
Montmorillonite/Illite Stability Diagrams

Robert M. Garrels

Department of Marine Science, University of South Florida, 140 7th Avenue South, St. Petersburg, Florida 33701

Abstract: Chemical activity diagrams, prepared to illustrate the properties expected if mixed-layer montmorillonite/illite is regarded as a solid solution, are compared to those derived from a treatment of these materials as a mixture of two phases. If the system is a solid solution, the coexisting aqueous solution should range from higher dissolved silica contents in the presence of kaolinite and a montmorillonite end member to lower dissolved silica in the presence of kaolinite and an illitic end member. Silica concentration in the aqueous solution might vary by a factor of as much as six. If the system is two phase, the silica content of a solution in equilibrium with kaolinite and both phases would be fixed at a given T and P, as would a solution equilibrated with both phases and K-feldspar. In the absence of a third phase, silica in equilibrium with both phases should be nearly constant, but increase with increasing ratio of K^+/H^+ in solution. Available data on coexisting aqueous solutions apparently are more nearly consistent with two phases than with a solid solution.

Key Words: Chemical activity diagram • Illite • Mixed layer • Montmorillonite • Phase • Solid solution • Stability

Clays and Clay Minerals; June 1984 v. 32; no. 3; p. 161-166; DOI: [10.1346/CCMN.1984.0320301](https://doi.org/10.1346/CCMN.1984.0320301)

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