

Principles of Isotope Geology

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The bibliography is comprehensive and appears to contain references to most of the major contributions in this field. As it stands, the book is a valuable addition to the library of any economic or mining geologist and is to be generally recommended despite the formidable price.

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Principles of Isotope Geology

By Gunter Faure
J. Wiley and Sons Inc., 464 p. 1977,
 \$19.95

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This is a book written for the student, and as such, succeeds admirably. It is the most comprehensive book yet written on the subject, and will make an excellent text for a course at the senior undergraduate or graduate level. I also recommend it for lay scientists and indeed professionals in the (isotope geology) field.

The book consists of 21 chapters, two appendices and an author and subject index. References are given at the end of each chapter and total approximately 900 (the author index has over 1,000 entries). Literature coverage is up to early 1976.

As I read this book I was again reminded of the impressive role Canadian scientists have played in the development of this field, beginning with the pioneer work of Rutherford and Soddy at McGill. Since that time there have been many significant contributions particularly in the area of Pb and S isotope studies. In the index, approximately 40 authors are listed whose work was carried out in Canadian laboratories.

Chapters 1 to 5 cover the fundamentals of physics and chemistry that are a necessary background to the remainder of the book, i.e., the internal structure of atoms, radioactive decay, mass spectrometry and neutron activation analysis. These chapters will be of particular

value to students without a strong science background. Faure presents the pertinent mathematical derivations in great detail, exactly what the student needs in a textbook, but often does not receive. Chapters 6 through 17 deal with the important radioactive decay schemes and the interpretation of the daughter isotopic compositions. Naturally, most attention is given to the Sr, Pb and Ar daughter systems, but a brief chapter of Os, Hf, and Ca is included. A separate chapter deals with each of fission track dating, the U-series disequilibrium method and C-14 dating. Chapters 18 to 21 cover the stable isotopes of H, O, C and S. Faure breaks the discussion on H and O into two chapters, concerned respectively with isotopic fractionation in the hydrosphere and atmosphere and in the lithosphere. Two of the more difficult topics in isotope geology, namely model Pb ages and U-series disequilibrium are well presented and made as clear as possible in such a textbook treatment.

Each chapter is followed by a set of problems (and answers) with data taken from the literature. Thus the student is confronted with real situations.

Appendix I lists a Fortran IV program for statistical analysis of Rb/Sr isochrons using the York (1969) treatment. It is fairly standard and similar to many programmes now used by workers in the field. Appendix II is the Phanerozoic time scale with age estimates from five sources.

The text is remarkably free of typographical errors. The tables and diagrams are clear and uncluttered and most figures have extensive captions. The index has approximately 900 entries and seems adequate.

Finally at \$19.95 (U.S.), the price is right.

MS received February 28, 1978

Chemical Petrology with Applications to The Terrestrial Planets and Meteorites

By Robert F. Mueller
 and Surendra K. Saxena
Springer-Verlag New York, Inc.,
394 p., 1977,
 \$29.80

Reviewed by J. J. Fawcett
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The judicious blending of information gained from field observations, from mineral and rock analyses, from textural observations and from chemical theory has been a goal of many petrologists (geochemists?) for almost a century. Undoubtedly many significant advances in petrological concepts have resulted from the adoption of chemical considerations in problems of rock genesis. Frequently the first application of innovative techniques from areas of basic science to petrological problems has been initiated by scientists with extensive training in that basic discipline. It does not necessarily follow that the best geologist is the one with the greatest capability in basic science. However, one of the more sensitive aspects of geological training is probably the balance to be achieved between geological content and basic science content. Perhaps fortunately for our science each of us views that balance from a slightly different perspective. Hence any attempt to produce a single volume bringing together aspects of petrology and chemistry is almost certain to draw fire on the selection of subject matter. This certainly applies to the Mueller and Saxena's *Chemical Petrology*. Although the text makes no claim to be comprehensive, it includes short sections on a number of standard topics in igneous and metamorphic petrology but omits items such as the role of carbonate and oxide minerals, the behaviour and patterns of minor element abundances in natural assemblages, the role of fluid inclusions in petrogenesis and the significance of isotopic studies. Admittedly each of these could