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BOOK REVIEWS

THE INTERPRETATION OF GEOLOGICAL PHASE DIAGRAMS. By Ernest G. Ehlers. Dover Publications, New York, 1987. viii + 280 pages. $8.95.

This book is an unabridged, corrected version of the edition published by W. H. Freeman and Company, San Francisco, in 1972. This important text has been out of print for some time, and it is good to see it reissued in paperback at a reasonable price. Because this book is a reprinting of the old edition and not a revised, new addition, it is only reasonable to refer to the original review by Donald H. Lindsley, which appeared in *American Mineralogist* (1973) v. 58, p. 969–970. Lindsley found it to be a sound text, despite the fact that it lacked any treatment of the thermodynamic basis that governs phase diagrams and it contained numerous diagrams that were thermodynamically impossible. It is reassuring to note that in this reprinted edition the most egregious errors identified by Lindsley have been corrected. The new text, however, has at least one error that was not present in the first printing. In discussing the lever rule on page 10, the text refers to measurements in Figure 3. It uses measurements that were taken from Figure 3 in the first edition and, because the new printing appears in a slightly reduced format, these do not correspond to the same distances in Figure 3 of this edition. This is bound to cause confusion among students trying to figure out how the lever rule works.

One of the weakest aspects of the text is in its treatment of pseudobinary sections (chapter 5, p. 100–105). I feel that the author should have spent more time showing the student how pseudobinary sections can be constructed from a ternary diagram. In the present format it is difficult for a person not thoroughly versed in pseudobinary sections to follow the arguments presented in the chapter. I found two other major failings in this book in addition to the weaknesses noted by Lindsley in the 1972 edition. Fifteen years is a long time in the history of any science, and I feel that it is unfortunate that the text was not reissued as a completely revised edition rather than a reprint of the old edition. It is true that much of the material in the book is timeless, but when it comes to discussion of geologic application, it is painful to see the text miss all the literature that has been published since 1972. The other problem with the book is that it has almost no discussion of phase diagrams used in metamorphic petrology. Chemical potential diagrams and T-X diagrams and the attendant concepts of internal verses external control of fluid composition were concepts that were around in 1972 when the original edition of this book was issued but that received no discussion at all.

Despite the many shortcomings of the book I still feel that it is a reasonable text for petrology classes, providing that the thermodynamic framework that is so obviously lacking is obtained from another source. The first three chapters are still the best introduction to the interpretation of binary and ternary diagrams available today. Chapter 3 alone is worth the price of admission. The latter half of the book is, of course, out of date, and instructors planning to use this section should plan to spend considerable time digging out modern references to augment the text.

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HYDROTHERMAL EXPERIMENTAL TECHNIQUES. Edited by G. C. Ulmer and H. L. Barnes. John Wiley and Sons, New York. 1987. 523 pages. $41.95.

This selection of 19 review articles, inspired by a workshop on hydrothermal techniques that was held as part of a 1983 international symposium on water-rock interactions in Misasa, Japan, is a welcome and timely updating and expansion of a similar volume (*Research Techniques for High Temperature and High Pressure*) published in 1971. The former volume belonged in the library of every experimental mineralogist and petrologist, and I suspect that the updated version will be equally popular.

The selection of papers is eclectic to the degree that some subjects fall either marginally or not at all within the scope of hydrothermal techniques (e.g., the megabar diamond-anvil cell). Nonetheless, this volume represents a valuable compilation of many diverse experimental techniques. Nearly half of the papers present an updating or re-evaluation of long-standing experimental problems dealing with either the calculation, control, or measurement of intensive parameters (such as f_{O_2}, pH, or the activities of Cl- or S-bearing species) in synthetic hydrothermal fluids. Other papers are principally hardware oriented—some of these concentrate only on recent advancements in a field whereas others provide exhaustive (and thus more informative) reviews. For me, the most interesting papers were those that combined descriptions of apparatus and/or experimental strategies with practical "how-to" tips and tactics that commonly might mean the difference between a successful and a failed experiment, but that are more commonly communicated by word of mouth to only a few individuals and thus rarely appear in scientific articles.

The complete listing of chapters (authors names in parentheses) indicates the range of subjects covered in this volume: (1) Mineral solubility and speciation in supercritical chloride fluids (Eugster, Chou, Wilson), (2) Use of gas mixtures at low pressure to specify oxygen and other fugacities of furnace atmospheres (Huebner), (3) Oxygen buffer and hydrogen sensor techniques at elevated pressures and temperatures (Chou), (4) Hydrogen: Metal membranes (Gunter, Myers, Girsperger), (5) TEFLON as a hydrogen diffusion membrane: Applications in hydrothermal experiments (Clemens, McKibben), (6) Problems in working with hydrogen under hydrothermal conditions (Seward, Kishima), (7) Hydrothermal pH sensors of ZrO_2, Pd hydrides, and Ir oxides (Bourcier, Ulmer, Barnes), (8) Rocking autoclaves for hydrothermal experiments I. Fixed-volume systems (Bourcier and Barnes), (9) Rocking autoclaves for hydrothermal experiments II. The flexible reaction-cell system (Seyfried, Janecky, Berndt), (10) Fluid-flow systems for kinetic and solubility studies (Potter, Pohl, Rimstidt), (11) Electrical conductance measurements of dilute, aqueous electrolytes at temperatures to 800 °C and pressures to 4264 bars: Techniques and interpretations (Marshall and Frantz), (12) Cold-seal systems (Kerrick), (13) Internally heated systems (Lofgren), (14) Vibrational and electronic spectroscopy of hydrothermal systems (Buback, Crerar, Koplitz), (15) Gas-solubility experiments: Analysis of error and techniques (Drummond), (16) Calorimetry (Robie), (17) Synthetic fluid inclusions (Bodnar, Sterner), (18) High-pressure mineral solubility experiments in the diamond-window cell (van Valkenburg, Bell, Mao), and (19) Operation of the megabar diamond-anvil cell

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(Jephcoat, Mao, Bell). A brief appendix chapter (Barnes) reviews buffer systems that have been used for both pH and redox control in high-pressure hydrothermal experiments.

Besides the increase in the number of topics covered, several additional changes are apparent when comparing the new volume to its predecessor. First, there are many more high-quality figures in the new volume, including a larger number of detailed technical drawings of apparatus. Second, some authors have included listings of specific hardware items used in assembling their laboratory equipment, along with names of possible suppliers. In cases where a given item is hard to find, such a listing is a welcome starting point, although because of prevailing economic uncertainties of high-tech industries, some suppliers will probably not be in business for as long as this book will still be useful! Finally, the present volume has been attractively produced, as it is completely typeset as opposed to the camera-ready typescript of the original.

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NOTICES

Rapid publication of short, timely papers in *American Mineralogist*

American Mineralogist has instituted a new procedure for publication of certain short communications that are unusually timely, significant, and of sufficiently general interest to be read by those outside the specific field of interest. Manuscripts must adhere to all requirements described in "Guidelines for Authors" (*American Mineralogist,* 72, 1043–1050) and, in addition, must be no more than 15 pages in total length, including all figures and tables (counted as one page each). Each submission must include a brief statement that justifies the timely nature of the paper and must include the names and current addresses of *at least* four potential reviewers. Papers that are otherwise acceptable but are not judged to be appropriate for this new section will be treated as regular articles. Papers that are accepted for this section will appear 4–6 months after submission.

Fluid-inclusion conference

The second biennial Pan-American Conference on Research on Fluid Inclusions (PACROFI II) will be held January 4–7, 1989, at Virginia Polytechnic Institute and State University, Blacksburg, Virginia. The scientific sessions will include both oral and poster presentations and will cover all aspects of fluid-inclusion research and related topics. A special session devoted to microanalysis as related to fluid inclusions is planned. Additional information can be obtained from Robert J. Bodnar, PACROFI II, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, U.S.A. [telephone: (703) 961-7455].

GAC-MAC meeting

The joint annual meeting of the Geological Association of Canada and the Mineralogical Association of Canada will be held in Montreal, May 14–17, 1989, with the participation of the Canadian Geophysical Union. For further information, please contact Colin Stearn, Chairman, Local Organizing Committee for Montréal '89, Rm. 238, 3450 University Street, Montreal, Quebec H3A 2A7, Canada. [telephone: (514) 398-4082].