

The occurrence of tinsleyite in the archaeological site of Santana do Riacho, Brazil

GERALDO MAGELA DA COSTA^{1,*} AND RÚBIA RIBEIRO VIANA²

¹Chemistry Department, Universidade Federal de Ouro Preto, 35400, Ouro Preto, Minas Gerais, Brazil

²Geology Department, Universidade Federal de Ouro Preto, 35400, Ouro Preto, Minas Gerais, Brazil

ABSTRACT

A second occurrence of tinsleyite, $\text{KAl}_2(\text{PO}_4)_2(\text{OH}) \cdot 2\text{H}_2\text{O}$, is reported. The mineral exists as a thin layer in a quartzite wall partially covered by rock paintings, and was characterized by X-ray diffraction, thermal and chemical analysis, and by Mössbauer spectroscopy. The calculated cell parameters are $a = 9.58(6)$, $b = 9.53(4)$, $c = 9.54(6)$ Å, $\beta = 103.2(4)^\circ$. Chemical analysis showed the presence of 3.9% Fe which probably replaces Al in the octahedral site. The Mössbauer spectra from room temperature down to 85 K show the existence of two Fe^{3+} doublets with $\Delta E_{Q1} \sim 0.57$ mm/s and $\Delta E_{Q2} \sim 1.0$ mm/s. At 77 K the spectrum drastically changes, suggesting that a structural transition might have occurred. The formation of tinsleyite might be due to the reaction of phosphate-rich water which runs along the fractures of the wall. The existence of tinsleyite in such a relatively large abundance indicates that this mineral might not be rare as previously thought.