

## **Crystal-chemistry of talc: A near infrared (NIR) spectroscopy study**

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### **ABSTRACT**

The crystal-chemistry of fifteen samples of talc from various localities and origins having a relatively wide range of Fe, Al, and F contents, have been studied mainly by Fourier-transform infrared (FTIR) spectroscopy, in both the near infrared (NIR) and middle infrared (MIR) regions, and by Mössbauer spectroscopy. For the first time, assignments have been made for the 2νOH bands in talc, and Mg/Al substitutions were revealed using NIR. Less than 0.01 atom of Fe<sup>2+</sup> or Al per half unit cell can be detected from the 2νOH region, whereas the sensitivity is about half in the νOH region. The amounts of F also can be quantified by NIR measurement, using the F inductive effect on the width of the 2νMg<sub>3</sub>OH band. The NIR data show that Fe<sup>2+</sup> and Mg are distributed randomly in their octahedral sheet. Actual structural formulae of natural talcs can be obtained from NIR and Mössbauer spectroscopies only, even for impure talc samples. NIR spectroscopy is simple to use and is a very powerful tool to study the crystal chemistry of talc.