
Influence of Chloride on the Formation of Iron Oxides from Fe(II) Chloride. II. Effect of [Cl] on the Formation of Lepidocrocite and its Crystallinity

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Abstract: Diffractograms of lepidocrocites formed from the oxidation of Fe(II) chloride solutions at pH 7 and 25° C showed differential line broadening with (0k0) reflections being much sharper than (hk0) or (hkl). As the initial [Cl]/[Fe] ratio was increased from 2, crystallinity increased in all axial directions, as defined by the width at half height of diffraction peaks. At [Cl]/[Fe] ratios greater than ~8, the crystallinity did not increase further, and for reflections involving the a-axis direction, it appeared to decrease. Increased [Cl]/[Fe] ratios changed the rate of the oxidation/hydrolysis reactions. These variations reflect changes in the stability and/or composition of the intermediate green rust phase, (Fe(II)Fe(III) hydroxychloride) in the high [Cl] environment. The influence of the [Cl]/[Fe] ratio was related to the experimental conditions employed, especially where they influenced the rate of oxidation.

Key Words: Chloride • Green rust • Iron oxides • Lepidocrocite • Oxidation • X-ray powder diffraction

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