Sodium hypochlorite

Forms of sodium hypochlorite

Sodium hypochlorite is available as solutions of varying strength. Concentrated solutions for disinfection purposes may contain 10 to 18 per cent available chlorine ; domestic and laundry bleaches typically contain 3 to 5 per cent available chlorine ; antiseptic solutions may contain only about 1 per cent chlorine.

Sodium hypochlorite for disinfection is commonly sold in drums, often of 25 litres. A large proportion of the weight of sodium hypochlorite when purchased is water. For this reason it is rarely economical unless other forms of chlorine (such as calcium hypochlorite powder) are unavailable or transport is short and not problematical.

Sodium hypochlorite may sometimes be available as an unwanted by-product of the chemical industry.

Uses of sodium hypochlorite

Sodium hypochlorite solution may be dosed into a flow of water at a constant rate (see Fact Sheet 2.22). It can be used for disinfecting installations (see Fact Sheets 2.21 to 2.28). It can also be used for disinfection of water in batches, typically in disaster situations and for disinfection of water in the home (see Fact Sheet 2.34).

Storage and handling of sodium hypochlorite

Chemicals should be stored in accordance with manufacturers' instructions and local safety regulations. This is to ensure both the safety of the operator and that the chemical does not deteriorate.

Deterioration of sodium hypochlorite solutions may be rapid and is accelerated by light, heat and ventilation. Solutions should be stored in a cool, dark place in closed, corrosion-resistant containers (for instance plastic, ceramic, dark glass or cement).

When diluted with hard water, sodium hypochlorite may react with salts and form a precipitate. In some areas, sodium hexametaphosphate is added to hypochlorite to prevent the formation of such a precipitate. Under very cold conditions, freezing of hypochlorite solutions may occur.

As with other disinfecting chemicals, stocks should be dated and controlled, and used in rotation to minimize the effects of deterioration.

Sodium hypochlorite which has been stored badly or which may have deteriorated with time may be tested to determine its available chlorine content as described below.

Safety

Sodium hypochlorite is a hazardous substance. In solution it is highly corrosive and splashes can cause burns and damage the eyes.

When handling concentrated sodium hypochlorite solutions, appropriate precautions should be taken. Ideally, gloves and protective eye glasses should be worn.

In the event of splashes and especially splashes to the eyes it is important immediately to rinse thoroughly with water.

When a disinfecting agent has to be transported under difficult conditions (for example on foot) then solid forms (rather than hypochlorite solutions or pure chlorine in cylinders) are advantageous and are less hazardous to handle.

All containers in which sodium hypochlorite is stored should be labelled, identifying the contents, and with a hazard warning in a form which is readily understood locally.

Storage sites for sodium hypochlorite in any form should be secure against unauthorized access and especially against children.

Available chlorine

The potency of the various forms of sodium hypochlorite is expressed as available chlorine. Available chlorine is expressed as a percentage ; for example, a bleaching powder may have 15 per cent available chlorine, that is 15 parts by weight of chlorine per 100 parts by weight of concentrated solution.

It is important to be able to assess the potency of sodium hypochlorite solutions. This is especially useful for comparing potential sources of supply, and in assessing the deterioration of solutions in storage. Available chlorine can be estimated simply if basic laboratory equipment is available, as described in the box.

Assessing sodium hypochlorite solutions

The solution is mixed and a small volume (say 1 ml) accurately measured and diluted in distilled water. Stepwise dilutions are made to bring the concentration of chlorine to within the range of chlorine measurement (depending on the equipment and method used) and the concentration of chlorine is accurately determined. The percentage of available chlorine in the original powder may then be calculated.
For example :

- Add 1 ml of bleach solution to 99 ml of distilled water (a 1/100 dilution) ;
- Add 1 ml of this (1/100 dilution) to 99 ml of distilled water (a 1/10,000 dilution) ;
- Add 1 ml of this (1/10,000 dilution) to 99 ml of distilled water (a 1/100,000 dilution) ;
- The chlorine in this (1/100,000 dilution) is accurately determined as 1.6 mg/litre ;
- The chlorine concentration in the bleach solution was :
  1.6 mg/litre x 100,000 = 160,000 mg/litre = 160 g/litre = 16 g/100 ml = 16%.