

BOOK NEWS

1. Book reviews

● *Geophysical and geochemical techniques for exploration of hydrocarbons and minerals*, edited by M. Sittig.

(Reviewer: J. Keenan)

This book is based on 389 U.S. patents, the bulk of the publication being given over to detailed descriptions of the workings of various systems with accompanying annotated diagrams (of variable quality). As such, it is a technical reference for researchers and geotechnicians involved in the development of geochemical and geophysical prospecting methods, particularly those related to the search for hydrocarbons.

The book is of limited value to the exploration geologist, merely being a collection of technical information. No reference is made to test surveys or case histories, and there is no attempt to evaluate or compare the various methods or even indicate their applicability in the search for various types of deposits. The mechanical listing of patent data, combined with a total lack of geological information, makes for difficult reading.

● *Separation procedures in inorganic analysis. A practical handbook*, by Roland S. Young. Charles Griffin, 1980. £23.00.

(Reviewer: R. Murray-Smith)

There is no doubt that in inorganic chemistry the preparation and purification of elements and compounds demand a thorough knowledge of separation procedures. This is equally true of analytical chemistry and hydrometallurgy. The author's claim to have produced a practical reference book on such procedures is not entirely justified.

The classical separation procedures are well covered; but the more modern techniques such as solvent extraction and ion exchange have been largely ignored. An example is the separation of gold, in which only the dithizone, cupferron, and ether extractions are discussed. There is no mention of Das and Bhattacharyya's excellent review of solvent-extraction procedures, nor of the 150 authoritative references it contains.

Little experimental detail is given, which is a serious shortcoming in a book that purports to have been formulated as a practical reference book.

Very few primary sources are quoted, most of the references being to classical texts such as Sandell (and, even here, reference is made to the 1959, rather than to the updated 1978, edition).

Fire assay as a method of isolating the noble metals is discussed only briefly.

The interest engendered by the book's title is largely unfulfilled: the contents are disappointing, particularly in relation to the author's previous works *Chemical Analysis in Extractive Metallurgy* and *Chemical Phase Analysis*.

2. Historical reprints

The Institution of Mining and Metallurgy is publishing a series of reprinted limited editions of important and interesting historical works. The facsimile printing of

each volume is being carried out by The Scholar Press of Ilkley, on high-quality paper with bindings of distinction. The numbers of each volume produced are strictly limited, ensuring that these books will be very collectable items, both for their content and appearance.

Details of the first three books in this series appear below. Orders for books not yet produced can be recorded. Orders and enquiries should be addressed to The Publications Sales Office, 44 Portland Place, London W1N 4BR Tel: 01 580 3802 Telex: 261410.

● *The miners dictionary*, by William Hooson. £14.

This book was first published in 1747. It contains Hooson's explanations of the terms used by miners, and details of contemporary theory and practice of mining, especially lead mining, of which the author had considerable experience, particularly in the Peak District of Derbyshire, Wales, and the north of England. The reprint was produced directly from the copy that forms part of the Institution's historical collection, and that bears the inscription 'Robert Hunt 1859'.

● *Discovery of subterranean treasure*, by Gabriel Plattes. £12.

Plattes' work of 1639 was the first printed work in English devoted entirely to mining. All kinds of mines and minerals are described, together with details of smelting and refining processes and assaying. There is also a chapter on colours from natural substances. The author was of Dutch extraction and is also well-known for his work in agriculture. This reprint is reproduced from the copy that forms part of the Annan Collection, Lyon Playfair Library, Imperial College, London.

● *Fodinae Regales (The Mines Royal)*, by Sir John Pettus.

This book of 1670 gives an account of the formation of the Company of Mines Royal and the Society of Mineral and Battery Works. Written at the request of Prince Rupert and Lord Shaftesbury, the book details the statutes of these two corporations and surveys the various mining rights granted or confirmed by sovereigns from Edward I onwards. Sir John Pettus served as Deputy Governor of the Mines Royal for thirty-five years. This is a limited reprinted edition of the original copy held in the Institution's historical collection.

3. De Beers' booklets

● *Amborite - a remarkable new cutting material*, by De Beers Industrial Diamond Division (P.O. Box 916, Johannesburg 2000). Booklet, 14 pp., free of charge.

Illustrated in colour and black and white, the booklet describes the properties and use of a new cubic boron nitride-based tool material. Manufactured by subjecting very fine and carefully graded Amber* boron nitride particles to high pressure and high temperature in the presence of metal to form a ceramic binder phase, Amborite is significantly harder than either cemented carbide or alumina ceramic cutting tool materials. Unlike these conventional tool materials, Amborite combines a high degree of toughness with

exceptional hardness, thereby making it ideal for the machining of hard, ferrous workpiece materials.

The new booklet comprises two papers by De Beers technical staff and is comprehensively illustrated with scanning electron micrographs, tables, graphs and diagrams.

● *Natural and synthetic micron powders*, by De Beers Industrial Diamond Division (P.O. Box 916, Johannesburg 2000). Leaflet, 5 pp., free of charge.

This illustrated data sheet describes the range of diamond and cubic boron nitride powders available from this South African supplier – the only organization in the world to offer a complete selection of both natural and synthetic diamond and CBN products to meet all industrial demands. The powders are precision graded from virgin material, and are specially designed for finish grinding, lapping, and polishing operations.

Marketed in a wide range of sizes, De Beers Micron diamond powders are also available with a nickel or copper coating in the sizing 6 to 12 μm and coarser. Micron ABN, the cubic boron nitride powder, is produced to the same wide size spectrum and, in the range 6 to 12 μm and coarser, is available with nickel cladding.

The leaflet is fully illustrated with graphs and scanning electron micrographs, and includes full details of performance, applications, and available sizes.

4. New books

● *Nickel in the environment*, edited by J. O. Nriagu. New York, Wiley, 1980. 928 pp. \$65.

This book provides the first comprehensive review of current knowledge about the role and hazards of nickel in the environment. Systematically, it deals with the sources, distribution, behaviour, and flow of nickel in different ecosystems, as well as with the metabolism, biochemistry, and systematic toxicity of nickel in plants, human beings, and other organisms. It discusses the carcinogenic and dermatological effects of nickel, and the interactions of nickel with essential minerals.

● *Underwater minerals*, by D. S. Cronan. London, Academic Press, 1980. 364 pp. \$57.50.

The material is structured so that each chapter deals with a distinct theme, taking the reader from basic principles to the most recent findings. Chapters range from an introductory section setting underwater minerals within a broad geological framework, through a sequence of sections on the origin, nature, and distribution of particular deposit types, to the final chapters, which review methods of undersea exploration, and mining and dredging techniques. However, a study of underwater minerals is not only of value from the resource point of view. It is also of use in helping to elucidate modern chemical processes in the oceans, and in the reconstruction of ancient sedimentary environments. Knowledge of the conditions under which modern underwater minerals form can aid in the understanding of the deposition of ancient sedimentary mineral deposits now on land, and hence in the reconstruction of their palaeo-environments. The final pages consider the environmental and legal implications of mineral exploitation.

● *Data conversion integrated circuits*, edited by D. Dooley. New York, Wiley, 1980. 298 pp. \$26.95 (cloth), \$17.50 (paper).

This book is a source of design and reference information for both the designer and user of circuits that convert digital and analogue data in computers and other digital systems. It treats specific design techniques that are being developed, providing readers with a working knowledge of design approach and limitations.

5. NIM reports

The following reports are available free of charge from the National Institute for Metallurgy, Private Bag X3015, Randburg, 2125 South Africa.

Report 2057

A mineralogical study of the Rooibokkop–Boschhoek copper deposit in the Marble Hall area.

The Rooibokkop–Boschhoek prospect, which is marked by prominent ridges of ferruginous rocks, is located 12 km N40E of Marble Hall, in the eastern Bushveld of the Transvaal. Drilling reconnaissance revealed that the ore-body is made up of sulphide-bearing veins of hydrothermal origin, which were emplaced along an existing fracture zone within the Nebo Granite. The major event was succeeded by the introduction of several sulphide assemblages, which precipitated chiefly in a quartz host at the hanging wall or footwall of the siderite veins. The main copper sulphide, chalcopyrite, contains trace amounts of silver, and sphalerite and galena occur only in subordinate quantities. At the surface, the mineralization displays a zonal distribution: a central elongated copper-rich belt is bordered on both sides by zones in which galena and sphalerite increase progressively outwards relative to the chalcopyrite.

Recurrent fracturing greatly improved the permeability of the host rock, permitting the mixing and circulation of fluids of meteoric and magmatic origin, which resulted in the transformation of pyrrhotite to open-textured marcasite–pyrite aggregates and the pervasive sericitization of granite in the fracture zone. At a later stage, oxygenated waters of atmospheric origin gained access to deeper levels, causing the hematitization of siderite, the replacement of chalcopyrite with bornite, and the chloritization of the granite between the oxidized veins.

The assay data for copper, lead, zinc, and silver on chip samples collected at the surface from trenches dug across the gossanous outcrops are promising, but enough data are not available for an economic assessment of the prospect. There are indications that the distribution of the copper is patchy and erratic. It is possible that, if there is a significant increase in the market price, which is low at present, this deposit may be worth a second look.

Report 2069

Automatic setting of the distance between sample and detector in gamma-ray spectroscopy.

An apparatus has been developed that automatically sets the distance from the sample to the detector according to the radioactivity of the sample. The

distance-setting unit works in conjunction with an automatic sample changer, and is interconnected with other components so that the counting head automatically moves to the optimum distance for the analysis of a particular sample.

The distance, which is indicated digitally in increments of 0,01 mm, can be set between 18 and 995 mm at count rates that can be preset between 1 000 and 10 000 counts per second.

On being tested, the instrument performed well within the desired range and accuracy. Under routine conditions, the spectra were much more accurate than before, especially when samples of different radioactivity were counted.

Report 2070

The prereduction of chromites from the UG-2 Reef.

This report describes a detailed laboratory study of the metallurgical behaviour, during prereduction, of pellets made of chromites from the UG-2 Reef. The pellets, which contain solid reducing agent, were reduced under argon at temperatures between 950 and 1500°C, and the progress of reduction was followed by use of thermogravimetric analysis. The analyses of the gaseous reaction products by gas chromatography for their carbon monoxide and carbon dioxide contents were in excellent agreement with the theoretical analyses calculated from the reduction rate. Microscopic examination indicated that reduction occurs via a mechanism

similar to that for other Transvaal chromites, although at a higher rate. The presence of small quantities of sodium chloride in the pellets was shown to accelerate the reaction, particularly in the early stages of reduction and at lower temperatures. A new method for the dissolution of the metal and carbides in the partially reduced pellets, which showed that significant chromium metallization occurs only after more than 70 per cent of the iron has been metallized, clarified the relationship between the degree of reduction and the degree of metallization.

Report 2075

The optimization of some of the conditions for analysis by spark-source mass spectrometry.

The need for improved precision in spark-source mass spectrometry is highlighted. Several parameters, such as the photoplate-development technique, instrumental stability and focus, and sparking conditions, were optimized. Measurements made under these optimum conditions attained precisions of more than 12 per cent.

Report 2082

A survey of the literature on gravity separation.

This survey covers work done on the wet and dry gravity separation of particles of intermediate size and of slimes. The development of gravity-concentration methods is considered, and present-day practices and various gravity-separation devices are discussed.