

## Book Reviews

ANALYTICAL GEOCHEMISTRY. By LORD ENERGLYN and L. BREALEY. *Methods in Geochemistry and Geophysics. Volume 5.* Pp. xvi + 426. Amsterdam, London and New York: Elsevier Publishing Company. 1971. Price £9.25.

The publishers must to a very large extent take the blame for the gross inadequacies of this book. This reviewer has criticised an earlier volume in this series, and the lack of a capable authority as Series Editor is even more apparent in this volume. The book is intended to serve those geologists who have not studied chemistry but require guidance rather than instruction (!) in this topic. In my view, geologists, students of geology and others active in this field would do well to avoid this volume.

The choice of material is unfortunate, especially the omission of any description of atomic-absorption techniques. Electron-probe analysis, with less than 1½ pages, deserves a great deal more, whilst the brief sections on solvent-extraction and ion-exchange methods are almost lost at the tail-end of the chapter on flame photometry. The chapters on X-ray diffraction and X-ray fluorescence are adequate and these, together with that on emission spectroscopy, form the best parts of the book. Absorption spectroscopy is sadly neglected.

Even taking the authors' special interests and expertise into consideration, over 60 pages on chromatography, including 46 pages on gas chromatography, is excessive when compared, for example, with none at all on calculations, errors, correlation of data, tests of significance and distribution of results—all topics of great importance to a geologist seeking an insight into the problems of geochemistry.

I wish I could say that, within the material selected, the authors have made a good job of their task. Unfortunately, I cannot. Never have I encountered an analytical text with so many errors. These range from errors of spelling (drogen on p. 111; smalite on p. 65) to errors of formula ( $\text{CaCl}$ ,  $\text{Ti}_2\text{O}_2$ ,  $\text{ThO}_3$  on p. 230;  $\text{Al}_2\text{O}_2$  on p. 293) to inconsistencies (feldspar and felspar; caesium and cesium; columbium and niobium; millimicron and angstrom) to lack of clarity (p. 282, Fig. 61, in which the Compton peak is not properly identified), to errors of fact (p. 48, carbonates of tin and titanium; p. 49, oxidation with ammonia; p. 111, titanium dioxide used to prepare sodium hydrogen sulphate). These examples include some of the worst errors, but there are many others. There is a curious duplication of the text on pp. 276 and 277, whilst Table VIII on p. 52 duplicates material given in the text on p. 53, although the authors indicate that it contains a list of the principal characteristics of microchemical tests.

Chapter 4, on the determination of minor elements, leaves much to be desired. The material upon which it is based is sadly out of date and the authors' choice of methods has not always been the best. The detailed criticisms are legion. Why is no mannitol method given for determining boron or Willard and Winter distillation for fluorine? Why is there no phenylfluorone method for germanium? Why are photometric methods for mercury, molybdenum, nickel, titanium and tungsten omitted? Why is sulphur, a commonly determined element, given only eight lines on pp. 200–201, whereas rhenium, a rare and seldom determined element, is given thirty lines on pp. 190–191?

This volume is expensive by present-day standards; for me it would be dear at any price.

P. G. JEFFERY

A TEXTBOOK OF SOIL CHEMICAL ANALYSIS. By P. R. HESSE. Pp. xxvi + 520. London: John Murray. 1971. Price £7.50.

It is difficult to assess how successfully the author has achieved his aim of narrowing the gap between the theory of soil chemistry and the practice of soil analysis as described in laboratory manuals. It is certainly questionable whether this treatise provides "a means of comparing all known methods for a particular analysis and of selecting the most suitable, considering available facilities," because modern instrumental methods, often the most appropriate, are largely ignored. Such references as are made to flame-photometric and other spectrochemical methods indicate a lack of appreciation of such techniques. The reader is often left in some doubt regarding the reason for the preference of a particular method and is given no facts from which to draw his own conclusions. Nevertheless, this book provides a source of background information about

analytical procedures that is unobtainable elsewhere and its main consequence may be to encourage intelligent enquiry into the choice of appropriate methods.

Two introductory chapters consider the purpose of soil analysis, precision and accuracy, the presentation of results and the preparation of samples for analysis, but not the actual process of sampling, possibly the most important step of all. Only in the final chapter, dealing with water-logged soils, is field sampling mentioned, and here only in the context of the special problems that arise in anaerobic conditions.

Seven chapters cover the related subjects of soil reaction, acidity, exchangeable hydrogen, lime requirement, insoluble carbonates, soluble salts, cation and anion exchange, calcium and magnesium and potassium and sodium. Included with carbonates is a discussion of sulphur requirement, relating not to sulphur deficiency but to the amelioration of saline soils. This 130-page section probably fulfils most closely the objectives of the author and gives useful guidance, as well as raising many topics that the enquiring student will want to examine more intensively.

The four chapters dealing with nitrogen, carbon and organic matter, phosphorus and sulphur are equally instructive, but the discussions on iron, aluminium and manganese and on silicon, titanium and sesquioxides in the two chapters that complete the coverage of the major constituents of soil are more superficial and illustrate the somewhat irrational nature of the presentation. A more systematic treatment, with the elimination of irrelevant material and statements out of context, would undoubtedly improve the over-all acceptability of the text.

The longest chapter devotes 7 pages to total (elemental) analysis and 57 pages to thirty-three trace elements. The former discusses methods of bringing soil constituents completely into solution prior to analysis. While the author points out that such treatment is seldom relevant to trace-element investigations, many of the methods quoted for these elements are in fact for total content. The discussion on trace-element determinations is probably the least useful part of the book. After a brief mention of the minerals in which trace elements occur in mineral deposits, but which are seldom their form of occurrence in soils at trace level, one or two possible chemical techniques for each is mentioned. Without first-hand knowledge of these techniques it is difficult to assess how reliable they would prove at the levels at which most trace elements occur in extractable or total form in soils. The analyst untrained in such work would be well advised to test the methods on analysed soils or rocks of widely variable matrix composition, as even under the best laboratory conditions unexpected problems arise and these problems are inadequately considered in this discussion.

In the final chapters on oxidation - reduction potentials and poorly drained soils, the treatment is again more competent. Throughout the text the reviewer would have welcomed more consideration of differences between the major soil types of the temperate and tropical regions, in so far as they demand different analytical treatment, and quite different diagnostic assessment. While the author emphasises the need for field experimentation, more indication of the levels that the analyst could expect to find would have been welcome, as would a more wholehearted recommendation of the use of activity or amount - intensity relationships in assessing plant availability.

R. L. MITCHELL

STRUCTURAL ANALYSIS OF ORGANIC COMPOUNDS BY SPECTROSCOPIC METHODS. By WILHELM SIMON and THOMAS CLERC. Pp. viii + 195. London: Macdonald; New York: American Elsevier. 1971. Price £3.50.

This book is a translation of a specially revised version of the original German edition, published in 1967. It forms part of the University Chemistry Series edited by Professors Grundon, Roberts and Smith, and is intended for use both by undergraduate and graduate students. The text deals exclusively with the four main spectroscopic methods used to elucidate the structure of organic compounds. These are ultraviolet, infrared, nuclear magnetic resonance and mass spectroscopy—the four most important and useful techniques. The book consists almost wholly of compilations of spectroscopic data for all four methods of analysis, presented in tabular form for most of the common types of organic compound. Tables of data are also given for the individual techniques, which enable the user to interpret in terms of particular groupings or functionalities the over-all structure of the compound being examined.

A useful feature of the book is the Appendix, which contains spectra for fifty unknown compounds, the structures of which are to be worked out by the reader (answers are given later). This provides useful experience in interpreting spectroscopic data and undoubtedly will help to

create confidence in assigning particular structures to totally unknown substances. This is a most useful book, particularly for those not wholly concerned with spectroscopy, but who desire some working knowledge of how to interpret the various spectra. It forms a handy and inexpensive reference volume, which students and research workers will appreciate. WILLIAM I. STEPHEN

KINETICS OF ELECTRODE PROCESSES. By TIBOR ERDEY-GRÚZ. Pp. 482. London: Adam Hilger Ltd. 1972. Price £9.

Although primarily intended for physical chemists and electrochemists, this book will be useful to those analytical chemists who are interested in the rates and mechanisms of electrode processes. The first few chapters will also be useful reading for students attending M.Sc. courses in analytical chemistry that include this subject in the syllabus. A general treatment of the basic principles of the kinetics of electrode processes in which the rate-determining step is alternatively (a) charge transfer, (b) chemical reaction and (c) diffusion or mass transfer is followed by a chapter on particular electrodes, including extensive treatment of the oxygen and hydrogen electrodes and of the kinetics of electrolytic metal deposition and dissolution. Separate chapters then deal with electrode processes in molten salts and on semiconductor interfaces as well as with the kinetics of anodic film formation. The translation is good and the literature is covered up to mid-1970 with useful coverage of the Russian literature. The general treatment will be very useful for students, as there are not many texts in which this information is presented with sufficient care or detail, but the later sections will be of limited appeal mainly to those chemists who are working in the particular fields covered. J. M. OTTAWAY

QUANTITATIVE EVALUATION OF SPECTROGRAMS BY MEANS OF *l*-TRANSFORMATION. By TIBOR TÖRÖK and KÁROLY ZIMMER. Pp. viii + 40, 40-114 loose leaf. London, New York and Rheine: Heyden and Son Ltd. 1972. Price £3.50; \$9; DM32.

From the earliest days of quantitative emission spectrochemical analysis, efforts have been made to find some simple function of the transmittance of the emulsion that will result in a straight-line emulsion calibration graph. This book gives a general review of most of the commonly used blackening transformations, such as those of Kaiser and Baker-Sampson, and discusses in more detail the *l*-transformation developed by the authors. The process of obtaining the *l*-transformation from the emulsion calibration data, and its application to quantitative analysis, are fully explained with the aid of numerical examples. The treatment of the various transformations is given in terms of the Gaussian subtraction logarithm of the blackening, which will probably be unfamiliar to many spectrographers, but this treatment has the advantage of unifying the various transformations and the more important expressions are also given in terms of the more commonly used parameter, the transmittance of the emulsion. One omission is a discussion of the effect of particular transformations on the accuracy of the calculated concentrations. Unless it can be shown that significant improvements in accuracy are obtained by using the *l*-transformation, it is unlikely that spectrographers will change from their existing methods of evaluation. Since, so far as I am aware, no review of these blackening transformations has previously been published, and the work on the *l*-transformation has appeared mainly in Hungarian journals, the book serves a most useful purpose. Although a few typographical and translation errors have crept in, the treatment is generally clear and concise and the numerical examples are a valuable feature. The book can be thoroughly recommended to all analytical spectrographers.

It seems a pity that the book could not have been produced in a stouter form. The main text is only 39 pages in length and the remaining 74 pages consist of loose cards that give the numerical tables that are required when using the *l*-transformation method. Considering the computing facilities that are generally available at the present time, these tables are of somewhat doubtful value. They are retained in an inadequate flap at the end of the book and would prove inconvenient to use and be easily mislaid. The binding is flimsy and would not survive hard use.

B. L. TAYLOR