

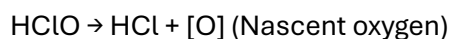
## Objective

Identify the bleaching powder from the given set of samples and understand the chemistry behind the bleaching action.

## Theory

Bleaching powder has a strong chlorine smell and is pale yellowish in colour. Even though it dissolves in water, impurities keep us from seeing a pure solution. Bleaching powder is chemically represented as  $\text{CaOCl}_2$ , although it is not a pure compound. In practice, it is a mixture of calcium hypochlorite  $[\text{Ca}(\text{OCl})_2]$ , calcium chloride  $[\text{CaCl}_2]$ , and calcium hydroxide  $[\text{Ca}(\text{OH})_2]$ . The textile industry uses bleaching powder, a water-soluble bleaching chemical. It is also used as a disinfectant and oxidiser in several industries. It's also important to remember that dry slaked lime ( $\text{Ca}(\text{OH})_2$ ) and chlorine gas react to create bleaching powder.

It functions as an oxidising and bleaching agent when treated with a little amount of diluted acid because it releases hypochlorous acid, which readily provides oxygen known as nascent oxygen.



In this experiment, we shall make use of this bleaching reaction to identify the bleaching powder from the given samples of chemicals.

## Application of bleaching powder

### 1. Water Treatment and Disinfection

- Drinking Water Purification: Used to disinfect water by killing bacteria, viruses, and other pathogens.
- Swimming Pools: Maintains hygiene by sanitizing pool water and preventing algae growth.
- Wastewater Treatment: Helps remove harmful microorganisms and neutralize odors.

### 2. Sanitation and Hygiene

- Public Health Applications: Disinfects public spaces, hospitals, toilets, and drains.
- Industrial Sanitation: Cleans and sterilizes equipment in industries like dairy, breweries, and food processing.

### 3. Bleaching Agent

- Textile Industry: Used for bleaching cotton, linen, and other fabrics.
- Paper Industry: Whitens pulp during paper manufacturing.

#### 4. Agriculture

- Soil Sterilization: Used in limited quantities to disinfect soil and control pests.
- Crop Protection: Prevents the spread of fungal and bacterial infections.

#### 5. Chemical Manufacturing

- Produces chloroform and other chemicals in laboratory and industrial processes.

#### 6. Odor Control

- Neutralizes foul odors by oxidizing organic matter in garbage dumps, septic tanks, and slaughterhouses.



Fig. 1 Structural formula of bleaching

powder

### Learning Outcomes

Students will

- Comprehend the chemistry of bleaching powder, including its composition and mechanism of action.
- Develop laboratory skills through hands-on experimentation with bleaching powder.
- Understand the role of nascent oxygen and calcium hypochlorite in its chemical activity.
- Explore and analyse the diverse applications of bleaching powder in real-world contexts.