

BOOK REVIEWS

APPLIED ORE MICROSCOPY. EDITED BY HUGO FREUND; translated by G. Aletan and C. G. Friedlander. The Macmillan Company, New York, 1966, xli+607 p., 382 figs., 44 tables, \$37.50.

The book consists of eight chapters on ore microscopy taken from the ten-volume *Handbuch der Mikroskopie in der Technik*, publication of which began in 1951. The chapters discuss the history of ore microscopy (O. Friedrich), instrumentation and theory of reflected-light microscopy and determination of the optical and physical properties of ore minerals (H. Ehrenberg), mineralogy and textures of the principal classes of ores (P. Ramdohr), preparation of materials for microscope study (P. Ramdohr and the late G. Rehwald), and microscope study of iron and ferroalloy minerals (Friedrich), precious metal and non-ferrous metal ores (Rehwald), primary uranium minerals (Ramdohr), and mill products (Ehrenberg). The original chapters, published from 1954 to 1960, have been updated, though unevenly, to 1962 or early 1963.

The book is designed primarily to acquaint mining and mineral dressing engineers with the mineralogy and textures of ores and the theory and practice of microscopic investigation of ores and mill products. It will be valuable for this purpose. The discussions are clear, well documented, and profusely illustrated. The translation is well done. The book has faults, however, that stem largely from its origin. The assemblage of chapters, originally parts of a monographic treatment of microscopy in general, constitutes a symposium rather than an integrated treatment of ore microscopy. Repetition of material adds unnecessarily to the length of the book. Certain material, e.g., the discussion of petrofabrics of ores, will be of little interest to engineers and could have been omitted. On the other hand, there are topics that merit more ample discussion. For example, the Rehwald-Vandervilt grinding and polishing method is given 26 pages; other methods, less perfect but far more widely used, are dismissed in two pages of obsolete discussion. The section on mineral separation seems incomplete without some mention of the Franz isodynamic separator. Despite their serious limitations, microchemical methods deserve more discussion.

Ore microscopists have many different backgrounds and special interests. No one book will satisfy them all. The present volume will be valuable especially to engineers, but mineralogists and economic geologists will find it a useful reference work.

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X-RAY EMISSION SPECTROGRAPHY IN GEOLOGY. ISIDORE ADLER, Elsevier Publishing Company, Inc., New York, 1966, xii+258 p., 33 tables, 86 illustrations, \$16.00.

X-ray Emission Spectrography in Geology is the fourth monograph in a series on "Methods in Geochemistry and Geophysics" published by Elsevier. Dr. Isidore Adler has assembled information essential to the understanding of the practical aspects of methods of X-ray emission spectrography. The work is divided into eleven chapters.

His treatment, covering the origin of X-ray spectrography, emission, and absorption, employs only the most elementary mathematics. A knowledge of quantum mechanics is not necessary for the treatment used. Chapters follow on detectors and counters and on the geometry of X-ray crystal spectrometry. Two rather complete chapters cover qualitative, semi-quantitative, and quantitative analysis.

The last four chapters cover the electron probe, including the principles of X-ray microanalysis with the electron probe, instrumentation, procedures for quantitative electron probe microanalysis, and applications of the probe to mineralogical problems.

With a minimum of mathematics the basic principles of X-ray spectroscopy are pre-

sented. Necessary equations are given without derivation. Thus the work is suitable for students lacking a formal background. Those with a more rigorous background will find the work equally valuable because the general purpose of the book is the presentation of information necessary to the practical analyst in the laboratory.

A most useful section is the selected bibliography of nine pages. A short appendix on counting strategy, following the treatment of Mack and Spielberg, is included.

The text provides an excellent introduction to and a survey of the methods of analysis dependent upon X-ray emission spectroscopy. The book should be particularly valuable not only to earth scientists, but to others who are beginning research programs with the electron probe or X-ray spectrometer. This well written and concise introductory text should be available to all workers in the fields described. It is a meaningful and most welcome addition to the literature of the very important methods of analysis based upon X-ray emission.

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LA CLASSIFICATION DES MINERAUX ARGILEUX. BY GEORGES PEDRO. 108 p. Ann. Agron. Vol. 16, 1965, Price Fr. 23.

The author presents a critical appraisal of the specifications which a comprehensive clay mineral classification should meet. His position is essentially that more precise detail is desirable than is presently afforded by compromising among the proposals advanced by the several national committees for consideration by the Societe Internationale Pour l'Etude des Argiles. As an individual author he enjoys far greater freedom to maintain internal consistency than is afforded to any working committee.

A preamble enumerates the generalities relating to the layer silicates which were deduced before the application of X-ray diffraction methods, and which were confirmed by the observations of the approximately 7, 10, or 14 Å layer periodicities. All of the classification schemes considered utilize these categories. They were designated in Pauling's articulated tetrahedral and octahedral coordination polyhedra schemes by the ratios 1/1, 2/1, and 2/1/1, respectively. They also recognize the traditional distinctions between octahedral complements of essentially two trivalent or three divalent cations.

Varied proposals of individual authors to accommodate deviations or violations of di- or tri- octahedral character, especially to achieve electrical neutrality in the 2/1 classification, are treated at face value even though it is clear that some deviations result from attributing analyses of impure materials to one assumed structure.

Enumeration of the complexities encountered, in intergrowths of the classifiable "monophyllites" with each other to comprise "polyphyllites", demonstrates well that categorical distinctions should not be extended beyond designations of regular or irregular at the present state of knowledge.

Pedro's comprehensive coverage of both consensus and divergent view-points can be used to good advantage in any eventual establishment of generally approved usages. In fact his definition of objectives has already proven of value in several agreements among the national representatives in international conferences.

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CLAYS AND CLAY MINERALS, PROCEEDINGS OF THE FOURTEENTH NATIONAL CLAY CONFERENCE, BERKELEY, CALIFORNIA. S. W. BAILEY, (ed.) Pergamon Press, Oxford, 1966, vi+447 pp., \$20.

This book contains thirty two papers and three abstracts of papers presented at the second meeting of the Clay Minerals Society. The proceedings are divided into three

symposia on Structure and Quantitative Analysis, Surface Reactivity, Genesis and Synthesis of Clays and a section containing general papers. The volume is completed by a comprehensive twenty four page index.

The symposium on structure and quantitative analysis includes an authoritative review of layer silicate structures, a paper on quantitative mineralogical analysis of clays and sediments using chemical methods, contributions on aspects of mica alteration and a report on progress towards an agreed nomenclature for clay minerals and related layer silicates. The group of papers brought together under the heading surface reactivity contains reports of work on interactions between clay particles and the influence of these interactions on properties such as viscosity, thixotropy and electrical conductance of clay-water systems. There are also, in this group, reports of work on the decomposition of cobalt complexes of montmorillonite and the decomposition of ammonium rectorite, both of which make extensive use of infrared absorption spectra and a paper on the kinetics of the conversion of Na or Ca clay to H-Al clay. In the genesis and synthesis symposium accounts are given of mineral alterations in soils and rocks. The general section contains papers on fabric analysis by X-ray diffraction and electron microscope studies and three papers concerned with the properties of kaolinites. There are also papers on reactions between soils and cement, damage to sandstones caused by clay dispersion and migration, the use of inelastic neutron scattering to give information the environment of hydroxyl groups in layer silicates, the orientation of absorbed pyridine on clay surfaces, "potassium fixation," and a method for the separation of swelling clay minerals from mixtures.

The standard of production of this book is high; tables, figures, and plates are excellent. It is a pity that the plates showing the apparatus for the centrifugal separation of clay minerals, described on pages 407-418, has been inserted between pages 216 and 217.

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ABRISS DER METASOMATISCHEM PROZESSE BY D. S. KORSHINSKIJ. Akademie Verlag, Berlin, translated into German from the original Russian by W. Oestreich, 195 pp., 1965; Price 27.60 MDN.

This volume originally appeared in 1952. The author rewrote approximately one quarter of the book for the German edition, which was published two years after the completion of the text. The major objective of the original book was to summarize for the geological profession as a whole the consequences of physical chemistry in the interpretation of metasomatic processes. Mathematical treatments have been avoided altogether in response to "urgent requests," presumably from the author's intended public. Unfortunately the book suffers both from its age and from the restrictions which the author set for himself.

The book opens with a 54-page section on the theory of metasomatic processes. The treatment is highly schematic and presents none of the available experimental data that are of importance for the interpretation of metasomatic reactions. A good deal of space is devoted to the author's acid filtration theory and to the effects of the differential mobility of components in metasomatic fluids; both of these seem to this reviewer to be quite controversial.

In the second section (pp. 55-184), the author reviews metasomatic phenomena in the field. Successive chapters deal with granitization reactions at contacts, autometasomatism, regional postmagmatic metasomatic metamorphism, and low temperature metamorphism surrounding veins. The illustrative examples were chosen largely from the Russian literature, and the author draws heavily on the results of his own extensive field work. Although the treatment is quite condensed, this section should be of considerable interest to western geologists as an entry into the Russian literature on metasomatic processes.

Professor Korshinskij hints that a more comprehensive work may be in preparation, and that the present volume is only a first attempt to prepare a compendium of metasomatic phenomena. It will be grand to have such a sequel to the *Physicochemical Basis of the Analysis of the Paragenesis of Minerals*.

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