Sodium Bromide 40

MICROBICIDE PRECURSOR FOR COOLING WATER

GENERAL:

Sodium Bromide 40 is 40% aqueous solution of sodium bromide (NaBr) for use in the generation of hypobromous acid (HOBr) in cooling water systems. Sodium Bromide 40 provides the most cost-effective way to brominate cooling water systems. Using Sodium Bromide 40 can be up to four times less costly than solid bromine donors. Because Sodium Bromide 40 is a liquid, the dosage can be more easily regulated than difficult to dissolve tablets.

Bromine is the oxidizing microbiocide of choice in alkaline cooling water systems (pH > 8.0). This is due to the more favorable dissociation curve of bromine compared to chlorine. Both chlorine and bromine will dissociate in cooling water to form hypohalous acid and hypohalite ion, the hypohalous acid (HOCl and HOBr) form being the more effective microbiocide over the hypohalite ion (OCl^- and OBr^-). At alkaline cooling water pH, a significantly greater percentage of bromine is in the hypohalous, or microbicidal form, than is the case with chlorine.

In addition to the dissociation curve, combined chlorine, such as chloramine, retains only a fraction of its microbicidal properties. Bromamines, however, provide microbicidal properties equivalent to the hypohalous acid form. This property is especially useful in systems that contain ammonia as a contaminant.

APPLICATION:

Sodium Bromide 40 requires activation by a chlorine or other oxidant source. Sodium hypochlorite (NaOCl) is generally recommended for the activation process. Sodium Bromide 40 and NaOCl should be pumped separately into a by-pass line prior to an in-line static mixer before introduction to the system. Doing so will ensure efficient activation of the bromide. When doing so, be sure to use materials suitable for handling both Sodium Bromide 40 and hypochlorite.

Sodium Bromide 40 and hypochlorite will react to form HOBr by the following reactions:

$NaOCl + NaBr \rightarrow NaOBr + NaCl$

$NaOBr + H_2O \rightarrow HOBr + NaOH$

Bromination frequency using Sodium Bromide 40 will depend on operating parameters and contaminants found in the system. Typical applications might include: a daily or twice daily bromination period of from 1 - 6 hours or a less frequent application of 1 - 5 days a week for 1 - 8 hours. Less

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frequent additions can be supplemented with non-oxidizing microbiocides, such as WSCP, MECT 5, or NABE-M.

Residuals maintained will be based on the needs of the system, but generally a 0.2 - 1.0 ppm TRO (total residual oxidant as Cl_2) is sufficient. Residuals can be measured using any standard chlorine test kit.

Typical Product Characteristics

Density at 25°C .....1.43 g/mL
Weight per U.S. Gallon .....11.9 lb.
pH (neat) .....6.5 - 7.5
Freeze point ..... - 32°C
Flash Point ..... > 100 ° C

The ratio of chlorine to bromine used will again depend on the nature of the system and will typically range from a 1:1 to a 4:1 molar ratio. Recirculating cooling water systems should use a ratio closer to 4:1 as the chlorine present will reactivate some of the bromide ion in the system. In once-through systems and in systems with high ammonia levels, a 1:1 ratio will provide the most effective control.

To calculate the amount of Sodium Bromide 40 and NaOCl needed at a given molar ratio, please refer to the Bromination Dosage Selection Chart.

PACKAGING AND HANDLING:
Sodium Bromide 40 is a liquid packed in non-returnable drums and in bulk. Refer to Material Safety Data Sheet for suitable materials of construction for handling and storing this product.
Improper handling of this product can be injurious to workers. Observe all safety precautions shown on the label and in the Material Safety Data Sheet.

Bromination Dosage Selection Chart

ppm NaOCl and Sodium Bromide 40 to achieve 1 ppm TRO (as Cl_2)

Molar Ratio	lbs. 10% NaOCl/lb. Sodium Bromide 40	NaOCl	Sodium Bromide 40
1:1	3	10.5	3.6
2:1	6	10.5	1.8
3:1	9	10.5	0.9
4:1	12	10.5	0.45

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