

## **Orientalional order-disorder of $\text{N}(\text{D},\text{H})_4^+$ in tobelite**

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### **ABSTRACT**

Orientalional order-disorder behavior of  $\text{NH}_4^+$  is a well-established phenomenon in certain ammonium halides and ammonium salts. Anticipating similar behavior of ammonium in the interlayer site of tobelite, synthetic  $\text{ND}_4/\text{NH}_4$  tobelite has been studied by infrared spectroscopy from room temperature down to 20 K. Both  $\text{ND}_4$  and  $\text{NH}_4$  are found to occupy the interlayer site in this mica structure. The spectra show noticeable changes on cooling. Autocorrelation analysis reveals distinct changes in the line width of the central autocorrelation peak. This is attributed to the transition of the  $\text{ND}_4^+$  group from an orientationally disordered state at higher temperatures to a relatively ordered state below a critical temperature of 140 K. The order parameter for the transition follows classical second-order behavior as a function of temperature.