GAMA Fact Sheet
Disinfectant - Chlorine

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What is chlorine?

Chlorine products are used extensively as disinfectants. The two most widely used chlorine releasing agents, suitable for use on surfaces, are sodium hypochlorite and sodium dichloroisocyanurate.

Chlorine is available in many forms; tablets, granules, powders, wipes. Some chlorine products also contain a compatible detergent.

Chlorine based disinfectant solutions are oxidative chemicals and have broad spectrum antimicrobial activity against bacteria, viruses, fungi and too some extent spores. However, not all bacterial spores are killed by chlorine and the amount of available chlorine must be considered when preparing the disinfectant.

Different concentrations of chlorine products are required in different circumstances, and it is usual to express the required concentration in 'parts per million', abbreviated to 'ppm'. The most common concentrations used are 1,000ppm, 5,000ppm and 10,000ppm. A concentration of 5,000 ppm (parts per million) available chlorine is recommended when using as a sporicidal agent.

Does chlorine clean or disinfect?

This will depend on the chlorine product. Several products now exist which combine a detergent cleaning effect with chlorine disinfection. These solutions are designed to eliminate the need for separate cleaning and disinfection processes by combining them into a single process. However, this is not the case for all chlorine products, and some will still require a detergent clean prior to using chlorine to disinfect. Chlorine is deactivated by organic matter so any dirty surface will need to be precleaned.[1]

How does chlorine kill bacteria and viruses?

Chlorine kills microorganisms by attacking the cell wall. Afterwards hypochlorous acid and water enter the cell, breaking down enzymes found in the cell wall, subsequently ripping the cell apart.

What are the advantages of chlorine for surface cleaning?

Chlorine products have a broad spectrum of antimicrobial activity, do not leave toxic residues, are unaffected by water hardness, are inexpensive, are active in removing biofilms and are relatively inexpensive.[2,3]

Good practice points for use of chlorine products for surface cleaning

Before using chlorine for surface cleaning, remember these key points to maintain a high-quality clean:

1. Check if it has detergent properties. If not surfaces must be cleaned with a detergent, removing any visible matter and ensuring the surface is dried or left to dry, before using a chlorine product.
2. Ensure you have read the manufacturer instructions on how to correctly prepare and use the product.
3. Check contact times and drying times of the product so you can appropriately disinfect your surface.

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What are the disadvantages of chlorine for surface disinfection?

Lengthy contact times

Certain microorganisms require specific contact times to disinfect surfaces. Wet contact time is the amount of time that a surface being disinfected should remain wet with disinfectant. For chlorine products this tends to range from 2 minutes to 10 minutes, which means the chlorine solution may have to be reapplied if it dries before the contact time is achieved.

Time-consuming

Some chlorine products require time consuming preparation prior to use. Once the solution is appropriately measured out and reconstituted, the solution should be used within the time stipulated by the manufacturer, generally 24 hours, or discarded.
Using a chlorine product is more time consuming if it does not have any detergent or cleaning properties.

Poor material compatibility

Chlorine products are corrosive and have been found to be corrosive to metals in concentrations (>500 ppm). Fabrics, carpets and rubbers such as nitrile and latex - prolonged use can lead to the discolouration, bleaching and deterioration of materials.[4]

Chlorine in contact with organic matter can produce chloramines, which are highly reactive and can cause cracking on some plastic surfaces.[5]

Some manufacturer's instructions request that chlorine products are washed off with detergent and water after use, which combined with the contact time required can lead to a lengthy cleaning process time.

Most chlorine-based products have been found to be incompatible with microfibre so compatibility must be established prior to use to ensure suitability.[6]

Side effects

Chlorine products cannot be used directly on urine or vomit, mixing this product with acid or ammonia releases harmful chlorine gas.[2]

Chlorine can be an irritant to the skin, eyes and respiratory tract / lungs at low levels of exposure. Higher levels of exposure may cause pulmonary oedema and subsequent breathing difficulties. Some individuals can become sensitised to chlorine. A chlorine solution of 1,000 parts per million available chlorine, will produce fumes which are potentially irritant to people who are sensitive. there must be adequate ventilation in place when using chlorine products both during and after cleaning and it needs to be kept out of reach of children.[2,7,8]

Accidental over-concentration, or the use of warm rather than cold water, will increase the amount of irritant fumes produced.[8]

Dilution errors

Some chlorine products require dilution from a tablet or concentrate, with known risk for human error as over, or under, dilution and concentration errors can easily occur when preparing chlorine disinfectant solutions. Too much water when mixing a solution can result in a disinfectant that is too weak and ineffective, whilst too little water results in a solution that is too strong, toxic and harmful to both surfaces and the user.[5]

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gama healthcare

GAMA Healthcare Australia Pty Ltd.,
Suite 1, 33-37 Duerdin Street,
Notting Hill, VIC 3168, Australia.
T: +61 (0)3 9769 6600
E: info@gamahealthcare.com.au
www.gamahealthcare.com

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