

PRODUCT PROFILE

SODIUM HYPOCHLORITE



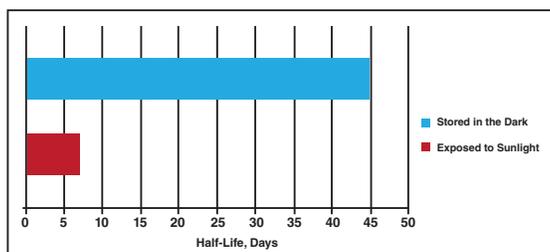
SODIUM HYPOCHLORITE STABILITY

Hill Brothers takes extra measures to ensure high quality bleach is produced to improve the stability of sodium hypochlorite by using strict raw material specifications and implementing a precise process and QC controls. While the decomposition or loss of strength of sodium hypochlorite cannot be completely avoided, it can be minimized at the customer's location. Sodium hypochlorite, be it 5% or 12.5% by weight, is regarded to be of poor quality when it is highly turbid or exhibits a color other than light green to bright yellow.

DECOMPOSITION FACTORS

Two important decomposition pathways will lead to the loss of concentration of sodium hypochlorite. The quicker decomposition pathway leads to the formation of the chlorate ion. The slower decomposition pathway leads to the formation of oxygen. To prevent the build-up of the chlorate ion and to control the stability of sodium hypochlorite the following factors must be considered.

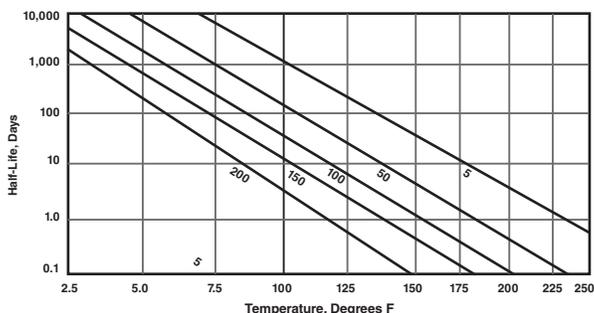
Concentration- Sodium hypochlorite at higher concentrations will have a faster decomposition rate. Conversely sodium hypochlorite at lower concentrations will have a slower decomposition rate. Precautions should be in place to insure the stability of bleach.



The effect of light on the stability of sodium hypochlorite solution (200 gpl available chlorine, 25°C)

UV Light- Product should be kept away from sunlight in order to minimize decomposition. Store product indoors, covered, or in white or opaque containers or tanks.

Temperature- The product should be kept as cool as possible to avoid decomposition and extend the shelf life of the product. Product kept at 60°F is ideal if decomposition is a problem. The decomposition rate of bleach is increased by a factor of 3.5 with every 10°C increase in storage temperature.



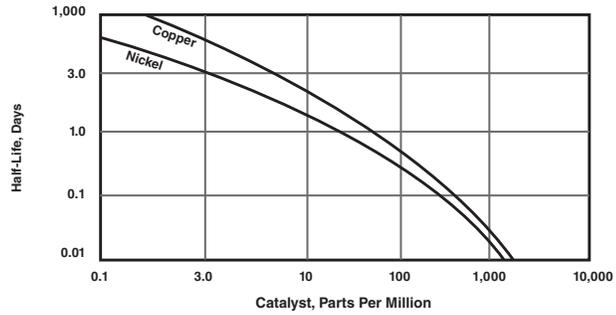
The effects of increasing temperature on the storage life of sodium hypochlorite solutions at different strengths stored in the dark. 200gpl, 150gpl, 100 gpl, 50 gpl and 5gpl.



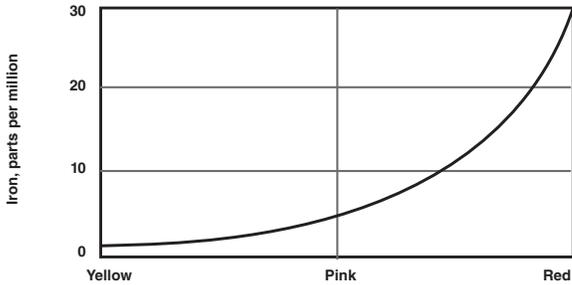
Hill Brothers Chemical Co.
Industrial Chemicals &
Construction Products
Since 1923

CATALYTIC EFFECTS OF METALS

The presence of transitional metal ions will cause the formation of oxygen in sodium hypochlorite solution, thereby, increasing decomposition. Without the presence of transitional metal ions, decomposition is slow. In order to minimize the contaminants from transitional metal ions, Hill Brothers employs the use of a high quality horizontal filtration system. Small particles that may be present from the manufacturing process are removed thereby improving the stability of the product. Metal ions contained in sodium hypochlorite can originate from several sources including the following:



The catalytic effect of copper and nickel on the stability of sodium hypochlorite solution (200 gpl available chlorine, stored in the dark at 25° C)



Iron – Although some iron may come from the sodium hydroxide used in sodium hypochlorite production, other sources include unlined or inappropriate piping, pumps and or storage tanks.

Color

The effect of iron on the color of sodium hypochlorite solution (15% NaOCL, 1% excess NaOH)

Calcium and Magnesium - Calcium and magnesium come from the water that is used to dilute the sodium hydroxide during manufacture. Hill Brothers employs the use of an industrial water softener. Monitoring of the water is done at regular intervals to ensure that the levels of calcium and magnesium (water hardness) are not excessive.

As sodium hypochlorite manufacturers Hill Brothers uses the following elements in our manufacturing process to minimize decomposition caused by transitional metal ions.

Careful Selection of Raw Materials – Hill Brothers uses only membrane grade sodium hydroxide in our manufacturing process.

Proper choice of construction materials – Piping and storage tanks are lined or composed of compatible materials.

Filtration – Small particles consisting of metals and other contaminants are removed in filtration. In addition to improving the stability of the product, filtration will improve the color and turbidity of the sodium hypochlorite solution.

To ensure the stability of your sodium hypochlorite it is also important to consider your process maintenance procedures. By the nature of the product, as high strength sodium hypochlorite ages precipitates will form and fall out of suspension. Periodic cleanout of storage tanks should be performed. This will minimize the buildup of precipitates that increase decomposition.

Rev. 11/11

Integrity, Quality, Safety, and Service...this has been the message of Hill Brothers Chemical Company since the day we opened our doors in 1923. After more than eighty years of commitment to the chemical industry, this simple message still guides our every action. Whether it's our Desert Brand Products, Water and Wastewater Treatment Chemicals, or our Specialty Construction & Concrete Products, we'd like to talk to you about how we can benefit you as the customer.

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