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Chemical Petrology – with applications to The Terrestrial Planets and Meteorites
By R. F. Mueller and S. K. Saxena, Springer-Verlag, 1977, pp. 394, $32.10.

The authors define Chemical Petrology as the application of physical chemistry to interpreting rock systems. Contrary to the impression given by its sub-title and the publisher's notes on the back of the book, only a small proportion of the work deals with meteorites and the terrestrial planets; i.e. 65 pages out of 394.

The first four chapters are introductory in nature. They cover the required physical chemistry and its application to mineral systems, and end in a description of rock classification.

The next three chapters deal with topics in planetary astronomy; Chapter 5 with the theory condensation in the primordial solar nebula, Chapter 6 with meteorites, and Chapter 7 with the terrestrial planets. The treatment of condensation theory follows that in Urey's classic book ("The Planets", 1952) which starts from first principles for every element. This results in a thorough review, but it is complex, and for a simpler treatment a reader would be best advised to consult the recent primary literature. This reviewer found the chapter on meteorites most disappointing and in many respects out of date. Prior's rules – which relate the composition of metal and silicate grains – are dealt with at length, but they are true only in a restricted sense and this is merely hinted at. A better view of the current situation would have resulted if some mention were made of the Mg/Si and Fe/Si fractionations which are now the basis of meteorite classification. The discussion of iron meteorites and their origin ignores the classification scheme specifically developed for its genetic implications and concentrates on structure – an important, but nevertheless, secondary feature. It was also disappointing to find no discussion of the fractionation of highly volatile elements, one of the most keenly contested topics in modern meteorite research. The major rival theories proposed to explain this fractionation involve condensation and metamorphism, both of which receive extensive coverage elsewhere in the book.

Chapter 7 deals with the terrestrial planets including the Moon. It includes a fascinating section on the lower atmosphere of Venus which, the authors argue persuasively, is the result of chemical reactions with the surface of the planet. Unfortunately, no attempt is made to utilise the condensation calculations described in Chapter 5 so meticulously, despite the elegant work of H. C. Urey, and, more recently, J. S. Lewis and others.

Chapters 8 to 11 concern metamorphic rocks and related theoretical and experimental studies, and Chapters 12 to 15 concern igneous rocks. They are well written, with the right amount of detail and are amply illustrated.

The book seems to have been written for undergraduates specialising in geochemistry: certainly a grounding in physical chemistry or geology to at least A-level is required. Research workers in any of the fields covered might also find it of interest. There are a few errors; the "olivine-pigeonite" meteorite group was based on an erroneous mineral identification and no longer exists, equations 5.29 and 5.30 are in error, the Martian volcano *Nix Olympica* is now known as *Olympus Mons*, and its photograph on page 120 appears on its side, so the mighty volcano looks like a conical depression. On the whole, however, the work is well presented, the 188 line drawings are clear and pleasing to look at, and there is an easy writing style.

This book may well prove of value to geochemists, but I would be reluctant to recommend it to anyone wanting it for its coverage of extraterrestrial material.

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