



Removal of manganese from surface water with oxidants in supplement to natural manganese sand in Sinopec Shanghai Ltd.

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Received 11 June 2009; Accepted 25 August 2009

ABSTRACT

Sinopec waterworks in Shanghai has limitations on its current treatment process to effectively remove Mn(II) from its surface water source. Previous study used natural manganese sand together with quartz sand to intercept Mn(II) and demonstrated that natural manganese sand cannot provide a stable Mn(II) removal when Mn(II) > 0.30 mg/L in the water source. In order to provide a more reliable Mn(II) removal strategy for Sinopec waterworks, this study applied chlorine dioxide, potassium permanganate, hydrogen peroxide, and aeration separately in supplement to natural manganese sand to remove Mn(II) within a pilot experiment system that simulates the current water treatment process in Sinopec waterworks. Experiment results indicated that chlorine dioxide and potassium permanganate both showed effective Mn(II) removal capabilities, with KMnO_4 more appropriate for Sinopec waterworks. Hydrogen peroxide showed a negative impact on Mn(II) removal by dissolving $\text{MnO}_x(\text{s})$. The improvement on Mn(II) removal from aeration was not promising neither. Final suggestion is to apply potassium permanganate as a pre-treatment process at about the stoichiometric Mn(II) oxidation requirement and keep filtration speed and coagulant dosage at Sinopec waterworks engineering convenience. Natural manganese sand still be used as a buffer for Mn(II) removal.

Keywords: Drinking water treatment; Manganese; Natural manganese sand; Oxidation; Potassium permanganate; Surface water

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