

overview of formulating a melt model and solving for the equilibrium situation using a free-energy minimization scheme. In the final chapter, Ghiorsio and I. S. Carmichael model magma cooling in small steps along reaction paths, allowing path simulation, and of fractionization, assimilation and other processes.

The book provides an *excellent* overall review of the prin-

ciples and procedures involved in thermodynamic modeling. Errors in the "proof ready" type are generally not serious and obvious enough not to detract from the meaning of the text. Considering the inexpensive price, I strongly recommend it to all students of geochemistry.

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Proceedings of the Nordic Symposium, Clay Minerals—Modern Society, Uppsala, Sweden, Nov. 20–21, 1985, N. A. Shaikh and N. G. Wik, eds., Nordic Society for Clay Research, % P.-A. Melkerud, Department of Forest Soils, Box 7001, S-750 07 Uppsala, Sweden, 1986. 217 pages, US\$25.00.

The Clay Minerals-Modern Society Symposium of the Nordic Society for Clay Research was held at Uppsala, Sweden, November 20–21, 1985. This symposium, which was concerned mainly with applied clay mineralogy, was sponsored by the Nordic Research Courses (The Nordic Council of Ministers), The Swedish Board for Technical Development, and The Geological Survey of Sweden. The Proceedings volume resulting from this symposium consists of 18 papers and 9 abstracts. All papers are in English, but the editing leaves much to be desired. Some of the abstracts are not informative, titles of several tables and illustrations in some of the papers are inadequate, and abbreviations are used in figures and tables that are not defined or referred to in the text. The high percentage of abstracts without papers and the fact that several papers do not adequately cover the material discussed also detract from the volume.

Among the more important papers in the symposium volume are two that are part of the program of the Standardization Group of the Nordic Society of Clay Research. One by C.-M. Blackman, A.-M. Brusewitz, and A. Sjödin outlines the mineralogy of the Geological Survey of Sweden's standard samples of glacial and post-glacial clays. The second paper, by I. Holmefjord, N. Gjelsvik, and E. Roaldset, deals with the methodology of clay mineral analysis used by the Norsk Hydro Research Center. Three papers and two abstracts are concerned with the applied clay mineralogy of kaolin. Two papers contain information on the characteristics of kaolin

used for paper filling and coating, and one discusses the results of drilling and testing of 10 deposits in a kaolin belt in southern Sweden. One of these deposits is thought to be of commercial value for the paper industry.

A. Hurst's (Statoil, Norway) descriptions of petroleum reservoirs indicates that chlorite cement in sandstone associated with sedimentary structures has a marked influence on neutron porosity logs, but does not significantly affect other types of porosity logs or core porosity measurements. Clays are also likely to affect other reservoir characteristics, such as bulk hydrogen content, cation-exchange capacity, density, pore size characteristics, wettability, and gamma radioactivity. N. Gjelsvik's research supports the conclusion that in a North Sea oil field water of low salinity causes severe reduction in flow by mobilizing kaolinite, but water of high salinity tends not to reduce flow. P. Aagaard found that during diagenesis in one North Sea oil field early precipitation of kaolinite in pore spaces was followed by later, more chemically complex aluminosilicates.

One very interesting paper by Birgitta Hulthen describes the use of clays in prehistoric societies. Numerous ceramic items have been found, including tools, figurines, beads, and musical instruments. A practical method of building houses by daubing clay on a lattice-like wattle of small tree branches was widely used. The role of clay minerals in geothermal energy research is discussed in a paper by Hrefna Kristmannsdottir of the Iceland National Energy Authority. She found that clay mineral zones in geothermal fields in Iceland, the United States, Mexico, New Zealand, and the Philippines differ appreciably with different geologic settings.

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