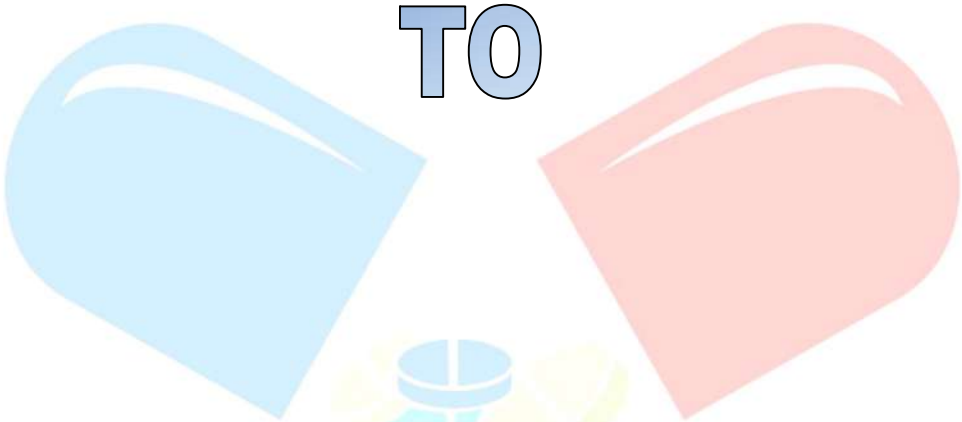
WELCOME

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 :

- **Cathartics :** Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite

CATHARTICS

→ Cathartics are the drugs or agents that are used to relieve constipation by promoting bowel movements and accelerating the process of defecation.
→ They work by:

- Increasing the **fluid content** of feces
- Softening the stool
- Increasing **intestinal motility (movement)**
- Stimulating bowel evacuation

Types of Cathartics

→ Cathartics are mainty classified into two categories

- Laxative
- Purgative

Laxative

→ Laxatives are mild acting cathartics
→ They work by either

- Increasing intestinal movement
- Increasing stool bulk
- Make stool softener

→ Prolong use of laxative may cause habit or dependency

Purgaltive

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

Classification of Cathartics (Based on Mechanism of Action)

1. Stimulant Cathartics

- **Mechanism:** Directly stimulate intestinal mucosa, increasing peristalsis (movement).
- **Examples:** Senna, Bisacodyl, Castor oil

2. Lubricant Cathartics (Stool Softeners)

- **Mechanism:** Coat the stool and intestinal wall with a slippery film to ease passage.
- **Examples:** Liquid paraffin, Mineral oil

3. Bulk-forming Cathartics

- **Mechanism:** Absorb water and **increase bulk** of stool, stimulating bowel movement.
- Must be taken with **plenty of water**.
- **Examples:** Psyllium husk (Isabgol), Methylcellulose

4. Saline Cathartics (Osmotic Cathartics)

- **Mechanism:** Increase osmotic pressure in intestine → draw water → soften stool and promote evacuation.
- **Examples:** Magnesium sulfate, Sodium phosphate, Milk of magnesia
- Act **rapidly**, often used for **bowel cleansing** before surgery

Uses of Cathartics

→ To relieve acute or chronic constipation
→ For bowel clearance before surgery or colonoscopy
→ To ease defecation in rectal diseases like hemorrhoids
→ To avoid straining during bowel movements (especially in heart patients)
→ Used in poisoning cases (to remove toxins from GI tract — under medical supervision)

Magnesium Sulphate

- Chemical Formula: $MgSO_4 \cdot 7H_2O$
- Molecular Weight: 246.47 g/mol
- Synonym: Epsom Salt

Method of Preparation

Magnesium sulphate can be prepared by the reaction of **magnesium carbonate ($MgCO_3$)** with **dilute sulphuric acid (H_2SO_4):**

$$MgCO_3 + H_2SO_4 \rightarrow MgSO_4 + H_2O + CO_2\uparrow$$

Alternatively, it can also be obtained from natural mineral sources like **Epsomite**

Physical Properties

- Appears as white crystalline powder or colorless crystals
- Odourless
- Has a cool, saline, and bitter taste
- Soluble in water
- Sparingly soluble in alcohol
- Effloresces in dry air (loses water)

Chemical Properties

- Decomposes upon strong heating, losing water of crystallization.
- Forms double salts with other sulfates (e.g., Tutton's salts).

Uses

1. Used as a saline cathartic (osmotic laxative)
   → Draws water into the intestines and promotes bowel movement.
2. Used in agriculture as a magnesium fertilizer
   → Supplies magnesium and sulfur to the soil.
3. Used medically to control seizures in eclampsia (pregnancy-induced seizures)
   → Acts as a central nervous system depressant.
4. Used in bathing solutions for muscle relaxation and pain relief
5. Used in electrolyte replacement therapy

Sodium Orthophosphate

- Chemical Formula: $Na_2HPO_4 \cdot 12H_2O$
- Molecular Weight: 358.14 g/mol

Preparation

Sodium orthophosphate is prepared by the reaction of sodium carbonate (Na_2CO_3) with a hot solution of phosphoric acid (H_3PO_4):

$$H_3PO_4 + Na_2CO_3 \rightarrow Na_2HPO_4 + H_2O + CO_2\uparrow$$

Physical Properties

- Occurs as colourless, transparent crystals
- Odourless
- Has a saline taste
- Soluble in water
- Insoluble in alcohol

Chemical Properties

Reaction with Acids

- Acts as a weak base and reacts with strong acids to form **acidic phosphates**.

$$Na_2HPO_4 + HCl \rightarrow NaH_2PO_4 + NaCl$$

Uses

1. Used as a saline cathartic
   → Promotes bowel evacuation by drawing water into the intestines.
2. Used in the preparation of buffer solutions
   → Helps maintain pH stability in pharmaceutical and laboratory preparations.
3. Used in water treatment and detergents (industrial use)

Kaolin

- Chemical Formula: $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$
- Molecular Weight: 258.16 g/mol
- Synonym: China Clay

Preparation

Kaolin is a naturally occurring hydrated aluminum silicate. It is prepared from natural clay by:

- Powdering
- Washing and sedimentation
- Purification to remove grit, sand, and other impurities

Physical Properties

- Appears as a light, white amorphous powder
- Odourless
- Tasteless
- Insoluble in water and organic solvents
- Smooth and soft texture

Chemical Properties

- **Chemically inert** (does not react easily)
- Can adsorb toxins and gases from the gastrointestinal tract
- Does not dissolve or disintegrate in acids or alkalis

Uses

1. Used as a mild cathartic
   → Helps in treating diarrhea by adsorbing toxins and bacteria.
2. Used in food poisoning and gastrointestinal infections
   → Adsorbs harmful substances in the gut.

Bentonite

- Chemical Formula: $Al_2O_3 \cdot 4SiO_2 \cdot H_2O$
- Molecular Weight: 360.31 g/mol
- Synonym: Clay

Preparation

Bentonite is a naturally occurring colloidal hydrated aluminum silicate, derived from volcanic ash.

It is obtained by:

- Mining natural clay deposits
- Followed by grinding, purification, and drying

Physical Properties

- Occurs as a very fine, cream-colored powder
- Odourless
- Tasteless
- Swells in water and forms a gel-like suspension
- Insoluble in water but highly absorbent

Chemical Properties

- Colloidal nature: forms suspensions in water
- High swelling capacity due to layered structure
- Can adsorb toxins, gases, and bacteria from the GIT
- Chemically inert in normal pH range

Uses

1. Used as a bulk-forming cathartic
   → Helps relieve constipation by absorbing water and increasing stool volume.
2. Used as an emulsifying agent
   → Stabilizes emulsions and suspensions in pharmaceutical formulations.
3. Used as a protective
   → Forms a coating over inflamed mucous membranes in the gastrointestinal tract.
4. Also used in:
   - Toothpastes and cosmetic products