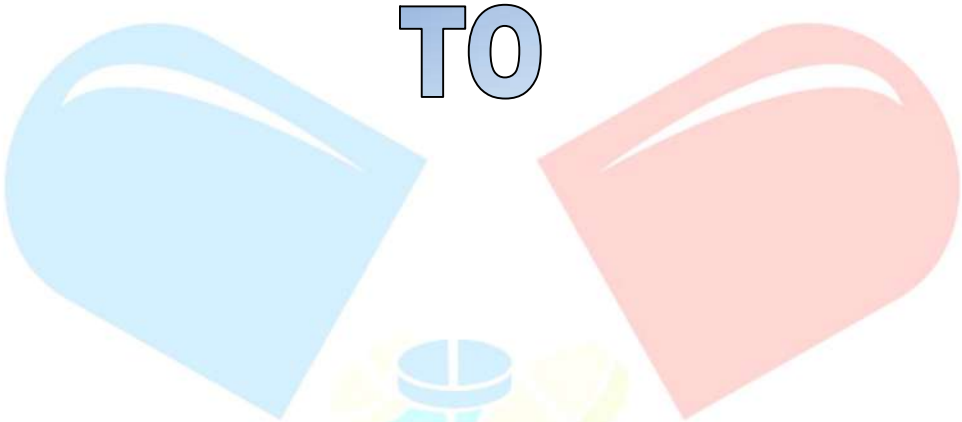
WELCOME

TO



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PHARMACEUTICAL INORGANIC CHEMISTRY

UNIT 4

TOPIC :

- **Haematinics :** Ferrous sulphate*, Ferrous gluconate

HAEMATINICS

- Haematinics are substances or drugs that help in the formation of blood.

  They are mainly used in the treatment and prevention of anaemia by increasing:
  - Red Blood Cells (RBCs) count
  - Haemoglobin (Hb) concentration

Function

Haematinics act by :

- Providing essential nutrients (like iron, folic acid, vitamin B12) required for RBC synthesis
- Helping to restore normal hemoglobin levels
- Supporting the body in recovery from blood loss or nutritional deficiencies

Anaemia

- Anaemia is a medical condition in which the hemoglobin concentration or number of RBCs in blood falls below normal levels. This leads to reduced oxygen-carrying capacity of blood.

Causes of Anaemia

- **Excessive Blood Loss**
  – Injury, surgery, menstruation, internal bleeding
- **Unhealthy RBC Formation**
  – Nutritional deficiencies (Iron, folic acid, vitamin B12)
- **Increased Destruction of RBCs**
  – Autoimmune diseases, infections, genetic disorders

Types of Anaemia

- Iron Deficiency Anaemia
- Aplastic Anaemia
- Haemolytic Anaemia
- Sickle Cell Anaemia
- Pernicious Anaemia

FERROUS SULPHATE

- Molecular Formula: $FeSO_4 \cdot 7H_2O$
- Molecular Weight: 278 g/mol
- Synonym: Green Vitriol or Copperas

Method of Preparation

- Ferrous sulphate is prepared by the reaction of iron (Fe) with dilute sulfuric acid (H_2SO_4):

  $$Fe + H_2SO_4 \rightarrow FeSO_4 + H_2\uparrow$$

- In this reaction, iron dissolves, forming ferrous sulphate and liberating hydrogen gas.

Physical Properties

- Appears as transparent green crystals or pale bluish-green crystalline powder
- Odourless
- Has a metallic taste
- Soluble in water
- Insoluble in alcohol
- Efflorescent in nature (loses water of crystallization on exposure to air)

Chemical Properties

- It is easily oxidized in air to ferric sulphate ($Fe_2(SO_4)_3$), especially in moist conditions
- On heating, it loses water and may decompose to form ferric oxide and sulfur dioxide

Uses of Ferrous Sulphate

1. **As a Haematinic:**
   - Used in the treatment of iron-deficiency anaemia
   - Increases **hemoglobin** and RBC formation
2. **As a Disinfectant:**
   - Has mild antimicrobial and deodorizing properties
3. **Other Uses:**
   - Used in water purification

FERROUS GLUCONATE

- Molecular Formula: $C_{12}H_{22}FeO_{14} \cdot xH_2O$
- Molecular Weight: Approximately 446.14 g/mol (anhydrous form)
- Synonym: Iron(II) gluconate

Method of Preparation

➢ Ferrous gluconate is prepared by the reaction of gluconic acid with ferrous carbonate ($FeCO_3$) or ferrous hydroxide ($Fe(OH)_2$):
$2C6H12O7(Gluconicacid)+FeCO3 \rightarrow Fe(C6H11O7)2+CO2+H2O$

Physical Properties

- Appears as grayish-yellow to pale green crystalline powder
- Odourless
- Mildly metallic taste
- Soluble in water
- Insoluble in alcohol
- Slightly hygroscopic in nature

Chemical Properties

- Ferrous gluconate is a ferrous salt of gluconic acid
- On exposure to air, oxidation to ferric gluconate may occur
- It is less irritating to the gastrointestinal tract than ferrous sulfate

Uses

✓ As a Haematinic Agent
→ Used in the treatment of iron-deficiency anaemia
→ Helps in increasing hemoglobin levels and RBC production

✓ Iron Supplement
→ Used in pregnancy, lactation, and growth phases where iron requirement is high

✓ Less Gastric Irritation
→ Preferred over ferrous sulfate for patients with sensitive stomach