AquaSorb® CX-MCA

Hydrogen Sulfide Removal from Water

The "rotten egg" odor in some water supplies is caused by sulfide in water. Sulfide can be treated using oxidation techniques, the goal being to convert the sulfide to high oxidation state species such as sulfate to eliminate the taste and odor concerns. Traditional oxidation techniques such as ozone and chlorine can be used, but can be expensive due to the equipment required to add and monitor the oxidant, and can lead to by-products such as trihalomethanes (THMs), which are regulated in drinking water supplies.

Activated carbon, a well recognized technology for removal of various compounds from water, can be utilized to remove sulfide from water, without the need to add additional oxidant. Although not a traditional application for activated carbon, sulfide in water is removed by a carbon catalyzed oxidation reaction, utitlizing dissolved oxygen in the water.

Removal Chemistry

Standard activated carbons are not designed to remove sulfide from water since the removal mechanism is not the standard adsorption mechanism, rather the removal process is one of adsorption and subsequent oxidation of the sulfide to a higher oxidation state sulfur species. The use of AquaSorb® CX-MCA is required to insure efficient removal of the taste and odor causing reduced sulfur species.

Sulfur can exist in many oxidation states, and therefore the reaction chemistry is very complex, however some general reactions for the oxidation of sulfide can be written to explain some of the major reaction species:

$$S_2^- + O_2 \rightarrow S_8 + SO_3 + SO_4 + S_x \text{ (Where X is 2,3,...7)}$$

The reaction product is determined by the amount of oxygen present, which in water is limited due to the solubility of oxygen in water. Using air, the dissolved oxygen content can reach the 7-8 mg/l range depending on temperature, and can reach 35mg/l if pure oxygen is used, which is unlikely for various reasons. The primary reaction products are elemental sulfur (S_8) and polysulfides (S_{2-7}), which once formed will remain within the carbon pore structure. Over time, these species can be further oxidized, although very slowly, to form sulfate, thus regenerating the carbon.

System Design

In order to insure effective removal of the sulfide, a proper system design is required. As a minimum, the system design guidelines below should be followed.

Empty Bed Contact Time (EBCT):	min. 3 minutes
Dissolved O_2 concentration:	min. 4 mg/l
Backwash flow rate:	8-10 gpm/ft^2

It is critical that these system designs are followed to insure the AquaSorb® CX-MCA is effectively utilized and to achieve the full removal capacity.

Although capacity is affected by many parameters such as oxygen concentration, sulfide concentration, as well as other adsorbable compounds in the water, the sulfide capacity for AquaSorb® CX-MCA is approximately 8% by weight.

For example, using 20,000 lbs of AquaSorb® CX-MCA, at 1 mg/l sulfide and 500 gpm flow rate, the AquaSorb® CX-MCA carbon should last approximately 267 days.

Advantages of AquaSorb® CX-MCA Activated Carbon

- Superior hardness compared to coal based carbons
- Superior adsorption capacity for trace level organic compounds compared to coal based carbons
- Low dust and turbidity compared to coal based carbons
- Low ash content compared to coal based carbons

For more information or to contact Jacobi visit: www.jacobi.net

JACOBI-TIS-AQUASORB-CXMCA-H2S-A4-ENG-A1113

Jacobi Corporate Headquarters
Slöjdaregatan 1
SE-39353 Kalmar | Sweden
Tel: +46 480 417550 | Fax: +46 480 417559
info@jacobi.net | www.jacobi.net

Jacobi
THE CARBON COMPANY