Chemical Formula: HSO₃NH₂

CAS Number: 5329-14-6

Molecular Weight: 97.10  Equivalent Weight: 97.10

Purpose: A descaler/cleaner.

Applications: Boiler and cooling systems and their associated heat exchange equipment. When properly inhibited, used to clean carbon steel, copper, admiralty brass, and, without chlorides, austenitic stainless steels. Not recommended for aluminum, zinc, cast iron, or 410 stainless steels. Best when used on calcium carbonate scale. Not effective on silica or calcium phosphate scales. Takes longer than hydrochloric acid to clean.

Dosage Range: 5 to 10% solution by weight (or 40 to 80 pounds per 100 gallons of water).

Neutralization: Neutralize with 1 to 2% sodium carbonate solution (soda ash, Na₂CO₃) with a target pH of 6 to 10 or whatever discharge pH range applies. Theoretically, it requires ½ pound of soda ash per 1 pound of sulfamic acid. Reality may be different, as some of the sulfamic acid will be consumed in the cleaning. The neutralization step should happen externally to the system so the precipitants don’t form within the system.

Synergies: When prepared in combination with sodium chloride (10% HSO₃NH₂, 5% NaCl), the solution is moderately effective for dissolving ferric oxide (do not use sodium chloride with stainless steels though).

Tests: pH. It is recommended that sulfamic acid be added to a sample of scale to determine its cleaning effectiveness first.

Properties: White, crystalline solid that, when dry, has negligible effect on the skin or clothing (always refer to MSDS). It produces no localized etching or pitting.

Concentration Effects:

Too Low: An effect cleaning will not be realized.

Too High: Corrosion to the system.

Microbiological Effects: None known.
Temperature Effects: Higher temperatures (>95°F) increase the cleaning ability. “The hotter, the better” with 120°F being effective. Hydrolyzes in hot aqueous solution to ammonium bisulfate.

Solubility: 200,000 ppm at 0°C and 400,000 ppm at 70°C.

Specific Gravity: 2.03 (at 12°C referred to water at 4°C).

Reactivity: Reduces nitrite to nitrogen.

Incompatibilities: Because it reduces nitrite to nitrogen, care must be taken to completely flush the sulfamic acid from the system before attempting to repassivate a cleaned system with sodium nitrite. Also incompatible with strong alkalis, chlorine, hypochlorous acid, hypochlorites, cyanides, and sulfides with the hazardous decomposition products being sulfur oxides and ammonia. (Always refer to MSDS.)

Example Cleaning Procedure:

1. Pre-mix the dry sulfamic acid in a tank, drum, or bucket prior to adding to the system. Add enough sulfamic to achieve 5 to 10%, by weight, being added to the total system volume to be cleaned.

2. Add the premixed sulfamic acid to the system fill the rest of the way with water.

3. Recirculate the 5 to 10% sulfamic acid solution through the system for several hours to a day to remove the scale. For heavy scaling, more than a day may be required.

4. Monitor the scale removal until the desired results are achieved.

5. Pump out or drain all the spent cleaning solution for pH adjustment prior to discharge to drain.

6. Refill the system with water and add 1 to 2% of soda ash, by weight, to neutralize the acid.

7. Check system pH and if it is between 6 to 10 (or any applicable pH range), drain the system. (You can use this high pH rinse water to help neutralize the low pH spent cleaning solution.)

8. Refill and place the system back into operation.