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# PHARMACEUTICAL INORGANIC CHEMISTRY

## UNIT 4

TOPIC :

- **Emetics** : Copper sulphate\*, Sodium potassium tartarate



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## EMETICS

- Emetics are agents or drugs that induce vomiting (medically known as emesis).  
They are used to empty the stomach contents, especially in cases of poisoning or overdose.
- Vomiting is a protective, involuntary reflex mechanism that helps to eliminate toxic or unwanted substances from the stomach.

### Mechanism of Action of Emetics

Emetics work by either of two major pathways:

#### 1. Central Acting Emetics:

- These act directly on the Chemoreceptor Trigger Zone (CTZ) located in the medulla oblongata (part of the brain).
- They stimulate the vomiting center via dopaminergic or other receptors, leading to emesis.

#### Example

- **Apomorphine** (acts on dopamine receptors in CTZ)

#### 2. Peripheral Acting Emetics:

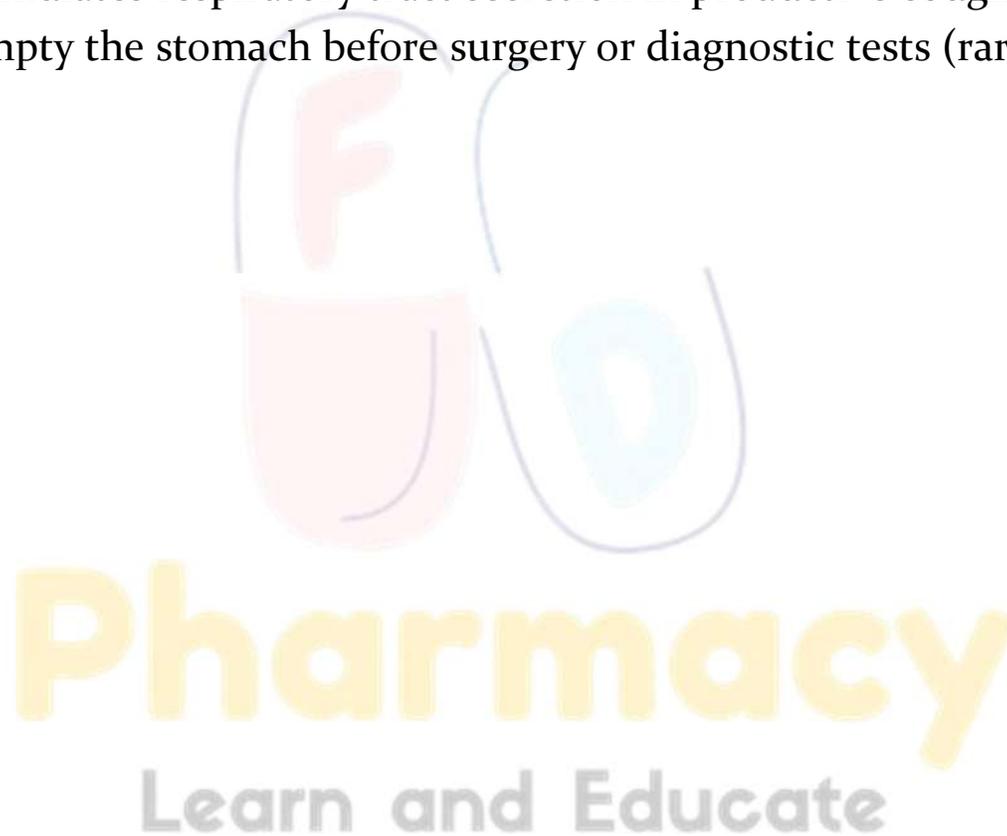
- These irritate the mucosa of the stomach or gastrointestinal tract (GIT)
- This irritation stimulates vagal afferent nerves, which in turn activate the vomiting center in the brain.

#### Examples

- **Ipecacuanha (syrup)**
- **Copper sulfate**
- **Zinc sulfate**

## Uses of Emetics

- ✓ In Acute Poisoning
  - To remove poison from the stomach (only when poison is non-corrosive and patient is conscious)
- ✓ In Drug Overdose
  - To remove excess drug before absorption
- ✓ As an Expectorant (Low Dose)
  - Stimulates respiratory tract secretion in productive cough
- ✓ To empty the stomach before surgery or diagnostic tests (rare use)



## COPPER SULPHATE

- Chemical Formula:  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- Molecular Weight: 249.68 g/mol (not 159.6 – that's for anhydrous form)
- Synonym: Blue Vitriol or Bluestone

### Method of Preparation

→ Copper sulphate is prepared by reacting cupric carbonate ( $\text{CuCO}_3$ ) with dilute sulfuric acid ( $\text{H}_2\text{SO}_4$ ):



→ It can also be prepared by the action of dilute sulfuric acid on metallic copper in the presence of oxygen or oxidizing agent.

### Physical Properties

- Appears as bright blue crystalline granules or blue powder
- Odourless
- Soluble in water, Insoluble in alcohol
- Loses water of crystallization upon heating and turns white (forms anhydrous copper sulphate)

### Chemical Properties

#### Hydrated and Anhydrous Form:

- Copper sulphate pentahydrate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) is blue in color.
- Upon heating, it loses water of crystallization and becomes white anhydrous copper sulphate ( $\text{CuSO}_4$ ):



### Uses

- ✓ As an Emetic (Peripheral Acting):  
→ Used in acute poisoning cases to induce vomiting (less common today due to toxicity concerns)
- ✓ As a Germicide and Fungicide:  
→ Used to kill bacteria, fungi, and algae (e.g., in agriculture, water treatment)
- ✓ As an Insecticide:  
→ Used in pesticide formulations to kill insects on crops

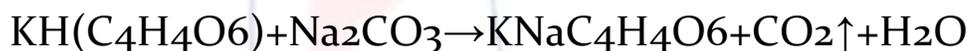
## SODIUM POTASSIUM TARTRATE

- Chemical Formula:  $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$
- Molecular Weight: 210.16 g/mol
- Synonym: Rochelle Salt

### Preparation

→ Sodium potassium tartrate is prepared by the reaction of sodium carbonate with a suspension of potassium hydrogen tartrate.

- Sodium carbonate is added to the potassium tartrate suspension.
- The mixture is heated by boiling, then allowed to cool.
- Upon cooling, crystals of sodium potassium tartrate are formed.



### Physical Properties

- Occurs as white or colorless crystalline powder
- Odourless
- Has a cool, saline taste
- Soluble in water
- Insoluble in alcohol

### Chemical Properties

- Forms neutral aqueous solutions
- On heating, it may decompose and release carbon dioxide
- Can act as a complexing agent in Fehling's and Benedict's reagent (helps keep copper in solution)

### Uses

- ✓ As an Emetic  
→ In high doses, induces vomiting (less commonly used now)
- ✓ As a Laxative  
→ Acts as a mild saline cathartic, helping in relieving constipation
- ✓ In Effervescent Powders  
→ Used with acids and carbonates to produce carbon dioxide during effervescence