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BOOK REVIEWS

GEOCHEMISTRY OF HYDROTHERMAL ORE DEPOSITS, Second Edition. Edited by H. L. Barnes. A Wiley-Interscience Publication. John Wiley & Sons, New York. $29.95. XVI + 798 pp., 1979.

The first edition (in 1967) of this book represented the most comprehensive review of hydrothermal ore deposits to appear during the past half century. Its 13 chapters were written by 19 specialists whose combined efforts made this book an outstanding text. The 15 chapters, containing contributions from 21 authors, of the second edition are arranged, in general, in the order of events taking place during the evolution of ideal ore solutions. Chapters emphasizing the sources of such solutions are followed by discussions of reactions between ore solutions and their host rocks. Next the products of precipitation are described. The final chapters deal with the nature of the residual fluids. A number of the chapters are written by authors who also contributed to the first edition and some of these chapters represent merely updating of the first edition chapters. However, new authors have written about half of the second edition chapters providing welcome discussions of mass-transfer phenomena and of diagenetic sources for hydrothermal fluids. The second edition does not make the first edition obsolete because certain subjects discussed in the latter are not treated in the new edition. The introductory chapter (21 p.), "The Many Origins of Hydrothermal Mineral Deposits" by B. J. Skinner, discusses the historical development of knowledge of hydrothermal mineral deposits and reviews our present understanding of hydrothermal solution. The second chapter (48 p.), Plumbotectonics, the Phanerozoic" by B. R. Doe and R. E. Zartman, reviews recent results of lead isotope studies and provides a new dynamic model of lead isotope evolution in ore deposits. Chapter 3 (66 p.), "Magmas and Hydrothermal Fluids" by C. W. Burnham, discusses the importance of volatiles in magmatic processes. The generation of hydrothermal fluids through sediment diagenesis is treated by J. S. Hanor in the next chapter (36 p.), "The Sedimentary Genesis of Hydrothermal Fluids". Chapter 5 (63 p.), "Hydrothermal Alteration" by A. W. Rose and D. M. Burt, is devoted to a discussion of processes, chemical theory, experimental data and field observations pertaining to wallrock alteration under hydrothermal conditions. The sixth chapter (42 p.), "Oxygen and Hydrogen Isotope Relationships in Hydrothermal Mineral Deposits", is written by H. P. Taylor, Jr. It evaluates the basic principles of hydrogen and oxygen isotope geochemistry that relate to the problems of ore deposition and hydrothermal alteration. This chapter is presented as a supplement to the one that Taylor wrote for this book's first edition. The book's seventh chapter (126 p.), "Sulfide Mineral Stabilities" by P. B. Barton, Jr. and B. J. Skinner, represents a carefully researched up-date of the review chapter of the same title these authors contributed to the first edition of this book. H. L. Barnes in Chapter 8 (57 p.), "Solubilities of Ore Minerals", summarizes data obtained during the 1967–1979 period on metal complexing in ore solutions and discusses the application of this recent information. In Chapter 9 (49 p.), H. D. Holland and S. D. Malinin discuss "The Solubility and Occurrence of Non-Ore Minerals". They proceed from simple to relatively more complex systems in their treatment of mineral solubilities, starting with $NaCl$–H_2O and going on to the solubility of quartz followed by that of fluorite, that of carbonates and ending with that of alkali earth sulfates. Much new data have appeared on sulfur and carbon isotopes since the first edition of this book appeared. H. Ohmoto and R. O. Rye review and evaluate this information in chapter 10 (59 p.), "Isotopes of Sulfur and Carbon". In Chapter 11 (49 p.), "Mass Transfer among Minerals and Hydrothermal Solutions", H. C. Helgeson discusses the numerical method for calculating reaction paths between minerals and solutions. Chapter 12 (21 p.) by D. Norton and L. M. Cathles is devoted to a discussion of "Thermal Aspects of Ore Deposition". Chapters 13 (52 p.) and 15 (43 p.) deal with geothermal systems. These two papers, "Explored Geothermal Systems" by A. J. Ellis and "Ore Metals in Active Geothermal Systems by B. G. Weissberg, P. E. L. Browne and T. M. Seward, are informative and useful but overlap considerably in subject matter. Chapter 14 (54 p.), "Fluid Inclusions as Samples of Ore Fluids" by E. Roedder, presents essentially the same material provided in the first edition of this book.

As a whole the book manages to summarize quite well what we presently know, from laboratory and field research, about hydrothermal ore deposition. The reader becomes aware of the existence of numerous and large gaps in our knowledge; gaps that can only be adequately filled by extensive new research centered on integration of field observations and laboratory experimentation. Most chapters are well written and thus, stimulate the reader to want further information about the subjects discussed. The book is printed on good quality paper and is well bound. I found very few printing errors. The figures are adequate and with few exceptions, useful and easy to read. The book is reasonably priced. It should find a rather large readership. Its authors and editor are to be commended for this fine contribution to our knowledge of hydrothermal mineral deposition.

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RESOURCES MINÉRALES. MINERAL RESOURCES. Ed. by Cl. Guillemin and Ph. Lagny. Mémoire du BRGM No. 106, 1980, 165 pp. (Obtainable from Editions du BRGM, B.P. 45060, Orléans Cedex, France)

Bilingual French/English proceedings of a colloquium held at the 26th International Geological Congress, with an introduction by Cl. Guillemin, devoted to four topics: 1) The distribution in space and time of mineral deposits (metallic and metallogenic provinces)—convened by P. Routhier; 2) Grade-tonnage relations—convened by B. J. Skinner; 3) New methods of mineral exploration and ore processing—convened by P. A. Bailly and J. M.

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Cases; 4) The economics of mineral raw materials and energy sources—convened by Cl. Guillemin and Cl. Salle.

Topic number one has been approached by reviewing the metallogeny of two contrasting "domains": (a) Provinces of Precambrian domains; (b) Circum-Pacific copper-molybdenum domains. Within the first group D. R. Derry has reviewed the metallogenic provinces in the Precambrian of North America and Australia, with the special attention paid to Abitibi area of the Canadian shield; W. J. Van Biljon has reviewed the metal deposits of Southern Africa giving a table illustrating the distribution of the Precambrian metal deposits in time, including gold, uranium, chromium, tin and others and differentiating between deposits bound on sedimentary sequences such as the Witwatersrand and those bound on igneous intrusions such as the Bushveld.

The Circum-Pacific Cu–Mo domains are analyzed in papers by J. D. Lowell, "Metallogenesis and porphyry deposits of North America and the Pacific Region", and by Jorge Qyarzún M. and José Frutos "Metallogenesis and porphyry deposits of the Andes (Southeastern Pacific Region)", the latter paper setting the origin of the deposits in the context of paleogeographic and magmatic evolution of the Andes.

Leo J. Miller reviews the "Distribution of ore deposits through geologic time", distinguishing four global geological environments of mineralization: 1) Eugeosynclines, 2) Back Arc shelves, 3) Cratonal shelves, and 4) Cratons. The beginning of the porphyry-type mineralization is placed at about 2,500 m.y. ago with a weak (uneconomic) manifestation of a porphyry copper-gold mineralization in the Superior zone of Quebec and Ontario, followed by significant deposits in the Jurassic at about 190 m.y. in British Columbia and by further increase in porphyry copper-gold deposits especially in the Circum-Pacific zone of the Southern Pacific Ocean, mostly differing from their cratonic counterparts by more mafic, usually quartz diorite host rock. The classical Cu-Mo deposits of the southwestern United States and the Andes Mountains in South America are classified under Cratonal-Porphyry copper and moly deposits, stressing that both are underlain by miogeosynclinal rocks of Paleozoic age. A separate group of "Cratonal—Porphyry moly deposits" includes the porphyry moly belt within the Rocky Mountains of the United States containing the well known deposits of Climax and Urad-Henderson.

P. Routhier's concluding remarks quote some points from a discussion that followed the presentation of papers and encourages further research.

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NOTICES

28th Annual Tucson Gem & Mineral Show

The 28th Annual Tucson Gem & Mineral Show will be held February 12, 13, 14, 1982 at The Tucson Community Center Exhibition Hall, 260 S. Church Avenue, Tucson, Arizona. Hours: 12th & 13th: 10 a.m.–8 p.m. 14th: 10 a.m.–5 p.m. Admission: $1.50 per day or $3.00 for three days. For further information: TGMS Show Committee, P.O. Box 42543, Tucson, Arizona 85733.

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OES Solicits Suggestions

The Office of Earth Sciences (OES) and its Advisory Board, Assembly of Mathematical and Physical Sciences, National Research Council, are anxious to have the assistance of earth scientists in assuring that their responsibilities are fully met. These responsibilities include continued awareness and active concern for the health of the earth sciences, identification of opportunities for the earth sciences in meeting national needs, and fostering of awareness of scientific advances that may help resolve national problems. Atmospheric, oceanographic, and solid-earth scientists are invited to suggest activities at the national level to the office and its advisory board.

The OES uses the solicited suggestions to complement its perception of important national topics that need attention. Research is not supported, but the suggestions receive attention in several ways. They are sent to appropriate units of the National Research Council when related activity is underway. In some cases, a suggestion may result in an independent committee being established to study and report on the topic. For example, a report is currently being prepared on the geological aspects of industrial waste disposal which was a suggested topic. Such a report is usually read by government officials, scientists in the field, and the public.

It is the wish of the OES Advisory Board to make this resource known to the scientific community so that all earth scientists can actively participate. Effective reports can strengthen our sciences through increased support of the scientific and technological community, increased awareness of the importance of particular topics, and initiation or change in the emphasis of federally-supported programs.

A suggestion should be sent to the Chairman of the Office of