

of organic matter is present, iron can be held in solution at pH levels of up to 9.5.

Copper ions and silica have a catalytic effect on the oxidation of iron and manganese [11]. The presence of about 0.1 mg/l of copper increases the rate of iron oxidation 5–6 times. Silica increases oxidation rates of both metals. Manganese oxides are catalytic in the oxidation of manganese. Tray aerators frequently contain coke or stone contact beds through which the water percolates. These media develop and support a catalytic coating of manganese oxides.

**11.33** Untreated well water contains 1.2 mg/l of iron and 0.8 mg/l of manganese at a pH of 7.5. Calculate the theoretical dosage of potassium permanganate required for iron and manganese oxidation.

$$11.33 \quad 1.2 \frac{1.0}{1.06} + 0.8 \frac{1.0}{0.52} = 2.7 \text{ mg/l of } \text{KMnO}_4$$

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