

UNIT 4

Miscellaneous compounds

Expectorants

Expectorants are agents that increase the volume or fluidity of bronchial secretions, making it easier to expel mucus from the respiratory tract by coughing. They are useful in treating productive cough and respiratory tract infections.

1. Potassium Iodide (KI)

Category: Expectorant

Molecular Formula: KI

Molecular Weight: 166.00

Preparation

Potassium iodide is prepared by reacting iodine with hot concentrated potassium hydroxide (KOH) solution:



The mixture is evaporated, and the iodate (KIO_3) is removed by crystallization or reduction. The remaining solution is evaporated to crystallize pure potassium iodide.

Properties

- White, crystalline powder or granules
- Odourless, salty taste
- Soluble in water and glycerin
- Slightly hygroscopic

Uses

- As an **expectorant**, it stimulates bronchial secretions, making sputum less viscous and easier to expel
- Also used in **thyroid disorders**, and **preparation of iodine solutions**
- Occasionally used in chronic respiratory conditions like asthma and bronchitis

Storage

- Store in tightly closed amber-coloured containers
- Protect from light and moisture

Emetics

Emetics are substances that induce vomiting, usually in cases of poisoning (if the poison is non-corrosive and ingestion is recent). Their use is limited due to availability of safer methods like gastric lavage.

2. Sodium Potassium Tartrate (Rochelle Salt) – $\text{NaKC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$

Category: Mild Emetic, Mild Laxative

Molecular Formula: $\text{NaKC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$

Molecular Weight: 282.22

Preparation

Sodium potassium tartrate is prepared by neutralizing **tartaric acid** with a mixture of **sodium carbonate** and **potassium carbonate**:



The resulting solution is evaporated to dryness and crystallized.

Properties

- Colourless or white crystalline powder
- Odourless, has a cooling saline taste
- Soluble in water, practically insoluble in alcohol

Uses

- Used as a **mild emetic** in cases of accidental poisoning (now largely obsolete)
- Acts as a **saline purgative/laxative**
- Also employed in **effervescent preparations** and **analytical chemistry**

Storage

- Store in a well-closed container in a dry, cool place

Haematinics

Haematinics are substances that are used in the treatment of anemia by increasing the hemoglobin content in the blood. The most common forms include iron salts.

Ferrous Gluconate ($\text{C}_{12}\text{H}_{22}\text{FeO}_{14} \cdot 2\text{H}_2\text{O}$)

Category: Haematinic

Molecular Weight: 482.18 (dihydrate)

Preparation

It is prepared by reacting **gluconic acid** with **ferrous carbonate** or **ferrous hydroxide**:



The solution is then filtered, concentrated, and crystallized to yield ferrous gluconate dihydrate.

Properties

- Yellowish-gray to pale green powder
- Odourless, mildly astringent taste
- Slightly soluble in water; insoluble in alcohol

Uses

- Used as an iron supplement in **iron deficiency anemia**
- Preferred in patients who cannot tolerate ferrous sulphate
- Less gastric irritation compared to other ferrous salts

Storage

- Store in airtight, light-resistant containers to avoid oxidation to ferric form

Poison and Antidotes

1. Activated Charcoal

Category: Universal Antidote (Physical Antidote)

Form: Fine black, odourless, tasteless powder

Source: Made from **carbonaceous materials** like wood, coconut shells by carbonization followed by activation (oxidation with steam or CO₂ at high temperature to develop porosity).

Preparation

- **Carbonization:** Heating organic material in limited air
- **Activation:** Exposing to oxidizing gases like steam or CO₂ at 800–1000°C to develop a large surface area

Mechanism of Action

- Works by **adsorbing** poisons in the GI tract, thereby preventing their absorption into the bloodstream

Uses

- Used in **acute poisoning**, especially for alkaloids, barbiturates, heavy metals
- Often used in combination with **cathartics** to promote elimination

Dose

- Single-dose: 1g/kg body weight orally
- Multiple doses in case of sustained-release poisons

Storage

- Store in well-closed containers in a dry place, away from volatile substances

2. Sodium Nitrite (NaNO₂)

Category: Antidote (Chemical), Vasodilator

Molecular Weight: 69.00

Appearance: White to slightly yellow hygroscopic crystalline powder

Preparation

Prepared industrially by **absorbing nitrogen oxides in sodium carbonate solution** or by neutralizing nitrous acid (HNO₂) with sodium hydroxide.

Mechanism of Action as Antidote

- Used in **cyanide poisoning**
- Converts hemoglobin to **methemoglobin**, which has a higher affinity for cyanide ions, forming cyanmethemoglobin and releasing cytochrome oxidase

Uses

- Antidote for **cyanide poisoning**, in combination with **sodium thiosulphate**
- Also used as a **preservative** in meats (non-pharma use)

Storage

- Store in airtight containers, protected from moisture and light

Astringents

Astringents are substances that cause the contraction or shrinkage of tissues by precipitating proteins, thereby reducing secretions, discharges, and inflammation. They are commonly used topically in the treatment of minor cuts, skin irritations, and as mouthwashes.

Pharmaceutical Uses:

- Used in the treatment of diarrhea, hemorrhoids, and oral ulcers
- Included in formulations like lotions, eye drops, and gargles

Examples:

Zinc sulphate, Potash alum

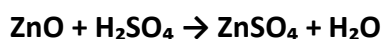
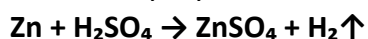
1. Zinc Sulphate ($\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$)

Category: Astringent, Antiseptic, Nutritional supplement

Molecular Weight: 287.54

Preparation

Zinc sulphate is prepared by dissolving **zinc metal** or **zinc oxide** in **dilute sulfuric acid**, followed by crystallization.



The solution is filtered, concentrated, and crystallized to obtain **zinc sulphate heptahydrate**.

Properties

- Colourless, transparent crystals or white crystalline powder
- Odourless, astringent and metallic taste
- Freely soluble in water, insoluble in alcohol
- Effloresces in dry air

Uses

- **Astringent** in eye drops and lotions due to its protein-precipitating ability
- Used in **mouthwashes** and **lotions** for skin conditions
- Given orally as a **zinc supplement** in zinc-deficiency-related diarrhea
- Also used in veterinary medicine and as a nutrient in parenteral nutrition

Storage

- Store in tightly closed containers, away from moisture
- Avoid contact with metals

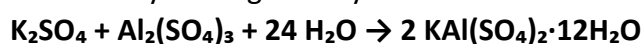
2. Potash Alum (Potassium Aluminium Sulphate) – $KAl(SO_4)_2 \cdot 12H_2O$

Category: Astringent, Styptic

Molecular Weight: 474.39

Preparation

It is prepared by **mixing hot solutions** of **aluminium sulphate** and **potassium sulphate**, followed by cooling and crystallization:



This gives transparent octahedral crystals of potash alum.

Properties

- Large, transparent colourless crystals
- Odourless, strongly astringent taste
- Soluble in water, insoluble in alcohol
- Exhibits acidic reaction in aqueous solution

Uses

- **Topical astringent** and **styptic** in bleeding from minor cuts
- Used in **gargles**, **mouthwashes**, and **throat lozenges**
- In **dentistry**, it is used to reduce bleeding and inflammation

- In water purification as a **coagulant**
- Also used in **cosmetics**, like aftershave styptic sticks and deodorants

Storage

- Store in well-closed containers
- Protect from moisture and strong light

Note:For compounds not mentioned here refer unit 1 all compounds are covered