TECHNICAL BULLETIN

19 Motivation Dve Wangara, WA, 6065 AUSTRALIA
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SODIUM METABISULFITE (SMBS) SOLUTIONS

BISULFITE SOLUTIONS FOR SANITISING, DECHLORINATION AND RO MEMBRANES

MATERIAL & FUNCTION

SODIUM METABISULFITE SOLUTIONS (SMBS 40%, 37%, 20%, 12.5% and 5%) are a source of sulfur dioxide which has strong antimicrobial properties. It is also a strong reducing agent used for removing chlorine and chloramines from water. It releases sulfur dioxide a pungent, unpleasant smelling gas that can also cause breathing difficulties in some people. It is used as a sterilizer, antioxidant and preservative.

An **SMBS** solution is made by dissolving solid **SODIUM METABISULFITE** into water and has a pH of 4.6 at 1.0 % (by weight) solution strength. The **SMBS** solution is not stable to air and reacts with oxygen as well as chlorine, therefore it is recommended that batches of less than 2 % by weight be used within 3 to 7 days and batch solutions less than 10 % be used within 7 to 14 days. Theoretically, 0.70 ppm of **SODIUM METABISULFITE**) will stoichiometrically neutralize 1.0 ppm of chlorine.

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· $Na_2S_2O_5$ (**SODIUM METABISULFITE**) + H_2O → 2 $NaHSO_3$ (sodium bisulfite)

· $NaHSO_3$ + HOCl → $NaHSO_4$ (sodium bisulfate) + HCl (hydrochloric acid)

· $NaHSO_3$ + Cl_2 + H_2O → $NaHSO_4$ + 2 HCl

APPLICATIONS

1. Dechlorination:

Free Available Chlorine in RO and NF feed waters need to be reduced to less than 0.05 ppm (as Cl_2) for compliance of Composite Polyamide [CPA] membrane warranties. The two most common pretreatment methods for reducing chlorine levels are by absorption onto activated granular carbon filter media or by the use of a chemical reducing agent such as sodium bisulfite.

Pressurized carbon filters are typically used on small systems (50 to 100 gpm or less) due to capital cost considerations. The advantages of a carbon filter are their ability to remove organics from the feedwater that could foul the RO membrane and they are more reliable in treating all the feed water than a chemical feed system. The disadvantage is that carbon filters are notorious for breeding bacteria that can result in a biological fouling of the RO. Carbon filters have been known to see a doubling of viable bacteria counts in 24 hours

SODIUM METABISULFITE [**SMBS**] is the typical chlorine reducing agent of choice for larger RO systems.

A dosing rate of 2.0 to 3.0 ppm **SMBS** per 1.0 ppm chlorine so as to include an industrial safety factor for brackish water RO systems with at least 20 seconds of reaction time. Proper in-line mixing is required which preferably includes a static mixer.

The advantages of **SMBS** dechlorination are that it is less capital intensive than carbon filters for large systems, the reaction by-products are readily removed by the RO, and residual **SMBS** is readily removed by the membrane.

The disadvantages of **SMBS** are the small volume of chemical required, the increased risk in chlorine making it to the membranes if sufficient monitoring and controls are not designed into the dechlorination system. In a few cases where Sulfur Reducing Bacteria [SBRs] are present in the feed supply the bisulfite functions as a nutrient and enhances their growth. SBRs are usually found in anaerobic (low oxygen content) shallow ground water. Frequently hydrogen sulfide (H_2S) is also

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present as a by-product of the SBR metabolic process.

Monitoring for dechlorination can be performed by the use of an Available Free Chlorine monitor, monitoring for a residual bisulfite concentration, or by an ORP monitor. The preferred method is to monitor for a residual bisulfite concentration, as this assures one that sufficient bisulfite exists to have neutralized all chlorine. Most commercial chlorine monitors measure with accuracy down to only 0.1 ppm, which is the upper limit for CPA membranes. The use of ORP monitors to indirectly measure residual bisulfite levels by the oxidation/reduction (Redox) level of the feedwater have proven not to be reliable due to hard to predict variability of the baseline millivolt readings.

ANTIMICROBIAL AGENT

Microbial growth can occur on either side or within the membrane. To be effective in killing microbes in the units when only one side of the membrane is available to treatment the antimicrobial composition must be able to pass through the membrane. Most common organic antimicrobial compounds having molecular weight greater than about 150 cannot successfully prevent or destroy microbial growth within membranes and on both surfaces since they cannot pass through the membrane.

SMBS solution should be dosed at 0.1 % v/v to 0.3% v/v at ambient temperature and left in contact with the Membrane for at least 30 minutes. Ensure that manufacturer's recommendations with respect to temperature, pH, time and concentration are met.

Theoretically, **SMBS** solution contains 40% **SODIUM METABISULFITE**. However, It does react with oxygen in the air and will lose some activity as Sulfur dioxide gas. Strength will also decrease on exposure to sunlight and heat. At full strength, Mem Clean MBS contains the equivalent of 24 % SO_2

CAUTION

Avoid contact with skin and eyes and avoid breathing vapour or spray mist. SMBS solution is an aqueous solution producing sulfur dioxide. A Material Safety Data Sheet (MSDS) is available on request.

Classification: Xn Harmful. R22 Harmful if swallowed. R31 Contact with acids liberates toxic gas. R41 Risk of serious damage to eyes.

PACKAGING

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15, 20, 200 Litre containers

IMPORTANT NOTICE TO CUSTOMER

Since the use of this product is beyond the control of either seller or manufacturer, their only obligation shall be to replace any quantity of product which is proven defective. They cannot assume any risk or liability in excess of the purchase price of the product itself, which does not include labour or any consequential damages resulting from the use of this product. Determining the suitability of this product for any intended use shall be solely the responsibility of the user. **ALWAYS TEST FIRST**