

Hydrogen peroxide: (H₂O₂)

Synonyms: Dioxidane; Oxidanyl; Perhydroxic acid

Molecular weight: 34.01g/mol

Standards: Hydrogen peroxide solution contains not less than 26% w/w and not more than 28% w/w hydrogen peroxide of 100ml solution.

Aqueous solutions of hydrogen peroxide not less than 6% w/w hydrogen peroxide.

Properties:

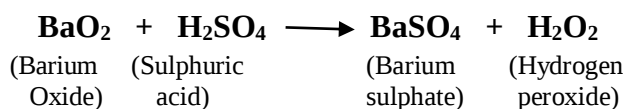
- **Colour :** Clear colorless liquid
- **Odour :** Odorless
- **Taste :** Bitter
- **Density :** 1.145 g/cm³ (20°C, pure)
- **Boiling point :** 150.2°C
- **Solubility in water :** Miscible
- **Acidity (pKa) :** 11.75 (slightly acidic)



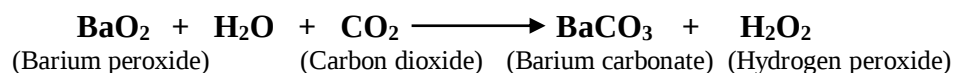
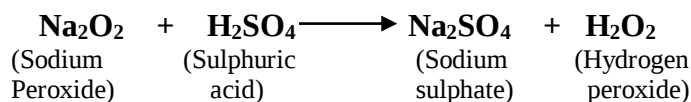
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Preparation:**1. From Barium peroxide**

When aqueous cream of barium peroxide treated with cold dilute sulphuric acid forms hydrogen peroxide



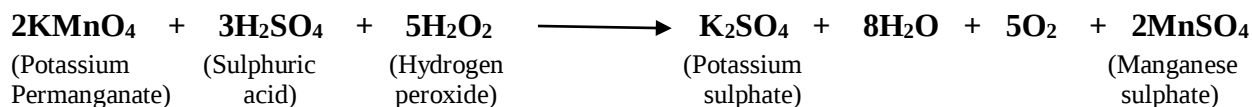
When carbon dioxide is passed slowly through ice-cold paste of barium peroxide, then hydrogen peroxide produced

**2. From sodium peroxide:** Sodium peroxide decomposed by addition of cold dilute sulphuric acid forms hydrogen peroxide

Assay: Hydrogen peroxide and potassium permanganate are strong oxidizing agents and reduce each other with the evolution of gaseous oxygen. Hydrogen peroxide reduces potassium permanganate solution and causes decolourization. At the endpoint, excess drops of potassium permanganate gives pink color.

- This assay is based upon volumetric titration method.
- 10mL of sample is diluted in 250mL of distilled water.
- Take 25ml from the solution, and add 10ml of 5N sulphuric acid
- The whole content is titrated with 0.1N KMnO₄ solution until pink color is obtained.

Each mL of 0.1N KMnO₄ is equivalent to 0.001701gm of H₂O₂



Mode of action: H₂O₂ releases the nascent oxygen i.e, [O], which by oxidative mechanism inhibits the action of micro organism and their growth.

Uses:

1. Medicinal uses:

- Hydrogen peroxide used as an antiseptic, germicidal and disinfectant.
- Hydrogen peroxide can be used for the sterilization of various surfaces, including surgical tools and may be deployed as a vapour (VHP) for room sterilization.
- H₂O₂ demonstrates broad-spectrum efficacy against viruses, bacteria, yeasts, and bacterial spores. In general, greater activity is seen against Gram-positive than Gram-negative bacteria.
- Hydrogen peroxide was used for disinfecting wounds.

2. Cosmetic applications:

- Diluted H₂O₂ (between 1.9% and 12%) mixed with ammonium hydroxide is used to bleach human hair.
- Hydrogen peroxide is also used for tooth whitening. It can be found in most whitening toothpastes.
- Hydrogen peroxide may be used to treat acne.

3. **Propellant:** High-concentration H₂O₂ is referred to as "high-test peroxide" (HTP). It can be used either as a monopropellant (not mixed with fuel) or as the oxidizer component of a bipropellant rocket.

4. **Explosives:** Hydrogen peroxide has been used for creating organic peroxide-based explosives, such as acetone peroxide, for improvised explosive devices.

5. **Industrial:** About 60% of the world's production of hydrogen peroxide is used for pulp and paper-bleaching. - The second major industrial application is the manufacture of sodium percarbonate and sodium perborate which are used as mild bleaches in laundry detergents.

Storage: Store in cool & dark place and light resistant container.

Chlorinated lime: (Ca(ClO)₂)

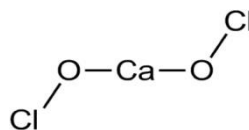
Synonyms: Hypochlorous acid; Bleaching powder; Calcium oxychloride; Calcium hypochlorite

Molecular weight: 142.98 g/mol

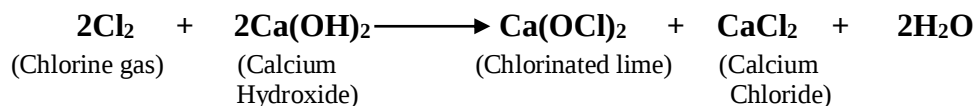
Standards: Chlorinated lime should contain not less than 30% w/w of available chlorine.

Properties:

- **Appearance:** White/gray powder
- **Odour:** It has strong odour of chlorine
- **Density:** 2.35 g/cm³ (20°C)
- **Melting point:** 100°C
- **Solubility in water:** 21 g/100 mL

**Preparation:**

It is prepared by the action of chlorine on calcium hydroxide. Calcium hydroxide is spread on the shelves in a suitable container. The chlorine gas is introduced at the top of the chamber. This process takes about 12-24hrs.



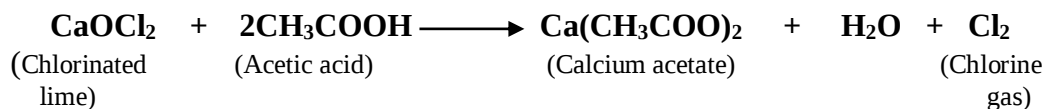
Mode of action: It works by chlorination of micro organisms protein, which ultimately leads to the destruction of protein and cell death.

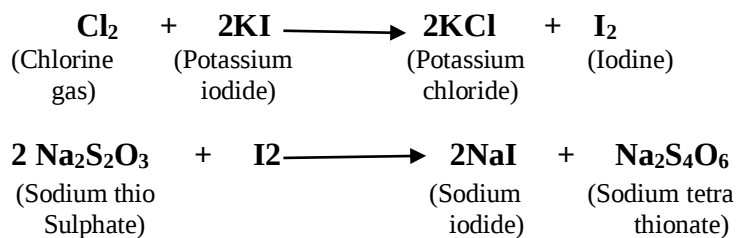
Assay: Its assay is based upon the redox titration method.

Chlorinated lime liberates the chlorine gas by the action of acid. Then, this free chlorine is allowed to react with potassium iodide to liberate iodine; the quantity of liberated iodine is then estimated by the titration with 0.1N Na₂S₂O₃

- Take 4gm of chlorinated lime with small quantity of water and transfer it to 1L flask and make up the volume to 1000mL.
- Measure 100mL of this suspension and transfer in another flask.
- Then it is titrated with 3gm KI solution, acidified with 5mL acetic acid, the liberated iodine is titrated against 0.1N Na₂S₂O₃ using starch as an indicator.

Each 1mL of 0.1 Na₂S₂O₃ is equivalent to 0.003545gm of chlorine



**Uses:****Sanitation:**

- Calcium hypochlorite has rapid bactericidal action. It kills most of bacteria, some fungi, yeast, algae, viruses and protozoa.
- Calcium hypochlorite is commonly used to sanitize public swimming pools and disinfect drinking water.
- Calcium hypochlorite is also used in kitchens to disinfect surfaces and equipment.
- Other common uses include bathroom cleansers, household disinfectant sprays, algaecides, herbicides, and laundry detergents.
- Used in decolourization of dyes.

Storage: Calcium hypochlorite is stored dry and cold, away from any organic material and metals. The hydrated form is safer to handle.