American Mineralogist, Volume 67, pages 1083–1085, 1982

BOOK REVIEWS

ADVANCES IN X-RAY ANALYSIS. Edited by Deane K. Smith and Charles S. Barret, Donald E. Leyden, and Paul K. Predecki. Plenum Publishing Corp., New York, 1981. xx + 428 pages. $49.50 hardback.

This volume of the series "Advances in X-ray Analysis" is a collection of papers presented at the 29th annual conference on application of X-ray analysis in Denver, Colorado in August of 1980. In keeping with the general program of past years, the conference stressed both recent innovations in XRF and XRD methodology and equipment as well as novel applications of XRF, automated analysis of powder diffraction data and XRF in industrial applications.

In terms of new instrumentation and methodology, the bulk of an entire session (11 papers) was devoted to papers on XRD applications of position sensitive detectors (PSD's). These reports are uneven in quality but quite satisfactory in indicating the present state of PSD utilization and future applicability. Subjects included rapid scanning powder diffractometry, time resolved powder diffraction for reaction kinetics studies, laboratory EXAFS analysis, stress measurements and, in the case of an area-imaging detector, simultaneous collection of a large fraction of a single crystal diffraction pattern or section of a powder Debye ring.

Another topic involved XRF measurements using HgI_2 room temperature semiconductor detectors (2 papers). These units should see increasing use in industrial and geological applications since liquid nitrogen cooling is unnecessary at the work site or in the field. The presented papers are useful in determining the utility of current HgI_2 detectors in various analysis roles.

Another new technique, which may be very useful for the semiconductor-integrated circuit industry, is Low-Energy Electron-Induced X-ray Spectroscopy (LEEIXS) which is discussed in a single informative paper. The technique utilizes a cold cathode source in a low vacuum chamber to excite fluorescence in a thin film which is then analyzed with a conventional wavelength dispersive spectrometer. It is adaptable to extremely thin films and can achieve depth resolution in some applications superior to Rutherford backscattering (RBS) techniques, or better than 50Å.

An excellent paper by C. N. J. Wagner *et al.* discusses the use of energy despersive measurements of the diffuse scattering from metallic glasses. Although not a new idea, the technique is now beginning to find applications in the study of both glasses and metals due to the large range of k inspected and the speed of the method compared to conventional monochromatic variable 2θ scattering measurements. Comparisons of both transmission and reflection mode collected interference functions (I(k) *versus* k) and G(r) for variable 2θ and variable λ methods showed good agreement.

The session on application of automated analysis of diffraction data contained papers on the Rietveld method for powder XRD structure refinement, crystallinity in fibrous polymers, quantitative analysis of dust samples, porotectosilicate structure modeling and the analysis and interpretation of diffraction data from amorphous materials. Most of the material presented in these papers is not new, and the reviewer questions why the words "automated analysis" were used in the session heading since this is not the same as computer analysis. Only one paper in the session actually utilizes direct computer-automated XRD.

The session on XRD mathematical methods, techniques and instrumentation contains the results of several round robin analysis tests. These involved a Hanawalt-type search procedure adapted for minicomputer use, qualitative phase analysis with improved peak search algorithm, and comparison of Gunier camera measurements made with Si metal calibrant SRM 640 from NBS. All of these reports may be quite valuable to industrial users of XRD equipment.

The conference volume also includes a session on XRF applications and mathematical methods, which contains eight papers on a wide range of useful XRF methodology. In particular, a paper by Huang *et al.* describes rapid high precision computer controlled quantitative XRF analysis in the wavelength dispersive mode. With the use of a rapid minicomputer system, the time for complete spectral analysis is comparable to that for an energy dispersive system.

Summarizing, this volume contains a considerable amount of up-to-date information on powder diffraction and XRF technique and methodology, and a good sampling of recent developments in instrumentation. It is thus of particular value to analytical industrial facilities where powder XRD and XRF techniques are the principal techniques applied. The contents are of less general use to X-ray crystallographers, mineralogists or materials scientists, although specific papers may have significant applicability. However, the text should be considered for any liberary which hopes to remain contemporary in modern X-ray analysis techniques.

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CHEMICAL METHODS OF ROCK ANALYSIS, Third Edition. By P. G. Jeffery and D. Hutchison. Pergamon Press, New York, 1981. xvi + 379 pages. $60.00.

In the third edition of this book the authors have followed the pattern of the earlier editions. Thus the first four general chapters (The Composition of Rock Material, Sample Decomposition, Classical Scheme for the Analysis of Silicate Rocks, Rapid Analysis of Silicate Rocks) are followed by forty-four chapters providing detailed discussion and practical procedures for estimation of individual elements or groups of elements (Li, Na, K, Rb, Cs; Al; Sb; As; Ba; Be; Bi; B; Cd; Ca; C; Cl; Br; I; Cr; F; Ga; Ge; H; In; Fe; Pb; Mg; Mn; Hg; Mo, W; Ni; Nb, Ta; N; P; Sc, Y, La; Se, Te; Si; Ag, Au, Pt-group; Sr; Tl; Th; Sn; Ti; U; V; Zn; and Zr, Hf). The emphasis of these chapters continues to be on spectrophotometric methods (or flame emission, titrimetric or gravimetric procedures when appropriate) with, despite deletion of outdated procedures that appeared in earlier editions, more than forty procedures being described for some thirty-plus elements. These procedures should be regarded as definitive or reference methods insofar as they stress complete

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decomposition of silicates and accurate determination of the total content of each element. This is not, therefore, a manual of rapid semi-total decomposition techniques and analytical schemes as used in exploration geochemical laboratories.

Loss of the chapter on statistics (to be regretted) and notes on the occurrence of each element, which appeared in the first edition, have been compensated by inclusion of newer methods—most notably use of specific ion electrodes (F) and brief discussions of the determination of more than twenty elements by atomic absorption. Decomposition techniques and procedural details, including separation steps to avoid interferences, are given for many of these elements and rapid schemes of silicate analysis by atomic absorption are also described in Chapter 4. More information on the determination of elements (As, Sb, Se, Te, Bi) by hydride generation—atomic absorption would have been useful and reflected the many publications on the topic during the last few years.

The text, which has been reproduced by direct reduction of the authors' typescript to minimize costs, does contain more than a usual number of typographic and editorial errors (for example, names of many of the authors cited in Chapter 18 do not appear in the Author Index). These do not, however, seriously detract from the book as an invaluable source of information for chemists and geologists involved in accurate analysis of silicates by chemical methods.

K. Fletcher
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GEMSTONE AND MINERAL DATA BOOK. By John Sinkankas. Van Nostrand Reinhold, New York, 1981. 352 pages.

This data book is a reprinting of the original 1972 edition and has not been revised. John Sinhankas is a well known and published authority in gemology and mineralogy with a remarkable capacity to gather and coordinate a broad range of information, even from obscure sources. As stated in the title, introduction and table of contents, this work is a compilation of a wide range of information about minerals and the measurements, techniques, nomenclature, and practices relevant to mineral identification, preparation, and lapidary. Because of the large amount of information about lapidary and identification, it should find and has found its largest audience in lapidarists, mineral collectors and gemologists. I expect it may have been overlooked by more academic types either due to its lack of a fundamental or theoretical treatment of subjects or because it is not suitable for teaching. However, for any mineralogist who has grappled with some pesky problems like figuring out archaic terms, converting measures, cleaning or polishing a mineral, etching an iron meteorite, or coping with any number of the unusual questions one receives from the public or students, this book often has the answer. Moreover, as there is so much diverse information it can save one spending time looking around in a myriad of other sources, or perhaps it may avoid one not answering a question due to a lack of stamina to find the proper source.

Some of the generally useful information covered are polishing, gluing, cleaning, solvents, and other often used compounds and techniques; specific gravity, optical properties, and hardness criteria and data for gems and minerals; gem nomenclature and definitions; measurement conversions; and, for those of you who have the art and equipment, blow pipe and other chemical testing techniques. Of particular interest to gem and lapidary enthusiasts and professionals are the exact formulae for polishing specific minerals and decorative rocks, cutting angles for gems, gem nomenclature and identification criteria which are here packed more concisely than in other standard references. One note is that the only illustration is the front cover photograph.

On the other hand, the book presents some relatively old information that in some cases is now out dated and should not be relied upon or has been superceded by new practices, materials or information. For example, the data on meteorite and tektite classification is out of date; the treatments of gems to modify or enhance colors have grown in numbers and variety in recent years, such that the data presented are inadequate; some newer glues and treating chemicals are available and some of the traditional ones should be mentioned with warnings of their hazardous (*e.g.*, toxic or carcinogenic) nature. However, these caveats are relatively few; noting the vintage of a reference in the text will often serve as a guide to such problems. One other problem is that the printing of certain pages is faint in the paperback edition I used, so that reading of the text can be difficult.

In summation, anyone who has been looking for a good pragmatic handbook of mineral and gem data and information relevant to cutting, polishing, cleaning, testing or identifying minerals may find it in John Sinkankas' *Data book*. The *Data Book* is one of those valuable references that provides sundry useful data and obscure information as well as interesting trivia, and at a price of $6.95, one can hardly complain that they are not receiving their money's worth.

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LANDOLT-BÖRNSTEIN, NUMERICAL DATA AND FUNCTIONAL RELATIONSHIPS IN SCIENCE AND TECHNOLOGY. New Series Group II, volume 11, Magnetic Properties of Coordination and Organometallic Transition Metal Compounds, Supplement 3 to volume II/2. Edited by E. König and G. König. Springer-Verlag Berline-Heidelbert, 1981. 304 figures, xxxv + 1002 pages.

This volume is compiled on the same concept which formed the basis for the previous two supplements and considers the publications on magnetic susceptibilities and electron spin resonance in 1971 and 1972 in direct subsequence of the data and literature of these supplements, volumes II/8 and II/10.

To assist the reader in rapidly locating desired information this volume contains a one page "survey" of its contents followed by a very detailed (26 page) regular table of contents. The volume is divided into two parts of which part one "magnetic susceptibility of coordination and organometallic transition metal compounds" contains 745 pages. This part is subdivided into a 45 page introductory section, a 614 page table listing magnetic susceptibility data for Ti, Zr, V, Nb, Ta, Cr, Mo, W, Mu, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu and Ag compounds in that order, a 61 page diagram section with 283 figures, and a 16 page list of references. Part 2 "Electron paramagnetic resonance of coordination and organometallic transition metal compounds" likewise is subdivided into a 17 page introductory section, a 231 page table listing electron paramagnetic resonance data for Ti, V, Nb,

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Cr, Mo, W, Mn, Tc, Fe, Ru, Os, Co, Rh, Ni, Pt, Cu, Ag and Au compounds in that order, a 1 page section of electron paramagnetic resonance diagrams with 2 figures, and a 7 page list of references to electron paramagnetic resonance data and diagrams.

The compiled data are impressively complete and are evaluated critically. The illustrations are excellent and the tables are clear and easy to use. The printing errors are few, witnessing to meticulous proofreading. The book is printed on high-quality paper and is well bound. This volume represents the best compilation available on data of its kind. It will enjoy extensive usage by researchers in its field, as do all the Landolt-Börnstein volumes, but its distribution likely will be restricted to rather specialized scientific libraries.

GUNNAR KULLERUD
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MINERALS OF THE WASHINGTON, D.C. AREA. By Lawrence R. Bernstein. Maryland Geological Survey, Educational Series No. 5, vi + 148 pages, 66 figures. $4.00 (Maryland Geological Survey, The Johns Hopkins University, Merryman Hall, Baltimore, MD 21218).

One does not normally think of Washington, D.C. as a mecca for the mineral collector, so it came as some surprise to learn from this publication that over 200 different minerals have been recorded within a 40-mile radius of the nation's capital, mainly within the Washington–Baltimore–Harpers Ferry triangle. Admittedly, many of these minerals are unspectacular, and many localities have had an ephemeral existence and are no longer accessible—for example, the several small gold mines in Montgomery County. The author has recorded more than 250 mineral localities within the region, nearly all of which he visited during the period from 1973 through 1977. He provides a brief but informative account of the regional geology, illustrated by a colored geological map (scale 1:500,000), followed by descriptions of the mineral localities on a county-by-county basis. The book is well illustrated by maps showing how to find these localities, and the text is extremely informative of the history and present condition thereof. It is designed primarily as a guide for mineral collectors, but it will be useful for local college and high-school geology classes, and to anyone interested in the natural history (and mining history) of the Washington–Baltimore area. It is an excellent publication which serves its purpose well.

BRIAN MASON
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THE INTERNATIONAL HANDBOOK: A multi-lingual reference directory for mineral collectors. By Sande H. Zirlin, Garnet Books Unlimited, P.O. Box 217, Fort Johnson, N. Y. 12070, 175 pp., $7.50.

The author states her purpose, "I saw the need for a reasonably priced, multi-lingual reference book for people like myself, one that was compact, concise, and geared to the hobbyist collector." She has collected about 800 terms in English and gives their equivalents in German, French, Norwegian, Swedish, Dutch, Spanish, Portugese, Italian, Russian, Chinese, and Japanese. Included are General Classification (Borates, Nitrates, *etc.*), Mineral Names, Crystallization, Color, Supportive Terminology (form, luster, physical properties), and a list of countries. The printing is in large type, easy to read.

I have checked the list of mineral names against standard reference books in German, French, Spanish, and Russian, but not the other seven languages. Very few typographical errors were found and there were only a few minor deviations in spelling from those in the standard references.

The book should be useful, not only to mineral collectors, but also to professional mineralogists, and especially to curators of collections. If there is a second edition, I should like to see the section on Mineral Names greatly expanded. It now contains 550 entries, of which 35 are rock names, and about 90 are varieties or synonyms (many of these might well be omitted), so that about 425 valid species are included. I should like to see the number doubled.

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NOTICES

29th Annual Tucson Gem & Mineral Show

The 29th Annual Tucson Gem & Mineral Show will be held February 10, 11, 12, 13, 1983 at the Tucson Community Center Exhibition Hall, 260 S. Church Avenue, Tucson, Arizona. Hours: 10th-12th: 10 a.m.-8 p.m.; 13th: 10 a.m.-5 p.m. Admission: $1.50 per day or $4.00 for four days. For further information: TGMS Show Committee, P.O. Box 42543, Tucson, Arizona 85733.

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