Investigating the Rate of Hydrogen Sulfide Removal by Manganese GreensandPlus® for Use in Large Scale Wastewater Treatment

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Moyle (1944) found that lakes with high sulfate levels do not contain wild rice. In wetland soil with low oxygen concentrations, bacteria convert sulfate from municipal or industrial sources into sulfide which is toxic to wild rice and many other freshwater organisms. Sulfide reacts with iron found in soil and iron is commonly used to control sulfide generated during biogas production. A commercially available manganese oxide, Manganese GreensandPlus®, undergoes reactions with sulfide similar to iron and has been used to control sulfide levels in groundwater. However, its reaction properties in high sulfide environments, such as those found in wastewater, are unknown. In this study, the reaction kinetics between Manganese GreensandPlus® and various concentrations of hydrogen sulfide were investigated. A set of batch experiments was used to determine the reaction rate coefficients where Manganese GreensandPlus® was used to convert several different concentrations of hydrogen sulfide into elemental sulfur. The value of the reaction rate coefficient was found to be proportional to the sulfide concentration at lower concentrations but reached a maximum at higher concentrations where the mass transfer limit of the Manganese GreensandPlus® was reached. Understanding the reaction rate coefficient is an important step towards developing a cost effective and low-waste filter to remove sulfides from natural waterways.

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