
Effect of Compaction Pressure and Water Content on the Thermal Conductivity of Some Natural Clays

Alain Beziat¹, Michel Dardaine¹ and Victor Gabis²

¹ Commissariat à l'Energie Atomique, DRDD/SESD B.P. 6, 92265 Fontenay-aux-Roses, France

² Université d'Orléans, ESEM, Laboratoire de Minéralogie Appliquée B.P. 6749, 45067 Orléans Cedex 2, France

Abstract: This paper presents thermal conductivity data for highly compacted Ca-smectite, Na-smectite, illite, and palygorskite as a function of density (i.e., compaction pressure), water content, and temperature. All the clays behaved similarly: thermal conductivity increased directly with density and water content. Specifically, the thermal conductivity increased from 0.63 to 1.32 W/m·K as the dry density increased from 1.2 to 1.8 g/cm³ (for a water content of 17%). An increase of water content from 6 to 17% resulted in an increase in thermal conductivity from 0.63 to 1.22 W/m·K (for a dry density of 1.6 g/cm³). Differences from one clay to the other were less important. The thermal conductivity (in W/m·K) for constant conditions of 12% of water and a dry density of 1.6 g/cm³ were: Ca-smectite 0.80, Na-smectite 0.74, palygorskite 0.71, and illite 0.69. Heating to 188° C produced only a 10% increase in the thermal conductivity.

Key Words: Compaction pressure • Illite • Palygorskite • Smectite • Thermal conductivity • Water content

Clays and Clay Minerals; October 1988 v. 36; no. 5; p. 462-466; DOI: [10.1346/CCMN.1988.0360512](https://doi.org/10.1346/CCMN.1988.0360512)

© 1988, The Clay Minerals Society

Clay Minerals Society (www.clays.org)
