

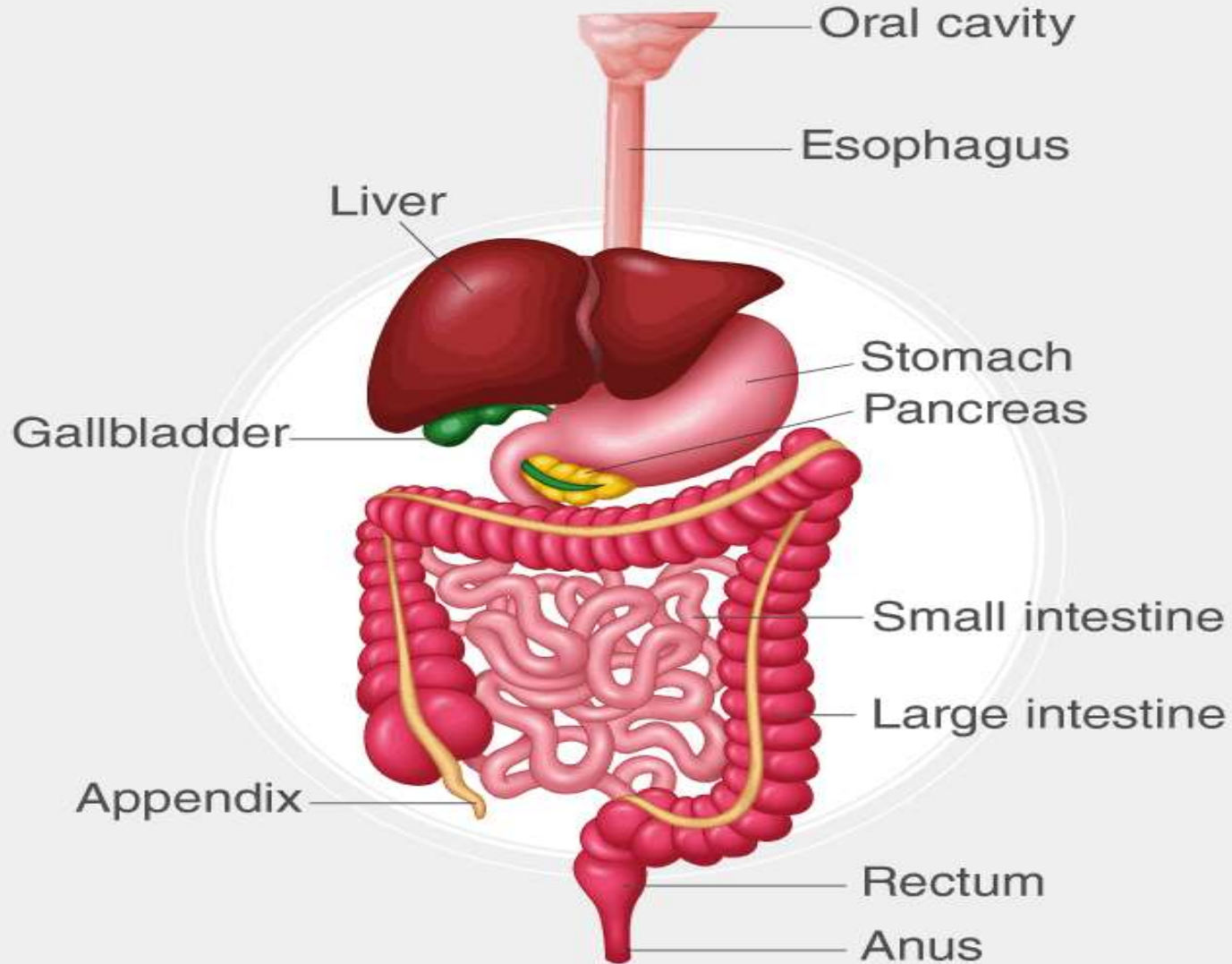


**JES's college of Pharmacy, Nandurbar**

# **ACIDIFYING AGENTS OR ACIDIFIERS**

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# Gastrointestinal Tract



# Gastrointestinal agents

- ▶ Gastrointestinal agents are drugs to treat disease related with Gastrointestinal tract (GIT)
- ▶ GIT includes stomach, small intestine (duodenum, jejunum and ileum), large intestine (caecum, ascending, transverse and descending colons) and the rectum with the exit anus.

## **Stomach**

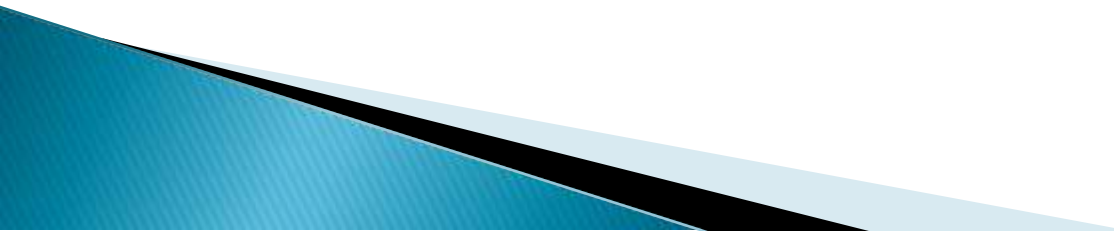
- ▶ Digestion of proteins in acidic medium
- ▶ HCl and pepsin enzyme are secreted by specialised cell which aids digestions.

## **Small intestine**

- ▶ Digestion of proteins in alkaline medium by enzymes
- ▶ Digestion of carbohydrate and lipids by enzymes and bile salts
- ▶ Absorption of digested food, vitamins and mineral.

Any disturbance in function of stomach and small intestine

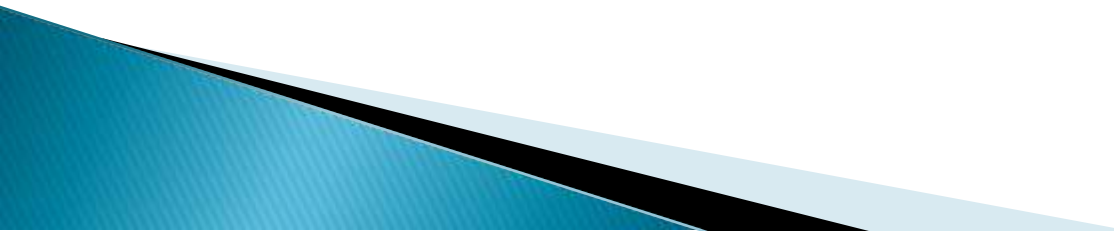
## leads to-

- ▶ **Achlorhydria or hypochlorhydeia** -absence of hydrochloric acid - in the gastric secretions.
  - ▶ **Hyperacidity & ulcer**- imbalance of acid-enzyme ratio.
  - ▶ Accumulation toxic substances of gases
  - ▶ **Diarrhoea** - inadequate absorption of fluids and minerals from large intestine
  - ▶ **Constipation** - due to insufficient peristaltic movement of large intestine
  - ▶ **Inadequate secretion of saliva**, thereby making the food to swallow with difficulty.
- 

# Introduction

- ▶ **Acidifying reagents or Acidifiers** -Acidifiers are drugs which are able to increase the acidity by increasing metabolic acidosis or by increasing the gastric hydrochloric acid.
- ▶ These are the inorganic chemical substances that either produce or increase acid in the G.I.T
- ▶ These chemicals increase the level of acid in the stomach when ingested, thereby decreasing the stomach PH.

## Classified in to four categories

1. **Gastric acidifiers** : These are the drugs which are used to increase acidity of the stomach in patients suffering from achlorhydria or hypochlorhydria.
  2. **Urinary acidifiers** : These are the drugs which are used to remove acidic urine from the body or to maintain the PH of urine.
  3. **Systemic acidifiers** : These are the drugs which are able to neutralise alkaline body fluids, specially blood or to maintain the Ph of all parts of body.
  4. **Acid** : These are used as pharmaceutical aids in preparation of medicaments.
- 

# Ammonium chloride



**Molecular Formula:**  $\text{NH}_4\text{Cl}$

**Molecular weight:** 53.49

## **Synonym:**

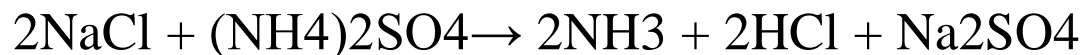
Ammonium muriate It contains not less than 99.5% of ammonium chloride, calculated with reference to dried substance.

## **Methods of Preparation:**

It is prepared by neutralizing hydrochloric acid with ammonia. The resulting solution of ammonium chloride is evaporated to dryness.



It is also prepared by treating ammonium sulphate with sodium chloride.



## **Physical Properties:**

- ▶ It is a white, fine crystalline powder.
- ▶ It is odourless
- ▶ has cooling saline taste.
- ▶ It is hygroscopic in nature.
- ▶ It is freely soluble in water but slightly soluble in alcohol. Its 0.8% w/v solution is isotonic with serum.

## **Assay:**

It is assayed by acid-base titrations. The neutral formaldehyde solution so that ammonium chloride will be converted to methanimine and hydrochloric acid. The liberated acid is titrated with 0.1 N NaOH using phenolphthalein as an indicator.




## **Identification tests:**

- ▶ It gives the reactions of ammonium salts and chlorides.
- ▶ A few mg of the substance is heated with sodium hydroxide solution, leading to the evolution of ammonia gas, which is recognizable by its odour and by its action on moist red litmus paper.

## **Test for Purity:**

The sample is tested for the presence of following impurities like Arsenic, Sulphate, calcium, Iron and Heavy metals. Loss on drying should not be more than 1%.

## **Uses:**

- ▶ It is used as an expectorant
  - ▶ It is used as a diuretic and systemic acidifying agent
  - ▶ It is used to maintain the urine at acid pH in the treatment of some UIT disorders
- 

# Dilute hydrochloric acid

**Molecular Formula:** HCl

**Molecular weight:** 36.46

**Synonyms:** Muriatic acid; Chlorohydric acid; Hydrogen chloride in aqueous solution.

**Preparation:** Hydrochloric acid (274 g) is added gradually to water (726 g) and mixed.

## Properties:

- 1] It occurs as a colorless fuming liquid with pungent odour.
- 2] It is miscible with water, alcohol & has a specific gravity of 1.18. Storage of HCl



## Identification:

- a) After neutralization, it gives reactions which are characteristics of chloride.
- b) When it is added to  $\text{KMnO}_4$  solution, chlorine gas is liberated.
- c) Weight per ml at  $25^\circ\text{C}$  is 1.04 to 1.05 g.

## Test for purity:

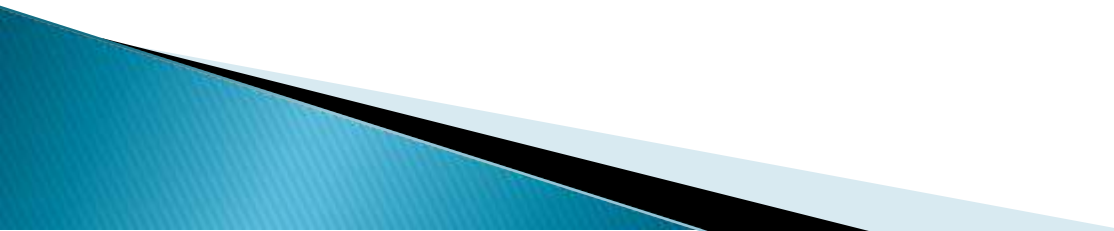
It has to be tested for As, heavy metals, bromide, iodide, sulphite and free chlorine

## **Uses:**

- ▶ It is use as an acidifier.
- ▶ Used as gastric acidifiers when levels of hydrochloric acid in gastric juice are low.

**Storage:** It is store in well closed containers.

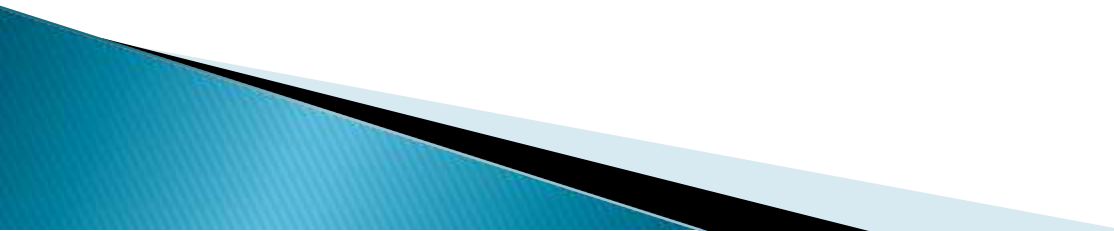
**Dose:** 0.6 to 8 ml.



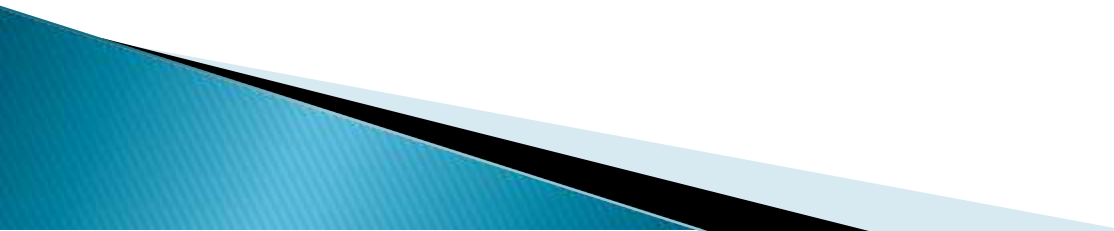
# Antacid

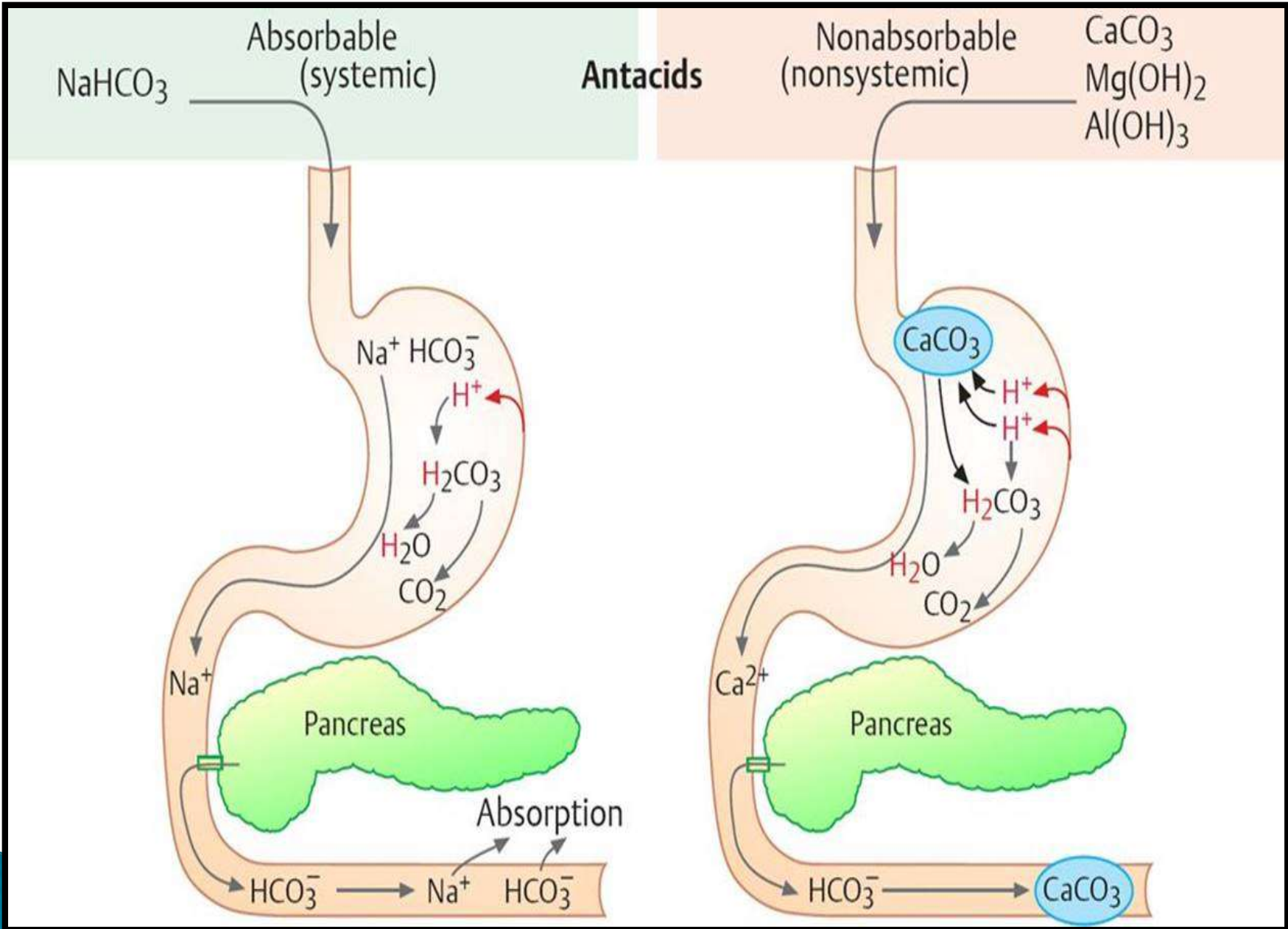


# Antacid

- ▶ These are the drugs which are usually alkaline substances and used for neutralising excess acid in the stomach of patients suffering from hyper-chlorhydria (hyperacidity).
  - ▶ These drugs give relief of pain due to hyper-chlorhydria.
  - ▶ Antacids are weak bases that are used to neutralize excess stomach acid
  - ▶ Most antacids are weak inorganic bases
- 

## Antacids may be classified as

- a) **Systemic (absorbable) antacids:** These are soluble, readily absorbable and capable of producing systemic electrolytic alterations and alkalosis e.g. sodium bicarbonate.
  
  - b) **Non-systemic (non-absorbable) antacids:** These are not absorbed to a significant extent and thus do not exert an appreciable systemic effect. This group is further sub-divided as follows:
- 



Absorbable (systemic)  
 $\text{NaHCO}_3$

**Antacids**

Nonabsorbable (nonsystemic)  
 $\text{CaCO}_3$   
 $\text{Mg}(\text{OH})_2$   
 $\text{Al}(\text{OH})_3$

$\text{Na}^+ \text{HCO}_3^-$

$\text{H}^+$

$\text{H}_2\text{CO}_3$

$\text{H}_2\text{O}$

$\text{CO}_2$

$\text{Na}^+$

Pancreas

Absorption

$\text{HCO}_3^-$

$\text{Na}^+$

$\text{HCO}_3^-$

$\text{CaCO}_3$

$\text{H}^+$

$\text{H}^+$

$\text{H}_2\text{CO}_3$

$\text{H}_2\text{O}$

$\text{CO}_2$

$\text{Ca}^{2+}$

Pancreas

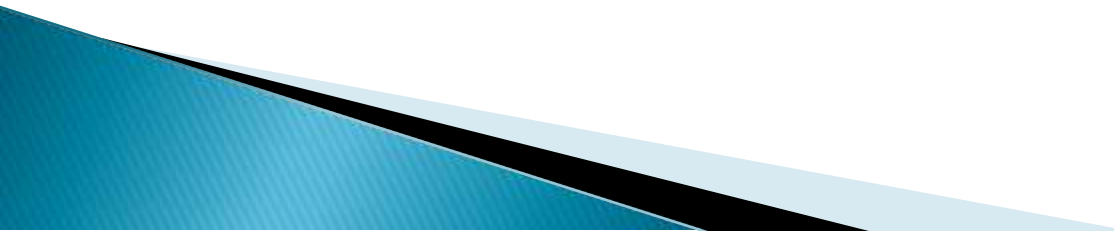
$\text{HCO}_3^-$

$\text{CaCO}_3$

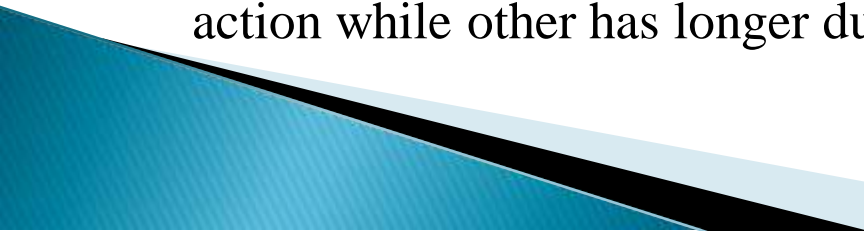


- i. **Aluminium containing antacids:** Examples are aluminium hydroxide, aluminium phosphate, dihydroxyaluminium aminoacetate, dihydroxyaluminium sodium carbonate, basic aluminium carbonate (gel).
- ii. **Calcium containing antacids:** Examples are calcium carbonate, tribasic calcium phosphate.
- iii. **Magnesium containing antacids:** Examples are magnesium carbonate, magnesium citrate, magnesium hydroxide, magnesium oxide, magnesium phosphate, magnesium trisilicate.
- iv. **Combination antacid preparations:** Examples are aluminium hydroxide gel and magnesium hydroxide, aluminium hydroxide gel and magnesium trisilicate, magaldrate (monoalium hydrate; hydrated magnesium aluminate), simethicone (defoaming agent) containing antacids, calcium carbonate containing antacid mixtures, alginic acid-sodium bicarbonate containing antacid mixtures

# Ideal Characteristic of Antacid

1. It should not be absorbable and cause systemic alkalosis
  2. It should not be laxative or cause constipation
  3. It should exert effect rapidly & over a long period of time
  4. It should buffer in pH 4-6.
  5. It should not produce large volume of gas
  6. It should be palatable & inexpensive
  7. It should probably inhibit pepsin
- 

# Combination Antacid Preparations

- ▶ No antacid has all properties of an ideal antacid.
  - ▶ Calcium & Aluminium antacids has constipating side effect.
  - ▶ Magnesium antacids reduced constipation but it has laxative action.
  - ▶ Thus most of the market preparation has combination of antacids.
  - ▶ The combination balance both constipative and laxativ e side effect of antacids.
  - ▶ Some preparation are mixture of two antacids , one has rapid onset of action while other has longer duration of action.
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# Sodium Bicarbonate (Baking soda)



**Mol formula-** $\text{NaHCO}_3$

**Mol Wt.** 84.01

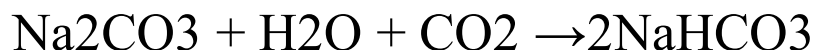
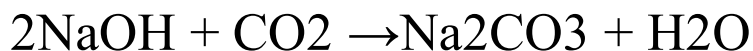
**Synonyms-** bicarbonate of soda, baking soda, sodium acid carbonate.

## **Properties:**

- ▶ White crystalline powder
- ▶ Odorless
- ▶ saline and slight alkaline taste
- ▶ Stable in dry air
- ▶ sparingly soluble in water, insoluble in alcohol

## Preparation:

On a small scale, it is prepared by passing CO<sub>2</sub> gas through a solution of sodium hydroxide. The solution is concentrated to get the product.



## Assay:

An accurately weighed amount of sample is taken in a flask. To it 25 ml of 1N H<sub>2</sub>SO<sub>4</sub> is added. The excess of acid is back titrated with 1 N NaOH using methyl red as an indicator. Each ml of 1 N H<sub>2</sub>SO<sub>4</sub>  $\approx$  0.02917 g of Mg(OH)<sub>2</sub>

## **Identification:**

It gives the reactions of sodium and carbonate. Its 1 per cent w/v solution has a pH not more than 8.6.

## **Tests of purity:**

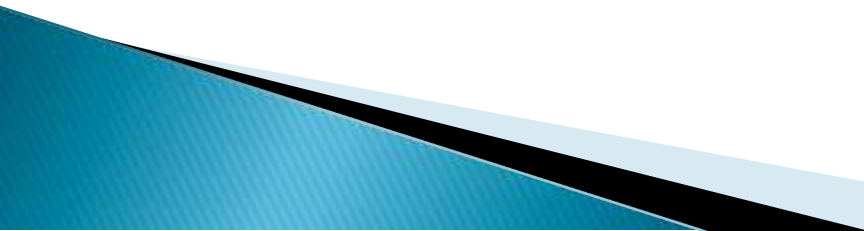
It is tested for alkalinity, Al, Ca, insoluble matter, As, Fe, heavy metals, chloride, sulphate and ammonium compounds.

## **Uses:**

It is used as antacid, and in electrolyte replacement.

## **Dose:**

300 mg to 2 g.



# Magnesium hydroxide

**Molecular Formula:**  $\text{Mg}(\text{OH})_2$



**Molecular weight:** 58.32. It is having not less than 95.0 per cent and not more than 100.5 per cent of  $\text{Mg}(\text{OH})_2$ .

## Synonyms

magnesium oxide, metallic element, magnesite, bitter spar.

## Preparation:

The magnesium hydroxide obtained in the preparation of milk of magnesia is evaporated to dryness. It is also prepared by treating sea water or other natural brines with sufficient calcium hydroxide to precipitate magnesium as magnesium hydroxide, then washing and drying the precipitate.

## Properties:

- ▶ It is a white fine amorphous powder.
- ▶ Odourless Powder
- ▶ Soluble in dilute acid and practically insoluble in ethanol and water

## Assay:

An accurately weighed amount of sample is taken in a flask. To it 25 ml of 1N H<sub>2</sub>SO<sub>4</sub> is added. The excess of acid is back titrated with 1 N NaOH using methyl red as an indicator. Each ml of 1 N H<sub>2</sub>SO<sub>4</sub> 0.02917 g of Mg (OH)<sub>2</sub>

## Uses:

- ▶ It is used as an antacid.
- ▶ Laxative to relief constipation



# Aluminum hydroxide gel



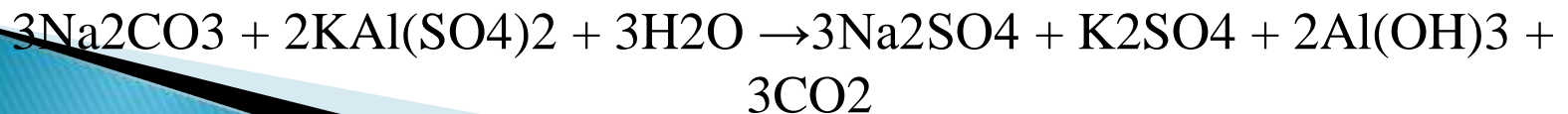
**Chemical formula-**  $\text{Al}(\text{OH})_3$

**Mol wt-** 77.99

**Synonyms:** Aluminic acid, Aluminic hydroxide, Aluminium(III) hydroxide, Aluminum hydroxide, Hydrated alumina, Orthoaluminic acid.

## **Preparation:**

- ✓ It is prepared by adding a hot solution of potash alum slowly with constant stirring to sodium carbonate.
- ✓ After complete removal of carbon dioxide the precipitated aluminium hydroxide is filtered.
- ✓ It is washed thoroughly with hot water until it becomes free from sulphate ion and the precipitate is suspended in distilled water to the required strength.



### **Tests for purity:**

It has to be tested for alkalinity, ammonium salts, arsenic, chloride, sulphate and acid consuming capacity.

### **Storage:**

It is to be stored in well-closed containers and should not be allowed to freeze. For attractiveness it is usually dispensed in blue or amber colored bottles.

## **Uses:**

- ▶ Aluminium hydroxide gel is a very effective slow-acting antacid.
- ▶ It does not get absorbed in alimentary canal and does not produce carbon dioxide.
- ▶ It is widely used in treatment of intestinal toxemia and hyperchlorhydria.
- ▶ It is able to neutralize gastric hydrochloric acid and causes absorption of toxins and gases.
- ▶ It does not cause system alkalosis.

## **Dose:**

Its dose is 7.5 to 15 ml. It causes constipation and is therefore administered with magnesium salt which is a mild laxative.

# Calcium Carbonate (precipitated chalk)

**Mol formula-**  $\text{Ca CO}_3$

**M.W.** = 100

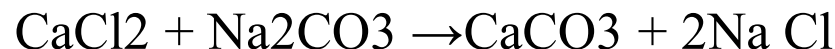


**Synonyms-** Purified, refined or synthetic calcium carbonate.

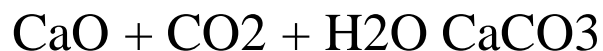
**Properties:** It occurs as a white, odorless tasteless microcrystalline powder which is stable in air. It exists in two crystal form and both are of commercial importance, one Aragonite and other is Calcite.

## Preparation:

- 1) It can be prepared by mixing and boiling calcium and sodium carbonate solution and allowing the resulting precipitate to settle. The precipitate is collected, washed with boiling water until free from chloride and dried.



- 2) By passing carbon dioxide through lime water



## Uses:

It is used as fast acting antacid, in calcium deficiency, dentifrices and in combination with magnesium containing antacids due to its constipative properties.

**Thank you**



# CATHARTICS

1

JES's College Of Pharmacy, Nandurbar

**Prepared By: Manisha K Gavit**  
**Assistant Professor**  
**(Department Of Pharmaceutical**  
**Chemistry)**

# Cathartics

2

- Cathartics are the drugs that are used to get relief from constipation.
- These are the drugs that...accelerates defecation.
- Cathartics act by increasing the fluid content of Faeces, making them softer and easier to pass.
- Cathartics increases the mobility of intestine



# Types of Cathartics

3

Cathartics are mainly classified into two categories:

1. Laxative
2. Purgative

## **Laxative**

- Laxatives are mild acting cathartics
- They work by either
  - ✓ Increasing intestinal movement
  - ✓ Increase stool Bulk
  - ✓ Make stool softener
  - ✓ Prolong use of laxative may cause habit or dependency.

## **Purgative**

- They are strong cathartics
- They are given in very serious conditions.
- They are generally given to completely remove solid materials from intestine before surgery.

# Classification (On the basis of mechanism)

5

1. Stimulant Cathartics
2. Lubricants
3. Bulk Forming
4. Saline Cathartics

1. **Stimulant Cathartics:** They act by producing local irritation on intestinal tract.
2. **Lubricants:** Provide lubricant effect so that stool easily passes through rectum, also known as stool softener.
3. **Bulk Forming:** These agents increase the amount of stool production.
4. **Saline Cathartics:** They increase the osmotic load of GIT med with large amount of water.

# Uses of Cathartics

7

- For easy defecation & other rectal diseases.
- To relief from acute constipation.
- To remove solid material from intestinal tract before surgery.
- To avoid rise in blood pressure due to constipation.

# Magnesium Sulphate

8

- **Chemical Formula:**  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
- **Molecular Weight:** 246-47 g/mol
- **Synonym:** Epsom Salt



- **Method of Preparation**

It is obtained by the action of dilute sulphuric acid ( $\text{H}_2\text{SO}_4$ ) and magnesium carbonate ( $\text{MgCO}_3$ )



## Properties

- It occurs as white crystals
- It is odourlessIt having a cool, saline, bitter taste
- It is soluble in water and sparingly soluble in alcohol.

## Uses

- It is used as cathartics.
- It is used in agriculture.
- It is used to control seizures in pregnancy.

# Sodium Orthophosphate

10

- **Chemical Formula:**  $\text{Na}_2\text{HPO}_4 \cdot 12 \text{H}_2\text{O}$
- **Molecular Weight:** 358.14 g/mol



## Preparation

- It is obtained by adding sodium carbonate to a hot solution of phosphoric acid.





## Properties

- It occurs as colourless crystals
- It is odourless
- It having a saline taste
- It is soluble in water
- It is insoluble in alcohol

# Kaolin

12

- **Molecular/Chemical formula**  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$
- **Molecular Weight:** 258.16 g/mol
- **Synonym:** China Clay
- **Preparation**

It is simply prepared from natural clay by powdering separating and purifying process.



## Properties

- It is light, white powder.
- It is odourless
- It is tasteless

## Uses

- It is used as cathartics
- It is used in food poisoning
- It is used in dusting powders.

# Bentonite

14

- **Chemical formula:**  $\text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$
- **Molecular Weight:** 360-31 g/mol:
- **Synonym:** Clay
- **Preparation**

It occurs naturally or can be prepared from natural clay



## Properties

- It occurs as very fine, cream colour powder
- It is odourless.
- It is insoluble in water.

## Uses

- It is used as cathartics.
- It is used as emulsifier.
- It is also used as protective's.

Thank You..!



JES's College of Pharmacy, Nandurbar

# ANTIMICROBIALS

Ms: Manisha K. Gavit

Assistant Professor

(Department of Pharmaceutical Chemistry)

➤ **What are Antimicrobials?**

An antimicrobial is a substance that either kills or inhibits the growth of microorganisms such as **bacteria, fungi, or protozoan's**.

➤ **History**

The history of antimicrobials begins with the observations of **Pasteur and Joubert**, who discovered that one type of bacteria could prevent the growth of another.



# Terminology

- ▶ **Infection-** An infection is the invasion of body tissues by disease causing microorganisms.
- ▶ **Microbiocidal-** Kills the microbes.
- ▶ **Microbiostatic-** Inhibits the growth of microbes
- ▶ **Disinfectant-** Used on non-living objects or outside the body.
- ▶ **Antiseptic-** Substances that are applied to living tissue/skin to reduce the possibility infection.
- ▶ **Chemotherapy-** Treatment of systemic infection with specific drug without affecting the host.

# Classification of Antimicrobial Agents

1. Antiseptics
2. Disinfectants
3. Germicides
4. Bacteriostatics
5. Sanitizers

➤ **Antiseptics:**

- ▶ These are substances that are able to **kill or prevent the growth of microorganisms.**
- ▶ This term is specific for preparations which are to be applied to living tissues. An ideal antiseptic should destroy **bacteria, spores, fungi, viruses** or any other infective agent without causing any harm to the tissue of the host.

➤ **Disinfectant:**

- ▶ These are substances which are used for **premises, atmosphere in a hospital environment, toilets, utensils and linen** used in a hospital to free them from living organisms.
- ▶ Widely used in home and hospital cleaning.
- ▶ E.g. Sulphur dioxide

➤ **Germicides:**

- ▶ These are substances which **kill microorganisms.**
- ▶ Bactericide (against bacteria)
- ▶ Fungicide (against fungi)
- ▶ Virucide (against virus)

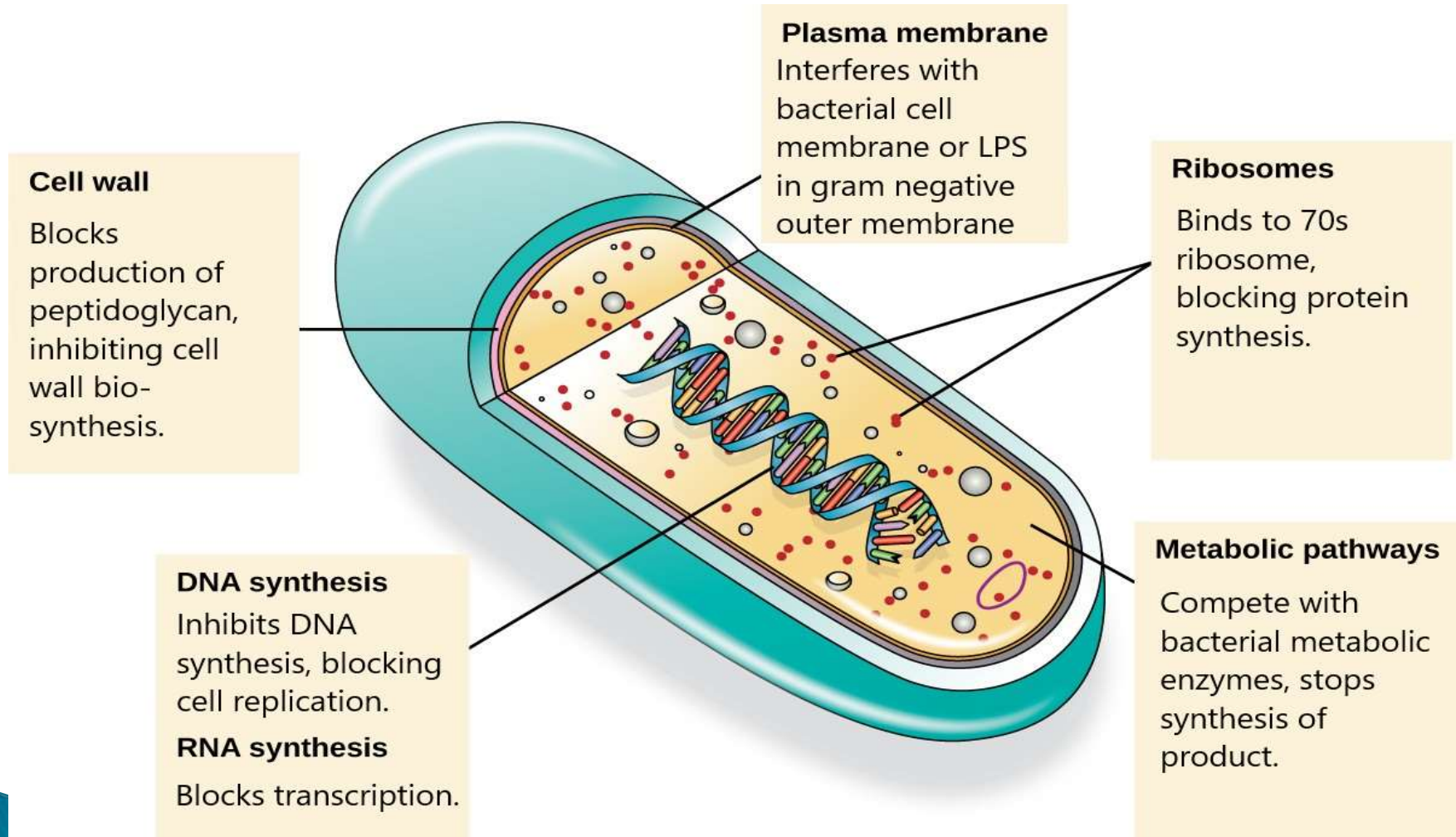
➤ **Bacteriostatics:**

- ▶ Substances which primarily function by **inhibiting the growth of bacteria.**
- ▶ They do not kill bacteria but stop the **growth of bacteria.**

➤ **Sanitizer:**

- ▶ Disinfectants that are used to maintain the general public health standards are called as **sanitizers**.
- ▶ Sanitation is concerned with cleaning and washing away organic matter.  
( saliva, mucous etc.)
- ▶ Sanitizers have power to **kill microorganisms**.
- ▶ Sanitizer should not cause local **cell damage**.

# Mechanism



Lipopolysaccharides (LPS)

# Potassium permanganate

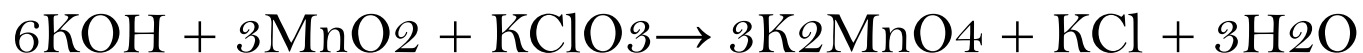
▶ **Molecular Formula:**  $\text{KMnO}_4$

▶ **Molecular weight:** 158.03

▶ **Synonym:** Permanganic acid

It contains not less than 99% and not more than 100.5% of  $\text{KMnO}_4$ .

▶ **Preparation:** Potassium permanganate is prepared by mixing a solution of **potassium hydroxide** with **powdered manganese dioxide** and **potassium chlorate**. The mixture is boiled, evaporated to yield the residue.



By passing chlorine gas through potassium permanganate solution.  $2\text{K}_2\text{MnO}_4 + 3\text{Cl}_2 \rightarrow 6\text{KMnO}_4 + 6\text{KCl}$



▶ **Properties:**

- ✓ It occurs in the form of dark purple prismatic crystal with **metallic lustre**.
- ✓ It is **odourless**
- ✓ It is tastes **sweet and astringent**.
- ✓ It decomposes at **higher temperature**.

▶ **Storage:**

It should be stored in **air tight containers**, to avoid contact with **organic matter**.



## Uses:

- ✓ It is a topical **anti-infective**.
- ✓ Its solution is used as an **antiseptic in mouth wash and for cleaning of ulcers**.
- ✓ It is used in the treatment of **urethritis**.
- ✓ It is used as an **antidote**.
- ✓ Its solution is used in bath for **eczema and acute dermatomes patients**.
- ✓ It is commonly used as an **antiseptic in veterinary practices**.

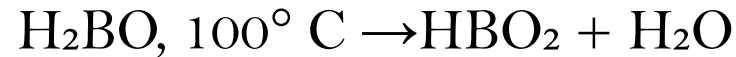
# Boric Acid

- ▶ **Chemical Formula-**  $H_3BO_3$
- ▶ **Molecular wt-** 61.83
- ▶ **Synonyms-**Hydrogen borate, Boracic acid, Orthoboric acid, Acidum boricum
- ▶ **Preparation-**
  - ✓ It is prepared by reacting **hydrochloric or sulphuric acid** with native **borax**. The solution is filtered.
  - ✓ The crystals obtained are washed and then allowed to dry at room temperature.



## Properties

1. It occurs as **colourless or white crystals**.
2. It is slightly soluble in **water and in alcohol**.
3. It is **odourless** with slightly **acidic and bitter taste**.
4. On heating, it decomposes to form **metaboric acid HBO<sub>2</sub>**.



Metaboric acid

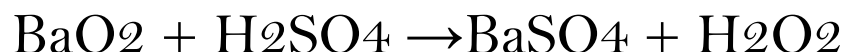
## Uses :

- ✓ Boric acid can be used as an **antiseptic for minor burns or cuts**.
- ✓ It is used in **dressings or salves**.
- ✓ It is applied in a very **dilute solution as an eye wash**.
- ✓ it can also be used as an **acne treatment**.

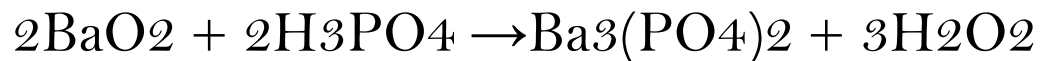
# Hydrogen peroxide

- ▶ **Molecular Formula:** H<sub>2</sub>O<sub>2</sub>
- ▶ **Molecular weight:** 34.01
- ▶ **Preparation:**

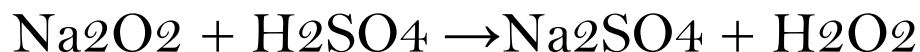
It is prepared by the action of **sulphuric acid on barium peroxide**.



Hydrogen peroxide solution may be prepared by reaction of **barium peroxide with phosphoric acid**. Barium peroxide Barium phosphate is filtered.



It can also be prepared by treating **sodium peroxide with sulphuric acid**.



▶ **Physical Properties:**

- ✓ Colourless
- ✓ Odourless.
- ✓ Its taste is slightly **acidic**.
- ✓ It readily gets decomposed when come in contact with **oxidisable organic metal**. And it miscible **with water**.

▶ **Tests for identity:**

- a) When made alkaline and heated, it gets decomposed with **effervescence, evolving oxygen**.
- b) To 1 drop, 20 ml of water, 1 drop of potassium chromate and 2 ml of solvent ether are added and shaken, Then, **ether layer becomes blue**.

## Assay:

The assay of hydrogen peroxide is carried out by the **permanganate method**. **10 ml of sample is diluted to 250 ml** in a volumetric flask with purified water. **to 25 ml of this solution, 10 ml of 5 N sulphuric acid added**. Then the content are titrated with 0.1 N **potassium permanganate** solution, until a **faint pink Colour is obtained**.

Each ml of 0.1N  $\text{KMnO}_4 \approx 0.001701$  g of  $\text{H}_2\text{O}_2$

## Uses:

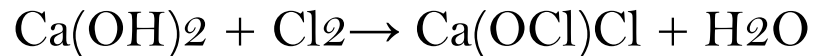
- ✓ Used for **bleaching**.
- ✓ It acts as an **antiseptic and a germicide**
- ✓ Is used for cleaning **cut and wounds**.
- ✓ It is effective antidote for **phosphorus and cyanide poisoning**.
- ✓ It is also use as a **deodorant**.
- ✓ It is use for **bleaching the hair**.

# Chlorinated lime OR (Bleaching Powder)



- ▶ **Molecular Formula:**  $\text{Ca}(\text{OCl})\text{Cl}$ ,  $\text{CaOCl}_2$
- ▶ **Molecular weight:** 136.98
- ▶ **Synonym: Bleaching powder**, chlorine of lime Chlorinated lime should contain not less than 30% w/w of available chlorine.
- ▶ **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 12-24 hrs.

▶ **Properties:**

- ✓ It is a **dull white powder**
- ✓ Characteristic **odour**.
- ✓ When exposed to air, it **absorbs moisture and gradually decomposed**.
- ✓ It is slightly **acidic in water and alcohol**.

- ▶ **Assay:** Its assay is based on **redox titration method**. Take **4 g of chlorinated lime** with **small quantity of water** and transfer it make it to **1 L flask** and make up the volume to the mark. **Measure 100 ml of this suspension and transfer in another flask**. Then it is titrated with **3 gm KI solution**, acidified with 5 ml acetic acid, the liberated iodine is titrated against 0.1 N sodium thiosulphate using **starch solution as an indicator**.

Each 1 ml of 0.1 N  $\text{Na}_2\text{S}_2\text{O}_3 \approx 0.003545\text{g}$  of available chlorine.



- ▶ **Identification Test:** When the sample is treated with concentrated HCl, chlorine gas is evolved in large amount.
  
- ▶ **Test for purity:** It has been tested for its stability by heating it at 100°C for 2 hrs. It must not lose more than 3% w/w of available chlorine.
  
- ▶ **Uses:**
  - ✓ Chlorinated lime has the **bactericidal action**.
  - ✓ It is also used as **disinfectant in wounds**.
  - ✓ It is used as a cleansing agent for **water closets (toilets), drains and effluents**.
  - ✓ It is also used as an ingredient in the **preparation of detergents**.
  - ✓ It is a powerful **bleaching agent**.

# Iodine

▶ **Molecular weight-** 126.9

▶ **Mol formula** –I<sub>2</sub>

▶ **Preparation:**

▶ It is manufactured by **extracting kelp (seaweed's ash) with water.**

▶ The solution is concentrated when the **sulphate and chloride of sodium and potassium get crystallized out, leaving** freely soluble sodium and potassium iodide in the **mother liquor.**

▶ **Sulphuric acid** is added to **mother liquor** and **sulphur and small amounts of thiosulphate and sulphide** are allowed to settle down.

▶ Mother liquor is **decanted** and to this MnO<sub>2</sub> is added and **iodine distills over.**



Seaweed Kelp

## Properties:

- ✓ **Bluish, black rhombic prisms.**
- ✓ **Have metallic luster.**
- ✓ **It volatilizes at ordinary temperature.**
- ✓ **Insoluble in water but soluble in alcohol.**
- ✓ **Potassium iodide is able to dissolve large quantities of iodine due to formation of  $I_3^-$ .**

## Uses:

- ✓ **Iodine is used as a counter irritant and disinfectant.**
- ✓ **Used as local germicide.**
- ✓ **For proper functioning of thyroid gland, elemental iodine is used.**

# Various Iodine preparations

1. Aqueous iodine solution
2. Weak iodine solution
3. Strong iodine solution
4. Povidone iodine solution
5. Tincture of Iodine

**Thank you..!**