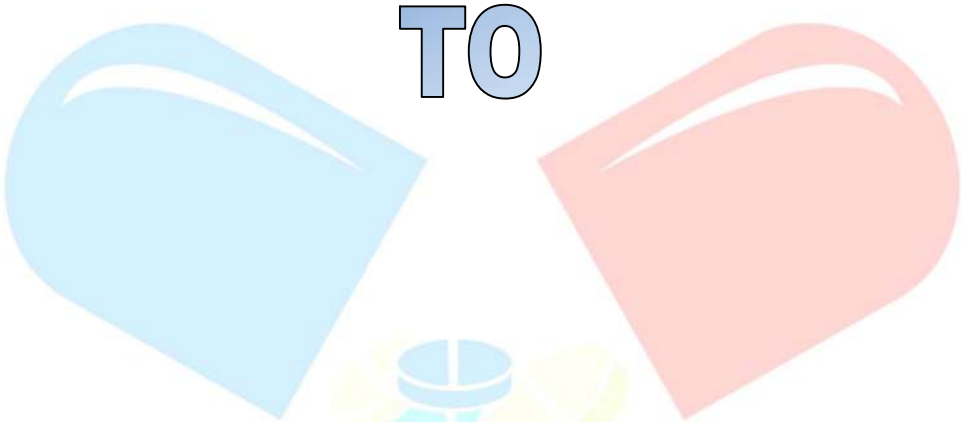
WELCOME

TO



This is an Education Platform

We Provide PDF Notes for Pharmacy Students

Web Site http://www.fdspharmacy.in/

You tube https://www.youtube.com/c/FDSpharmacy

Telegram https://t.me/Fdspharmacy

App https://play.google.com/store/apps/details?id=com.FDSPharmacyMedia.FDSPharmacy

E-mail fdspharmacyinfo@gmail.com

PHARMACEUTICAL INORGANIC CHEMISTRY

UNIT 3

TOPIC :

- **Antacid :** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture

ANTACIDS

- Antacids are such substances which are used to neutralise the excess amount of acid in our stomach.
- It may cause many severe problems like pain, ulceration, and also inactivate the pepsin (proteolytic enzyme).
- The stomach pH can range from pH 1, when empty to pH 7, when food is present.
- The low pH is due to the presence of endogenous hydrochloric acid, which is always present under physiological conditions.
- When hyperacidity develops, the results can range from gastritis (a general inflammation of the gastric mucosa) to peptic ulcer (specific circumscribed erosion)
- Patients with this condition will frequently suffer from "heartburn", which occurs due to the gastric acid entering the Oesophagus either during a belch or upon lying in bed.

Ideal Properties

- It should be non-absorbable
- It should not cause constipation.
- It should act rapidly for a prolonged time period.
- Its pH should lie within the range of 4-6.
- It should not evolve a large amount of gas on reacting with gastric hydrochloric acid.
- It should inhibit pepsin.
- It should not interfere with food absorption.

Classification

1) **Systemic antacids (absorbable) :** e-g., sodium bicarbonate which is soluble, readily absorbable and capable of producing systemic electrolytic alterations and alkalosis.
2) **Non-systemic antacids (non-absorbable):** Aluminium salts, magnesium salts, calcium carbonate, and sodium carboxyethylcellulose, which are not absorbed to a significant extent and thus do not exert a systemic effect.

Combination of Antacids

- It is not possible to fulfil all the criteria for an ideal antacid, so the mixtures (Combination) fo antacid are prepared and available in the market for desired therapeutic action of antacids.
- Combination of antacids refers to the use of two or more antacid agents together in a single formulation. This is done to enhance effectiveness, prolong the action, and reduce side effects caused by individual antacids.

Example

Magnesium hydroxide + Aluminium hydroxide

- **Magnesium hydroxide**: Fast-acting but causes diarrhea
- **Aluminium hydroxide**: Slow-acting but causes constipation
  Together: Balanced and effective relief

Sodium Bicarbonate

- Chemical Formula : NaнCo 3
- Molecular weight: 84.0.1 g/mol
- Synonym: Baking Soda

Preparation

→A similar method is used for the production of sodium bicarbonate on commercial scale. The soda ash (mined in the form of ore trona) is dissolved in water and treated with carbon dioxide. From this method, sodium bicarbonate is obtained as a solid precipitate.

$$Na_2CO_3 + CO_2 + H_2O \longrightarrow 2NaHCO_3$$

Physical Properties

- **Appperance** : white crystalline powder
- **Odour** : odourless
- **Stability** : It is stable only in dry air.
- **Solubility** : soluble in water and insoluble in other solvent like alcohol.

Chemical Properties

- It can be used as a wash for removing any acidic impurities from a crude liquid and resulting to a pure sample.
- It reacts with acetic acid (CH_3COOH) to give sodium acetate.

Uses

- Aqueous solution of sodium bicarbonate is used as an antacid which is given orally to treat acid indigestion and heartburn.
- It is used in urinary alkalinisation for treating uric acid renal stones

Aluminium Hydroxide Gel

- Chemical Formula: AI COH) 3
- Molecular Weight: 78.00 g/mol
- Synonym: Aluminium Hydrated Powder

Preparation

- It can be formed by treating an aluminium salt (e.g, aluminium chloride or sulphate) with ammonium hydroxide.

- $AICl_3 + 3NH_4OH \rightarrow Al(OH)_3 + 3NH_4CI$

Physical Properties

- **Appearance** : white amorphouse solid
- **Odour** : Odourless.
- **Solubility** : It is insoluble in water and ethanol, but soluble in acids and alkalis solutions.

Chemical Properties

- It gets converted to aluminium oxide on heating.

  $2AI(OH)_3 \rightarrow Al_2O_3 + 3H_2O$

- It acts as an acid in the presence of an alkali.

  $Al(OH)_3 \rightarrow 3H^+ + AlO_3^{3-}$

Uses

- To treat peptic ulcer, gastritis, peptic oesophagitis, gastric hyperactivity, and hiatal hernia,
- To protect the skin

Magnesium Hydroxide

- Chemical Formula: $Mg(OH)_2$
- Molecular Weight: 58.32 g/mol
- Synonym: Milk of Magnesia

Preparation

➲ Treating the solution of different soluble magnesium salts with alkaline water induces the precipitation of the solid hydroxide Mg(OH)2: Mg2+ + 2OH– → Mg(OH)

Physical Properties

♦ **Appearance :** White powder

♦ **Solubility :** Soluable in water

Chemical properties

♠ At pH 10, magnesium hydroxide is alkaline to litmus solution and absorbs carbon dioxide from air.

Uses

➢ Magnesium hydroxide is a non-systemic gastric antacid and mild cathartic. But on continuous or prolonged use, kidney stones may develop.