## Infrared Spectroscopy of Picloram Interactions with Al(III)-, Fe(III)-, and Cu(II)-Saturated and Hydrous Oxide-Coated Montmorillonite

## Y. Aochi and W. J. Farmer

Department of Soil and Environmental Sciences, University of California, Riverside Riverside, California 92521

**Abstract:** Thin clay films prepared from aqueous suspensions of the potassium or sodium salt of picloram (4-amino-3,5,6-trichloropicolinic acid) with Al-, Fe-, or Cu-saturated montmorillonite or with montmorillonite coated with hydrous oxides of Al, Fe, or Cu were examined in an air-dry condition by infrared (IR) techniques to elucidate possible modes of interaction between picloram and the mineral surfaces. Deuteration was used to confirm band assignments of picloram and its salts prior to interaction with montmorillonite. Picloram interactions with Al- and Fe-saturated montmorillonite and with montmorillonite coated with hydrous oxides of Al and Fe were concentration dependent. At high picloram concentrations similarities with the IR spectrum of potassium picloram indicated that much of the picloram was present in the salt form. As the concentration of picloram was reduced below that equivalent to 1 meq/g clay, the IR spectrum indicated the presence of the monomeric acid on the mineral surface. The spectrum of picloram on montmorillonite with a coating of copper hydrous oxide was similar to that of a Cu-picloram complex indicating coordination type bonding. The spectrum of picloram with montmorillonite coated with a hydrous oxide coating of Cu and with Cu-saturated montmorillonite were independent of picloram concentration in the range 2.20– 0.44 meq/g clay.

Key Words: Adsorption • Hydrous oxides • Infrared spectroscopy • Montmorillonite • Picloram

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