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Sulfide-iron interactions in domestic wastewater from a gravity sewer

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Abstract:

Interactions between iron and sulfide in domestic wastewater from a gravity sewer were investigated with particular emphasis on redox cycling of iron and iron sulfide formation. The concentration ranges of iron and total sulfide in the experiments were 0.4–5.4 mg Fe L⁻¹ and 0–5.1 mg S L⁻¹, respectively. During anaerobic conditions, iron reduction kinetics were investigated and reduction rates amounted on average to 1.32 mg Fe L⁻¹ d⁻¹. Despite the very low solubility of iron sulfide, the reduced iron reacted only partly with sulfide to produce iron sulfide, even when dissolved sulfide was in excess. When a ferric chloride solution was added to sulfide containing anaerobic wastewater, the ferric iron was quickly reduced to ferrous forms by oxidation of dissolved sulfide and the ferrous iron precipitated almost completely as iron sulfide. During aerobic conditions, iron sulfide was oxidized with a half-life period of 11.7 h. The oxidation rate of iron sulfide was significantly lower than that reported for the oxidation of dissolved sulfide.

Key-words: Iron, precipitation, sewer, sulphide, wastewater