
Adsorbed Cr(III) on Chlorite, Illite, and Kaolinite: An X-ray Photoelectron Spectroscopic Study

M. H. Koppelman¹, A. B. Emerson¹ and J. G. Dillard

Department of Chemistry, Virginia Polytechnic Institute and State University Blacksburg, Virginia 24061

¹ Present address: Georgia Kaolin Research Laboratories, 25 Route 22, East, Springfield, New Jersey 07081.

Abstract: The adsorption of Cr(III) was studied at pH 1, 2, 3, 4, 6, 8, and 10 on chlorite and kaolinite and at pH 1, 2, 3, and 6 on illite. The amount of chromium adsorbed on chlorite varied from 3.1×10^{-5} mole/g at pH 1 to 16.6×10^{-5} mole/g at pH 4, and on illite from 4.9×10^{-5} mole/g to 9.2×10^{-5} mole/g at pH 1 and 3, respectively. Kaolinite adsorbed 3.7×10^{-5} mole Cr/g at pH 1, 2, and 3 and 5.5×10^{-5} mole Cr/g at pH 4. Measurements of the Cr 2p core-level binding energies indicate that chromium is probably adsorbed as a Cr(III) aqua ion at pH values below 4. The binding energies for the Cr 2p level for samples prepared above pH 4 compare favorably with the value determined for chromium hydroxide and lead to the conclusion that the chromium species present at pH 6, 8, and 10 is chromium hydroxide.

Key Words: Adsorption • Binding energy • Chlorite • Chromium • Illite • Kaolinite • XPS

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