ATR-FTIR study of ammonia sorption by soil and specimen clays. (S02-dontsova142944-Poster)

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Abstract:

Soil clays are known to enhance ammonia retention when anhydrous ammonia fertilizer is injected into the soil. In this study, ammonia sorption by SAz-1 smectite and the clay fraction of a Blount soil (fine, illitic, mesic Aeric Epiaqualfs) was studied using in situ ATR FTIR spectroscopy. Clays exchanged with Ca or Mg were deposited on the surface of a ZnSe crystal in the ATR cell, dried, equilibrated at high or low partial pressure of water vapor, and exposed to NH3 gas. Immediately after exposure of the clay to ammonia the spectra indicated the presence of ammonia in protonated form as NH4+ and in the unprotonated form as physically adsorbed NH3. Flushing the cell with water vapor removed the physically adsorbed ammonia, while ammonium was retained. The total amount and form in which ammonia was adsorbed was affected by clay mineralogy, water content and exchangeable cation. At high clay water contents more ammonium was adsorbed on Mg-clays than on Ca-clays. In SAz clay more ammonia was protonated to ammonium at low partial pressure of water vapor.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 9:00-11:00 am
Poster Board Number: 1421

Keywords:

ammonia sorption, soil clays, ATR cell, FTIR