

## CHLORINE, A GREAT DISINFECTANT

### BUT WE MUST LEARN THE DIFFERENCE BETWEEN sodium hypochlorite i.e. HOUSEHOLD BLEACH and calcium hypochlorite DRY CHLORINE TABLETS AND POWDER

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Calcium Hypochlorite tablets when mixed with water produce a **FRESH** hypochlorite solution, used as it is being produced. "**BLEACH**", often called "**chlorine bleach**" a sodium hypochlorite solution usually containing **LYE** is manufactured at a factory, stored, shipped to distribution centers, stored again and then sold.

**According to all the technical literature, depending on storage conditions; all hypochlorite solutions will lose half of their potency in less than thirty days. Light, temperature and age are the biggest factors.**

We must also recognize that the word **bleach** means to **whiten**, and it does not mean it contains chlorine. There are many bleaching agents that do not contain any chlorine at all and are still called bleach.

**A web site of the Clorox company says "CLOROX BLEACH IS NOT CHLORINE, EVEN THOUGH SOME CALL IT "CHLORINE BLEACH" IT CONTAINS NO MORE CHLORINE THAN COMMON TABLE SALT " 1998, The Clorox Company**

There are three main and distinct differences between **calcium hypochlorite** and **sodium hypochlorite, often called "chlorine bleach"**.

1- Dry calcium hypochlorite tablets produce a "**FRESH**" hypochlorite solution when mixed with water. In tests done, a solution produced with the proper calcium hypochlorite tablet, can maintain "**free available chlorine**" or **HOCl the active disinfectant in a chlorine solution**, for about 4 hrs, then it starts rapidly degrading. There are many dry chlorine dispensers available.

The biggest misconception is that liquid household bleach (sodium hypochlorite) does not lose potency until you make a sodium hypochlorite solution; "**liquid household bleach**" is already a **sodium hypochlorite solution**, that starts degrading soon after manufacture, so a "bleach" bottle bought at a retail store or chemical supply house is, **NOT A FRESH HYPOCHLORITE SOLUTION** it is a hypochlorite solution with an **unknown chlorine content**, so when we make a solution all we are doing is diluting an already weak hypochlorite solution even more. All literature recommends that if you are using "chlorine bleach", daily tests should be conducted by a laboratory to assure its potency.

2. - For a chlorine solution to be a good disinfectant it must meet the **Chlorine Demand**. The chlorine demand is the amount of **FREE AVAILABLE CHLORINE, or (FAC)** often called **HYPOCHLOROUS ACID** or **HOCl, needed to disinfect or oxidize organic matter before a FAC residual is reached**. If the chlorine demand is not met then complete disinfection has not been obtained. One of the best signs that the Chlorine Demand has not been met is the strong chlorine odor present produced by chloramine gas. **HOCl**, (hypochlorous acid), is the most germicidal of all chlorine compounds, between 80 and 120 times stronger than the **OCl<sup>-</sup>** ion. (Kapoor, University of Illinois. Fair, G.M. Harvard University). The pH of the solution is the determining factor on which species of chlorine is produced in the solution, **HOCl or OCl<sup>-</sup>**. The ideal pH of a disinfecting chlorine solution is a pH of 6 to 8.

3.- Most **FRESH CALCIUM HYPOCHLORITE** solutions have a pH of between 7 and 8, **ALL (fresh or old) SODIUM HYPOCHLORITE solutions**, ("**chlorine bleach**") unless buffered by the injection of an acid, have a pH of 10.25+ producing no HOCl. These solutions produce only the OCl<sup>-</sup> ion, a very poor disinfectant which is from 80 to 120 times less effective as a disinfectant than HOCl, providing that there is any chlorine left in the stock solution.

**There is a big misconception that an EPA REGISTRATION means that product is APPROVED by EPA.**

**According to the EPA web site the registration means that, "All pesticides, (disinfectants are pesticides), sold or distributed in the USA must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment.**

#### REFERENCES

George Clifford White, Handbook of Chlorination and Alternative Disinfectants. Third Edition, Van Nostrand Reinhold, New York, 1999.

George R. Dychdala. Chlorine and Chlorine Compounds. In: Block SS, ed. Disinfection, Sterilization, and Preservation, 5th ed. Philadelphia Lippincott Williams & Wilkins, 2001.