
Structural and Magnetic Properties of Ferrihydrite

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Abstract: ⁵⁷Fe Mössbauer spectra of two synthetic samples of ferrihydrite, recorded at 4.2 K in applied fields of up to 9 T, have been analysed by a mean-field model. The samples exhibit two and six X-ray diffraction peaks. It is shown that only one ferric ion site is present in the mineral, and that in this site the ions are octahedrally coordinated. The spectra show the presence of different magnetic states: ferrimagnetism in two-line ferrihydrite, and antiferromagnetism in six-line ferrihydrite. The ferrimagnetism in two-line ferrihydrite is analysed in terms of random fluctuations arising from the small numbers of ferric ions per particle, and it is shown that the different magnetic states may arise purely as a result of these fluctuations.

Key Words: Ferrihydrite • Ferrimagnetism • Antiferromagnetism

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