
Influence of Citric and Tannic Acids on Hydroxy-Al Interlayering in Montmorillonite

Tee Boon Goh and P. M. Huang

Department of Soil Science, Saskatchewan Institute of Pedology University of Saskatchewan Saskatoon, Saskatchewan S7N 0W0, Canada

Abstract: The formation of hydroxy-Al-interlayered montmorillonite was affected by complexing organic acids. Montmorillonite (<2.0 μm) was aged for three months at an initial pH of 5.0 or 6.0 in AlCl_3 solutions containing citric or tannic acid at organic acid/Al molar ratios from 0 to 1.0. The Al/clay ratio in the system was 900 meq Al^{3+} /100 g of montmorillonite. Ion-exchange experiments revealed that organically complexed Al ions have both positive and negative charges. Evidence from X-ray powder diffraction, electron microscopic examination, measurements of specific surface, cation-exchange capacity, organic carbon, and the nature of sorbed Al indicates that citric and tannic acids influence differently the hydroxy-Al interlayer formation in montmorillonite. Hydroxy-Al-citrate can be adsorbed as interlayers in montmorillonite, but hydroxy-Al-tannate exists principally as a separate phase binding the clay particles. The differences observed between the influence of citric and tannic acids on Al interlayering are probably due to their differences in molecular weight (size) and structure.

Key Words: Al polymers • Hydroxy-Al interlayer • Ion-exchange resin • Montmorillonite • Organic acid • Specific surface

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