

## HDTMA in the Interlayers of High-charged Llano Vermiculite

Phil G. Slade<sup>+</sup> and Will P. Gates<sup>\*</sup>

CSIRO Land and Water, Adelaide, South Australia, Australia

<sup>+</sup> Post retirement fellow

<sup>\*</sup> Corresponding Author and Present Address

Centre for Green Chemistry  
Monash University, Clayton VIC

**Abstract** – X-ray diffraction shows that ordered interlayer structures form when high-charged Llano vermiculite is reacted with HDTMA-Br or HDTMA-acetate, but the structures differ from those given by low-charged vermiculites. The differences exist when co-adsorbed organo salt molecules are present and also when only organo cations are present. Organic salt molecules tend to order along widely spaced rows corresponding to the intersections of two sets of scattering planes. For the acetate salt one set of planes have spacings 3.52 Å, but for the bromide salt the value is 3.67 Å. Scattering planes in the second set have spacings of 4.02 Å, independent of counter anion size. These two sets of planes diverge from one another by ~10°. Ordering is more apparent in the presence of acetate ions than it is for the smaller Br<sup>-</sup> ions. In salt-free, high-charged intercalates, organic cations occupy positions in a centered two-dimensional superlattice; some interstitial positions are also occupied randomly.

**Key words** – High-charge Vermiculite, HDTMA-vermiculites, HDTMA-acetate Molecules, Interlayer Structure, Two-dimensional Ordering, Structural Models.