
Cation Migration into Empty Octahedral Sites and Surface Properties of Clays

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Abstract: The migration of small cations into the empty octahedral sites of dioctahedral clays allows one to study the local effects in the trioctahedral structure and the consequences of the exchange capacity decrease on the solvation properties. The results concern essentially the montmorillonite saturated by lithium. Computations based on a point charge model shows the necessity for the OH groups to undergo a reorientation when the lithium ions are within the octahedral sites. This change of orientation was studied by i.r. spectroscopy which permits one to estimate the amounts of lithium present in the structure. By analogy with i.r. results obtained for the Li, Mg, Ca and K montmorillonites, one can say that the non-exchangeable lithium which is not within the octahedral sites must be in the bottom of the hexagonal cavities. Moreover, it is shown that the solvation properties of the clay depend on the number of exchangeable cations and on the nature of the solvent. The clay does not swell with water when the amount of exchangeable cation is lower than 50 per cent of the exchange capacity. This limit is 30 per cent with glycerol, and 20 per cent with ethylene glycol.

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