

Hydrogen Sulfide Removal with Ozone

Background

Hydrogen sulfide is sometimes found in ground water. It has the odor of rotten eggs and has a threshold of 0.0011 mg/l. It can also cause water to have characteristic and unpleasant tastes. While aeration can be used to strip some of the hydrogen sulfide from the water, this converts a water problem to an air pollution problem if further treatment is not applied.

Hydrogen sulfide is easily oxidized by ozone, ultimately to form sulfate. The initial oxidation is to form elemental sulfur which is seen as a light colored colloidal suspension. Further oxidation dissolves the elemental sulfur to sulfite and continued oxidation produces sulfate. As a result, more ozone is required to produce sulfate from hydrogen sulfide than is required sulfur.

Design Considerations¹

The theoretical dose to oxidize ozone to sulfate is 3:1, but in practice the ratio is 4:1. This will leave a small ozone residual in the water, 0.2-0.3 ppm. This residual can be used to ensure that the hydrogen sulfide is fully removed. In the case of variable hydrogen sulfide concentration, following the residual will allow for adjustment in the ozone dosage rate to maintain complete removal of the ozone.

Ozone should only be injected into the first chamber of contact vessel if fine bubble diffusers and a multiple chambered contact vessel are employed. If ozone is injected in later chambers the off gas might strip hydrogen sulfide from the water. This can foul the catalyst used to destroy excess ozone in the off gas. The proper injection point should allow for a long (2 year) catalyst lifetime.

Spartan Environmental Technologies

Spartan provides ozone generators and other equipment for various water and air treatment applications, including the removal of hydrogen sulfide from water. For further information, please contact Spartan by phone, fax or e-mail using the contact information at the bottom of the page.

Rakness, K.L. 2005. Ozone in Drinking Water Treatment: Process Design, Operation and Optimization. AWWA Denver, CO

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