
Hydroxy-Cu-Vermiculite Formed by the Weathering of Fe-Biotites at Salobo, Carajas, Brazil

Philippe Ildefonse¹, Alain Manceau², Dominique Prost¹ and Maria Christina Toledo Groke³

¹ Laboratoire de Pédologie, Université Paris 7, 2 place Jussieu, 75251 Paris Cedex 05, France

² Laboratoire de Minéralogie-Cristallographie, UA 0– 9, Universités Paris 6 et 7, 4 Place Jussieu, 75230 Paris Cedex 05, and Laboratoire pour l'Utilisation du Rayonnement Electromagnétique (LURE) C.N.R.S., 91450 Orsay, France

³ Instituto di Geosciencias, Universidad de Sao Paulo, Caixa Postal 20-899, CEP 1014 98 Sao Paulo, Brazil

Abstract: Weathering of a copper stratiform deposit (schist) at Salobo, Brazil, has produced two distinct Cu-bearing minerals from a biotite parent: vermiculite and a manganese oxide containing as much as 13% and 25% CuO, respectively. Manganiferous products were formed as the result of an interhorizon transfer of solutions through a fissure system. Thus, the structural orientation of the schists was a major factor in controlling the supergene concentration of Cu. The Cu-vermiculite formed by the weathering of Fe-biotite, although the unweathered biotites in the parent rocks were found to contain no copper, suggesting that Cu was supplied by weathering solutions. X-ray powder diffraction (XRD) and cation-exchange capacity data for the Cu-vermiculite differ from those of typical Mg-vermiculite and are similar to those of hydroxy-Al-vermiculite. A comparison of the XRD pattern of the Cu-vermiculite with that of a Cu-free vermiculite indicates that Cu atoms are located in interlayer sites. Cu probably occurs in a brucite-like layer. The position and structure of the Cu K-absorption spectrum suggest that the Cu is divalent and exists in 6-fold coordination.

Key Words: Cation-exchange capacity • Copper • Intergrade • Manganese oxide • Supergene enrichment • Vermiculite • Weathering

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