

Neutralization of Perasan® A and BioSide® HS 15% using sodium metabisulfite and sodium bisulfite

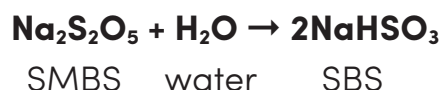
Background

Sodium metabisulfite (SMBS) and sodium bisulfite (SBS) are common reducing agents used to neutralize oxidizers such as peracetic acid (PAA) and hydrogen peroxide (H2O2). Enviro Tech Chemical Services' peracetic acid products are equilibrium mixtures of both PAA and H2O2.

These compounds are powerful oxidizing agents whose activity degrades slowly over time; as long as active PAA and H2O2 are present, oxidation will occur. In the field, it is common to use sodium metabisulfite and sodium bisulfite to totally neutralize peracetic acid mixtures and therefore halt their activity on demand. When these applications are required, it is important to know exactly how much reducing agent is needed to completely neutralize the active oxidizers present. This paper will explain in detail how much of each reducing agent (SBS or SMBS) is required to neutralize the peracetic acid and hydrogen peroxide from two of Enviro Tech most common PAA products: Perasan® A and BioSide® HS 15 %.

Neutralization using sodium metabisulfite (recommended)

Enviro Tech Chemical Services recommends sodium metabisulfite as the most cost-effective reducing agent for peracetic acid products. This is because one molecule of SMBS dissolves in water into two molecules of sodium bisulfite as shown below.



Therefore, SMBS is more efficient on a per mass basis at neutralizing mixtures of PAA when compared to SBS. The following values must also be considered when neutralizing PAA:

- Perasan® A is a mixture of 26.5% H2O2 and 5.6% PAA, a mass ratio of 4.74:1.
- BioSide® HS 15% is a mixture of 22% H2O2 and 15.2% PAA, a mass ratio of 1.47:1.
- 1 ppm PAA requires 1.25 ppm SMBS for total neutralization.
- 1 ppm H2O2 requires 2.79 ppm SMBS for total neutralization.

These values were used to calculate the total amount of SMBS needed to neutralize both the hydrogen peroxide and peracetic acid present for every 1 ppm of peracetic acid. The results of these calculations are shown in **Table 1**.

PHYSICAL PROPERTIES

Appearance:	Clear vinegar-like odor
Concentration:	5.5 – 5.9% as peracetic acid 26.5 – 27.3% as hydrogen peroxide
pH (1% solution):	2.8
Solubility in Water:	Complete
Freezing Point:	< -12° C (10° F)
Stable (when properly stored):	1-year shelf life

TABLE 1. Neutralization of Perasan A and BioSide HS 15% with sodium metabisulfite.

	Perasan® A	BioSide® HS 15%
Each 1 ppm PAA	4.74 ppm H ₂ O ₂	1.47 ppm H ₂ O ₂
Each 1 ppm PAA requires	1.25 ppm SMBS	1.25 ppm SMBS
Each 1 ppm H ₂ O ₂ require	2.79 ppm SMBS	2.79 ppm SMBS
Total SMBS required per 1 ppm PAA	14.47 ppm SMBS	5.27 ppm SMBS
100% SMBS required per 1 ppm PAA per 1 million gallons	120.6 lbs	43.9 lbs

The final result can be multiplied based on the concentration of your application to give the total amount of SMBS needed for neutralization. For example, an application of 5 ppm PAA from BioSide® HS 15% would require 43.9 lbs x 5 = 219.7 lbs SMBS per 1 million gallons of water.

Neutralization using sodium bisulfite

Neutralization with sodium bisulfite (SBS) is slightly less efficient. The following values must be taken into consideration:

- 1 ppm PAA requires 1.37 ppm SBS for total neutralization.
- 1 ppm H₂O₂ requires 3.06 ppm SBS for total neutralization.

These values were used to calculate the total amount of SBS needed to neutralize both the hydrogen peroxide and peracetic acid present for every 1 ppm of peracetic acid. *The results of these calculations are shown in Table 2.*

TABLE 2. Neutralization of Perasan A and BioSide HS 15% with sodium bisulfite.

	Perasan® A	BioSide® HS 15%
Each 1 ppm PAA	4.74 ppm H ₂ O ₂	1.47 ppm H ₂ O ₂
Each 1 ppm PAA requires	1.37 ppm SBS	1.37 ppm SBS
Each 1 ppm H ₂ O ₂ require	3.06 ppm SBS	3.06 ppm SBS
Total SBS required per 1 ppm PAA	15.86 ppm SBS	5.78 ppm SBS
100% SBS required per 1 ppm PAA per 1 million gallons	132.2 lbs	48.2 lbs

The final result can be multiplied based on the concentration of your application to give the total amount of SBS needed for neutralization. For example, an application of 8 ppm PAA from Perasan® A would require 132.2 lbs x 8 = 1057 lbs SBS per 1 million gallons of water.