
Heterogeneity of Montmorillonite Surface and Its Effect on the Nature of Hydroxy-Aluminum Interlayers

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Abstract: A specimen montmorillonite (Arizona bentonite) was treated with hydroxy-aluminum solutions of various basicity. The cation exchange sites of this clay were found not to be homogeneous in their strength of retaining hydroxy-aluminum polymers; this strength varied from very weak, with which the Al polymers were only loosely held, to very strong, with which stable interlayer Al-clay complexes were formed. When a large amount of clay was treated with a small amount of solution, the polymers were held only in positions of strong affinity; the polymers were difficult to extract with neutral salt solutions and did not change to crystalline $\text{Al}(\text{OH})_3$ during prolonged aging. When a small amount of clay was treated with a large amount of solution, the exchange sites were completely occupied by polymers; a portion of these polymers was easily extractable with neutral salt solutions and, during aging, changed to $\text{Al}(\text{OH})_3$. This contrast is significant in any attempt to compare results obtained under different experimental conditions and to correlate laboratory experimentation with the occurrence of gibbsite and interlayer Al-clay complexes in nature.

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