
Crystallochemical Study of a Population of Particles in Smectites from a Lateritic Weathering Profile

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Abstract: In the copper deposit of Salobo 3A (Brazil), nontronite-like clay samples were found at the bottom of the weathering blanket. Samples were fractionated first by sedimentation and then by a HGMS method. From XRD data, it was found that the samples are essentially smectite with kaolinite in very small quantities. The average structural formula of the smectite, presented in the traditional manner, is: (Si 3.59 Al 0.41) O 10 (Fe 1.53 Al 0.39 Mg 0.08 Ti 0.01 Cu 0.02) (OH) 2 (Ca 0.12 Na 0.09 K 0.01 Cu 0.02) Chemical analyses show that the smectite samples contain a population of clay particles whose chemistry ranges between a nontronite end-member and an Al-Mg beidellite end-member.

Spectroscopic studies by FTIR, Mössbauer, and ESR show that the three major octahedral cations (Al, Fe, Mg) are present in each octahedral sheet of the smectite, forming a solid solution, and that the chemical trends of the smectite clay detected at a " macroscopic " scale (associated clay particles) can also be observed at the unit cell scale.

Key Words: Crystal-chemistry • ESR • FTIR • Layer structural composition • Mössbauer • Nontronite • Smectite • Solid-solution

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