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## Arsenic(III) Remediation from Contaminated Water by Oxidation and Fe/Al Co-Precipitation

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### ABSTRACT

Battery grade  $\gamma$ - $MnO_2$  powder was investigated as an oxidant and an adsorbent in combination with Fe/Al coagulants for removal of arsenic from contaminated water. Simultaneous oxidation of As(III) and removal by coprecipitation/adsorption (one step process) was compared with pre-oxidation and subsequent removal by coprecipitation/adsorption (two step process). The rate of As(III) oxidation with  $MnO_2$  is completed in two stages: rapid initially followed by a first order reaction. As(III) is oxidised to As(V) by the  $MnO_2$  with a release of approximately 1:1 molar Mn(II) into the solution. No significant pH effect on oxidation of As(III) was observed in the pH range 4 - 6. The rate showed a decreasing trend above pH 6. The removal of As(V) by adsorption on the  $MnO_2$  decreased significantly with increasing pH from 4 to 8. The adsorption capacity of the  $\gamma$ - $MnO_2$  with particle size 90% passing  $10\ \mu m$  was determined to be 1.5 mg/g at pH 7.  $MnO_2$  was found to be more effective as an oxidant for As(III) in the two step process than in the one step process.

### KEYWORDS

Manganese Oxides, Iron Hydroxides, Arsenic Remediation, Fe/Al Coagulants, Contaminated Water

### Cite this paper

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