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The infrared spectrum of synthetic akaganéite, β-FeOOH

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ABSTRACT

Fourier-transform infrared spectra of a synthetic akaganéite, β-FeOOH, were acquired in transmittance, attenuated total reflectance (ATR) and diffuse reflectance. The transmittance spectra showed a distinct dependence on the mode of sample preparation: measurements taken on pellets prepared by pressing the sample with alkali halides (KBr or CsI) displayed bands at 1096, 1050, and 698 cm^{-1} that were not observed in spectra of the neat material and must therefore be considered artifacts. Variations in the sampling environment (e.g., water and/or organic volatiles) were also observed to exert a noticeable influence on the development of the IR spectra.

Infrared bands due to akaganéite were found at 3480 + 3390 (doublet), 1630, 850 + 820 (doublet), 650, 490, and ~420 cm^{-1}. Diffuse reflectance spectra dominated by volume scattering (loose), diffuse reflectance spectra comprised of both volume and surface scattering (compacted), ATR spectra (surface only), and transmittance spectra (absorbance only, inverse of ATR) showed compatible trends for the akaganéite features both above and below ~1000 cm^{-1}. This indicates that the multiple akaganéite measurements are consistent and confirms the band assignments.