

The chemist wishing to apply quantum mechanics has had his share of problems just dealing with an electrostatic hamiltonian. Magnetic phenomena involve vector potentials, and life has become even more complicated for the chemist. Hameka's treatment of the gauge is a welcome sight and should go a long way toward helping the chemist identify and cope with the problem.

Hameka's book provides an overview of the "Theory of Interactions between Molecules and Electromagnetic Fields." This overview is somewhat polarized by his own research interests. Where the theory is shaky and ill defined, he has not hesitated to so label it. Furthermore, he has not hesitated to speculate. The book should help bridge the communications gap as stated in its purpose. Perhaps an even more important effect of the book will be to suggest ways in which chemists can probe even more deeply into nature's molecular secrets.

P. G. Lykos

*Department of Chemistry, Illinois Institute of Technology
Chicago, Illinois*

Introduction to Quantitative Ultramicroanalysis. By I. M. KORENMAN, Professor of Analytical Chemistry, Gorkiy State University, U. S. S. R. Academic Press Inc., 111 Fifth Ave., New York, N. Y. 1965. ix + 234 pp. 16 × 23.5 cm. \$9.50.

This book is most welcome because it brings to the attention of the American research scientist a considerable portion of the work done in Russia in the field of ultramicroanalysis, in which there is growing interest. The author is a foremost Russian scientist in his field, and it is of equal importance that the translation editor (Dr. Ronald Belcher) is one of the pioneers on the subject.

The book is divided into seven chapters. Chapter 1 devotes eight pages to a general discussion of the subject matter defining terms. The author uses a number of mathematical calculations to illustrate the points of his discussion.

Chapter 2 devotes 53 pages to the principal techniques of operation and includes a number of subjects such as sampling techniques, isolation of precipitates, electrolysis, extraction, chromatography, determination of sample size, etc. Sixty illustrations are used to clarify the text.

Chapter 3 devotes 30 pages to the subject of gravimetric analysis. A good portion of this chapter deals with a discussion of various ultramicrobalances and includes a number of schematic drawings to illustrate various points of the subject.

Chapter 4 (64 pages) deals with volumetric analysis. Considerable space is devoted to various types of burets and pipets and the errors involved through their use. The latter portion of the chapter covers a number of specific cases such as the determination of acids, bases, calcium, copper, chromate, chloride, and silver.

The fifth chapter presents a number of physical-chemical methods of analysis. A number of schematic drawings are used in helping to describe what can be done with potentiometric, colorimetric, spectrophotometric, etc. methods.

The sixth chapter, which is quite short, is termed "Other Analytical Techniques" and provides information on determinations on paper and gelatin films, kinetic methods, and determinations based on the volume of the precipitate.

The final chapter, which occupies 11 pages, gives information on gas analysis when dealing with minute volumes.

In general, this book will be of interest to both the experienced microanalyst, who wishes to extend his work to the ultramicroanalytical field, and to the beginner, who wishes to work in the ultramicroanalytical range.

Al Steyermark

*Hoffmann-La Roche Inc.
Nutley, New Jersey*

Treatise on Electrochemistry. By G. KORTÜM, Professor of Physical Chemistry, Tübingen University. Translated from the third German Edition of 1962. American Elsevier Publishing Co., Inc., 52 Vanderbilt Ave., New York, N. Y. 1965. xxii + 637 pp. 17.5 × 25 cm. \$30.00.

The first English edition of this well-known work appeared in two volumes in 1951 with J. O'M. Bockris as collaborator and translator. The present version returns to a single-volume format and single authorship.

Early in the book there is a substantial chapter on chemical thermodynamics in general; one wonders whether this space might not have been better used in a specialized text, but the author's philosophy appears to be to make the book as self-contained as possible. In the same way, one finds fairly detailed treatments of dipole, induction, and dispersion forces in the chapter on the solvation of ions. The treatment of activities and conductances of strong electrolytes follows conventional lines. The discussion of experimental techniques is too brief to be of value; the reviewer considers that a fuller treatment of these could advantageously have replaced some of the general thermodynamic background material in earlier chapters. There is a good chapter on the uses and interpretation of conductance measurements, including those on molten salts. The various practical applications of emf measurements are also well treated. A chapter on acids and bases follows, with some discussion of substituent effects.

The long Chapters XI and XII deal with potential differences at phase boundaries, including discussions of the double layer, polarized electrodes, membrane potentials, and electrokinetic phenomena, and with electrode kinetics. The final chapter on applications of electrochemical processes deals with electrochemical energy sources (including fuel cells), polarography, and other analytical techniques, electrometallurgy, and corrosion. The tabular material in the appendix is greatly reduced in comparison with the earlier two-volume edition, but there is a considerable number of useful tables throughout the text.

If one admits the desirability of having a single book to cover a subject as large and important as electrochemistry, there is probably no better one available today. For the advanced student seeking an over-all picture of the subject, Professor Kortüm has done a great service. For the research worker, the book is also very useful but will naturally require supplementation. The author has provided extensive references, frequent general bibliographies, and a very detailed index.

R. H. Stokes

*University of New England
Armidale, New South Wales, Australia*