
Dielectric Properties of Montmorillonites Saturated by Bivalent Cations

R. Calvet

Centre National de la Recherche Agronomique, Versailles, France

Abstract: This study deals with the analysis of dielectric measurements made on montmorillonites saturated by bivalent cations. These measurements are performed between -150°C and $+30^{\circ}\text{C}$ at frequencies ranging from 300 to 10,000 Hz. Their interpretation is based on a numerical analysis allowing determination of the dielectric losses due to free charge carriers conductivity phenomena and losses due to relaxation phenomena. The free charge carriers conductivity is due to the movement of protons. It depends very much on the nature of compensating cations and on the water content and seems to be closely related to the characteristics of the swelling.

Two types of relaxation phenomenon are described: a Debye relaxation due to electric dipole rotations and a Maxwell-Wagner relaxation due to heterogeneity effects. The analysis of the first phenomenon leads to the examination of the values of the relaxation time. It appears that the rotations of water molecules are difficult with bivalent cations. This essentially is shown by the high activation energy of the phenomenon. The discussion of these parameters shows that the state of adsorbed water molecules are certainly different as compared to the state of water molecules in ice or in liquid water. The characteristics of the second relaxation phenomenon are closely dependent on the free carriers charge conductivity.

Clays and Clay Minerals; September 1975 v. 23; no. 4; p. 257-265; DOI: [10.1346/CCMN.1975.0230401](https://doi.org/10.1346/CCMN.1975.0230401)
© 1975, The Clay Minerals Society
Clay Minerals Society (www.clays.org)
