Potassium and Cesium Ion Selectivity in Relation to Clay Mineral Structure

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Abstract: Selectivity of a number of vermiculites, montmorillonites and micas for K and Cs ions was determined by sorption of these ions from equilibrium solutions of diverse concentrations. The selectivity coefficients were related to the layer charge density and the area of the frayed edges in layer silicates.

Montmorillonites had the smallest selectivity for the two ions, while biotite and illite had the greatest selectivity. Selectivity of biotite and illite was limited to small concentrations of K, however. At greater concentrations the selectivity of vermiculite for K exceeded the selectivity of the micas.

The greater selectivity of vermiculites than montmorillonites for K and Cs ions was attributed to the greater layer charge density in vermiculites. The greater selectivity of micas than montmorillonites and vermiculites was attributed to the frayed edges of micas in addition to their larger layer charge density. As the frayed edges in illite were increased in area by removal of the interlayer K, the selectivity of illite for K also increased; thus confirming the selectivity of frayed edges for the K ions.

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