
Properties of Silica-Intercalated Hectorite¹

T. Endo², M. M. Mortland and T. J. Pinnavaia

Department of Crop and Soil Science, Michigan State University, East Lansing, Michigan 48824

Department of Chemistry, Michigan State University, East Lansing, Michigan 48824

¹ Michigan State University Agricultural Experiment Station manuscript 9747.

² Present address: National Institute for Researches in Inorganic Materials, Kurakake, Sakura-Mura, Niihari-Gun, Ibaraki 300-31, Japan.

Abstract: Silica-intercalated hectorite with an 001 spacing of 12.6 Å and a N₂ BET surface area of 220 m²/g was prepared by hydrolysis and oxidation at 500° C of hectorite containing a silicon acetylacetonate complex. The intercalate swelled to higher spacings upon adsorption of water, glycerol, and pyridine, but the silica was not expelled when the interlayers swelled and contracted in successive adsorption/desorption cycles. The surface area measured by isobutane adsorption agrees with the N₂BET surface area, suggesting that the interlayers are available for adsorption of aliphatic hydrocarbons. The intercalated silica did not inhibit the ability of the interlayers to enter into cation-exchange reactions, as judged from Cu²⁺-binding experiments. Infrared studies of NH₃-, pyridine-, and NO₂-adsorption indicate the presence of Bronsted acidity and the absence of Lewis acidity in the interlayer regions.

Key Words: Acidity • Hectorite • Infrared spectroscopy • Intercalation • Silica • Surface area

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