

## BOOK REVIEW

### Handbook of Physical Properties of Rocks

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**REFERENCE:** Carmichael, R. S., *Handbook of Physical Properties of Rocks*, Vols. I, II, and III, CRC Press, Boca Raton, FL, 1982, 404 pp. (Vol. I), 1982, 345 pp. (Vol. II), and 1984, 340 pp. (Vol. III).

The compilation of data on the physical properties of rocks is a challenging task because rocks are heterogeneous materials found under a wide variety of environmental conditions. The 11 chapters which make up this three volume set contain a wealth of rock property information. This reference work belongs in the library of any organization that deals with earth materials. Volume I contains "Mineral Composition of Rocks" by Kenneth F. Clark, "Electrical Properties of Rocks and Minerals" by George V. Keller, and "Spectroscopic Properties of Rocks and Minerals" by Graham R. Hunt. Volume II contains "Seismic Velocities" by Nikolas I. Christensen, "Magnetic Properties of Minerals and Rocks" by Robert S. Carmichael, and "Engineering Properties of Rocks" by Allen W. Hatheway and George A. Kiersch. Volume III contains "Density of Rocks and Minerals" by Gordon R. Johnson and Gary R. Olhoeft, "Elastic Constants of Minerals" by Yoshio Sumino and Orson L. Anderson, "Inelastic Properties of Rocks and Minerals" by Stephen H. Kirby and John W. McCormick, "Radioactivity Properties of Minerals and Rocks" by W. Randall Van Schmus, and "Seismic Attenuation" by Mario S. Vassiliou, Carlos A. Salvado, and Bernhard R. Tittmann. The individual contributors are all experts in their fields and have been comprehensive in their summaries. The chapters are typically between 40 and 200 pages in length. The authors have approached their subjects in different ways. Some chapters, such as those on electrical properties or inelastic properties, are review papers on the science of the subject for which a plethora of data serves as illustrative material. Other chapters, such as those on seismic velocities or elastic constants, are a handbook compilation as one might expect from the series title. Thus, a certain heterogen-

eity of style exists, partly because of the proclivities of individual authors and partly because the different physical properties lend themselves to different treatments. Overall, the reader will find a lot of attractive graphically presented information along with the expected tables.

The chapter organization seems somewhat random. I might have grouped seismic velocities with mineral elastic constants and attenuation, or electrical properties with magnetic properties. The index is by individual volume, and hence is a conglomeration of the keywords picked up in the chapters that make up that volume. References are located in different places within chapters. Some chapters usefully segregate general references, including previous compilations, from the specific references to tables and graphs.

The volumes are visually attractive and easy to read. Occasionally tables are too busy and not clearly headed. I obviously have not studied every graph and table, but I have found a few typographical errors. The detailed references will enable the reader to check any data with the original source.

This CRC *Handbook of Physical Properties* prompts me to compare it with the 1966 *Handbook of Physical Constants* edited by S. P. Clark, Jr. and the 1981 *Physical Properties of Rocks and Minerals* edited by Y. S. Touloukian, W. R. Judd, and R. F. Roy. Most notable is that we are now dealing with three volumes instead of one. If one is interested simply in a compressive strength of "granite," all the compilations serve quite well. However, the other books contain chapters on thermal expansion and thermal conductivity, physical properties not explicitly covered in the CRC volumes. Evidently a "Thermal Properties" chapter was planned as part of Volume III because the introduction to Volume II indicates it as forthcoming. Also, given the current interest in permeability, I believe that such chapter is useful and indeed it can be found in the Touloukian et al version. The CRC volumes are more comprehensive in what they do include. They serve the reader who not only is after specific data but is also after a summary of the science behind the data. That guidance can prevent the misuse of rock property data.

The authors and editor are to be commended for diligently completing an often thankless task.