literature references appear at the end of each chapter. The authors have attempted to standardize symbol nomenclature by including a master symbol list based upon IUPAC recommendations.

The book provides all chemists, and particularly analytical chemists, with a reliable reference and the means to review and update techniques of separation. It should provide an excellent text for any advanced course in separations and is highly recommended as a valuable addition to every technical library.

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Surface and Colloid Science, Vol. VI, Egon Matijevic, Editor (John Wiley and Sons, New York, N.Y., 1973, 310 p., $22.50)

This book is one of a series which, together, are designed to comprise a comprehensive treatise on surface and colloid science. Each volume consists of a number of chapters written by specialists devoted to various topics in the field. It is expected that the chapters will contain critical reviews of the topics covered, including historical backgrounds, rather than summaries of the authors' own works or digests of latest developments.

The current volume contains four chapters: "Colloidal Silica," written by R.K. Iler, du Pont; "Radioactive Tracers in Surface and Colloid Science," by M. Muramatsu, Tokyo Metropolitan University; "Biopolymers at Interfaces," by I.R. Miller and D. Bach, Weitzmann Institute in Israel; and "Lipid Multilayers," by K. Larsson, University of Göteborg. The four chapters vary considerably in length, the chapter on colloidal silica comprising more than one third of the volume, while the chapter on lipid multilayers comprises less than a tenth.

Chapter I on colloidal silica covers methods of preparation and characterization of silica sols; dissolution and polymerization of silica and the gelling, coagulation, and flocculation of silica particles in aqueous medium; theory of gel formation and strength; and modification of particle surface in sols. Sections on commercial products and uses of colloidal silica are included at the end of the chapter. The chapter is well written in an easily readable fashion and

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Left to right: John Winger, luncheon speaker, Chase Manhattan Bank, Henry Fielding, Foster Wheeler, and Frank White, Foster Wheeler.

R. Willis, left, Stauffer Chemical Co., and V. Hann, right.

Eugene Marshack, left, Eugene Marshack Associates, and Karl Klein, right, De Laval Separator.

Left to right: Bill Grassmyer, Alan Beerbower, ESSO Research and Engineering, and R.A. Cupper.

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contains numerous diagrams illustrating the phenomena discussed. Over 300 references to the literature in the field are cited.

Chapter II, "Radioactive Tracers in Surface and Colloid Science," covers first the radiochemical aspects of the tracer method: the principles of the radiotracer method; the determination of radioactivity; and purity, labeling, storage, and stability of radioactively labeled substances. Following this, the author discusses the use of radioactive tracers at the various interfaces: gas, solution, air, solid, solid, solution in diffusion and penetration into porous media and in dispersed systems. Throughout the chapter, the author discusses the limitations of the methods used, the precautions necessary for obtaining valid results and, in the light of these, critically evaluates the results obtained by workers in the field.

Chapter III, entitled "Biopolymers at Interfaces," covers first the mathematical treatment of polymer adsorption and then describes the results of investigations of surface films of biocolloids at the mercury, water; air, water; oil, water; and solid, water interfaces. Also included are the interactions of biocolloids with monolayers and bilayers and a short section on enzymatic activity at interfaces.

Chapter IV, "Lipid Multilayers," is devoted to describing the structures of the various types of lipid multilayers obtained by investigators. Most of this short chapter is devoted to multilayers on water, both simple lipid and mixed lipid. There are also brief discussions of soap films, multilayer films on solids, and the relationship of lipid multilayers to biomembranes. Included in this last section is a suggested mechanism for transport of material across lipid bilayers.

Because the individual chapters clearly are not intended to bear any relationship to each other and the topics covered vary rather widely, there is no one type of reader to which this volume is addressed. It is expected that most readers will have a major interest in only certain chapters. Those with industrial background probably will find the chapter on colloidal silica most valuable, while those with a biochemical or biophysical bent should find the last two chapters most closely relate to their interests. Researchers interested in adsorption will find the chapter on radiotracers useful and informative. Volumes of this type would be more completely useful, albeit to a more limited readership, if the chapters were selected to bear such relationship to each other that, together, they would produce an in-depth coverage of some area of surface and colloid science.

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