

---

# Adsorption of Hydroxy-Al by Certain Phyllosilicates and its Relation to K/Ca Cation Exchange Selectivity\*

L. M. Kozak and P. M. Huang<sup>†</sup>

Department of Soil Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

\* Contribution No. R62, Saskatchewan Institute of Pedology, Department of Soil Science, University of Saskatchewan, Saskatoon, Sask., Canada.

<sup>†</sup> Graduate Research Assistant and Assistant Professor, respectively.

**Abstract:** The adsorption of hydroxy-Al by the 2– 0.2 μ size fractions of muscovite, biotite, K-depleted micas, vermiculite and montmorillonite was studied. The differences in the amounts of hydroxy-Al adsorbed were apparently related to the expansibility and layer charge of minerals, the ionic saturation and degree of K-depletion, the basicity (OH/Al ratio) of the equilibrating hydroxy-Al solution, and the solution-clay ratio. The CEC reduction was not necessarily proportional to the amount of Al adsorbed because CEC reduction may occur through occupation of cation exchange sites by hydroxy-Al, or through hindrance to the entry of the replacing cation to these sites. Aluminum interlayering generally increases the K/Ca cation exchange selectivity (CES) of Na-vermiculite and K-depleted biotite, whereas the K/Ca CES of Na-montmorillonite was little affected. The basicity of the initial hydroxy-Al solution appeared to affect the K/Ca CES of Na-vermiculite and K-depleted biotite by controlling the amount of hydroxyl-Al adsorbed. The data indicate that in addition to the “propping effect”, hydroxy-Al interlayers may affect the K/Ca CES through the following mechanisms; (1) the “preferential occupation” of Ca adsorbing sites, and/or (2) the “retarding effect” on the entry of the more hydrated Ca ions.

*Clays and Clay Minerals*; June 1971 v. 19; no. 2; p. 95-102; DOI: [10.1346/CCMN.1971.0190205](https://doi.org/10.1346/CCMN.1971.0190205)

© 1971, The Clay Minerals Society

Clay Minerals Society ([www.clays.org](http://www.clays.org))

---