

---

# Effects of Iron Oxidation State on the Specific Surface Area of Nontronite

Paul R. Lear<sup>1</sup> and Joseph W. Stucki

Department of Agronomy, University of Illinois, Urbana, Illinois 61801

<sup>1</sup> Current address: EPL Bio-Analytical Services, Inc., Decatur, Illinois 62525.

**Abstract:** The effect of Fe oxidation state on the specific surface area,  $S_m$ , of nontronite was studied using the <2- $\mu\text{m}$ ,  $\text{Na}^+$ -saturated fraction of the SWa-1 and Garfield nontronite reference clays. The reduction of structural  $\text{Fe}^{3+}$  in the octahedral sheet of the nontronite decreased  $S_m$  as measured by the adsorption of 2-ethoxyethanol (ethylene glycol-monoethyl ether, EGME). The swellability in water of the nontronite also decreased during reduction. The amount of nonexchangeable  $\text{Na}^+$ , on the other hand, increased with increasing  $\text{Fe}^{2+}$  content and was highly correlated with EGME adsorption ( $r = -.985$ ). The relationship between  $S_m$  and  $\text{Fe}^{2+}$  was attributed to the collapse of partially or fully expanded layers to unexpanded layers.

**Key Words:** Ethylene glycol-monoethyl ether • Iron • Nontronite • Oxidation • Specific surface area

*Clays and Clay Minerals*; December 1989 v. 37; no. 6; p. 547-552; DOI: [10.1346/CCMN.1989.0370607](https://doi.org/10.1346/CCMN.1989.0370607)

© 1989, The Clay Minerals Society

Clay Minerals Society ([www.clays.org](http://www.clays.org))

---