

UNIT - IV MISCELLANEOUS COMPOUNDS

POINTS TO BE COVERED IN THIS TOPIC

EXPECTORANTS

EMETICS

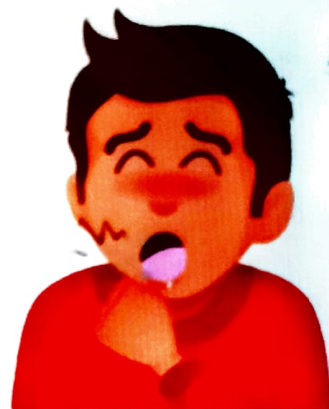
HAEMATINICS

POISON AND ANTIDOTE

ASTRINGENTS

EXPECTORANTS

- **Expectorants** are those drugs which help in **removing sputum** from the **respiratory tract** either by **increasing the fluidity** (or reducing the viscosity) of sputum or **increasing volume** of fluids that have to be expelled from the **respiratory tract** by coughing.
- E.g. **Ammonium chloride, Potassium iodide, Antimony potassium tartarate.**

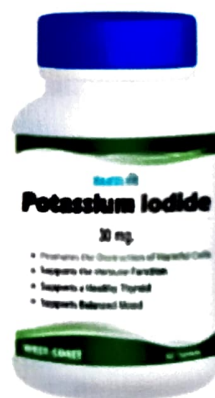


➤ CLASSIFICATION OF EXPECTORANTS

- ❖ **Sedative expectorant** - These are **stomach irritant expectorants** which produce their effect through **stimulation of gastric reflexes**. Examples of **sedative expectorants** include bitter drugs such as **ipecac, senega**.
- ❖ **Stimulant expectorant** - These **expectorants** bring about a **stimulation of the secretory cells** of the respiratory tract directly or indirectly. Since these drugs **stimulate secretion**, more fluid gets **produced in respiratory tract** and **sputum is diluted**. Examples of **stimulant expectorants** include drugs such as **Eucalyptus, lemon, anise**.

➤ POTASSIUM IODIDE

- Molecular formula - **KI**
- Molecular weight - **166.01**
- Synonym - **Kalii iodidum, pot. Iod.**



❖ PREPARATION

- It is prepared by **treating iron** filling with **iodine** under water to **get iodide** which is then reacted with **potassium carbonate**.

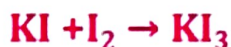


- **Hydrochloric acid** when treated with **potassium bicarbonate** results in the formation of **potassium iodide**.



❖ PROPERTIES

- It occurs as **odourless, transparent** or **opaque crystals**.
- It is **white granular powder**.
- It is slightly **hygroscopic in nature**.
- **Chemical Property** - Iodine readily dissolves in an **aqueous solution** of **potassium iodide** forming a dark brown solution containing **potassium tri-iodide**.



❖ USES

- It is used as an **ingredient of expectorant mixture**.
- It may be used for **prophylaxis** and treatment of **simple goitre**.
- It is used as an **antifungal agent** in **veterinary practise**.
- **Potassium iodide solution** is used as **iodine supplement**.

➤ AMMONIUM CHLORIDE

- Molecular formula – **NH₄Cl**
- Molecular weight – **53.49**
- Synonym – **Ammonium Muriate, Sal ammoniac, Amchlor, Ammon**.



❖ PREPARATION

- It is a product of the **Solvay Process** used to produce **Ammonium Chloride and Sodium Carbonate**.



- This method is used to **minimize ammonia** release in some **industrial operations**.
- **Ammonium chloride** is prepared by **combining ammonia** with either **hydrogen chloride (gas)** or **hydrochloric acid**.



❖ PROPERTIES

- It is a **white crystalline salt**, **highly soluble in water**.
- Solutions of **ammonium chloride** are **mildly acidic**.
- It is some what **hygroscopic**.
- It is **odourless and possesses** cooling saline taste.
- **Ammonium chloride** reacts with a **strong base** e.g. **sodium hydroxide** to release ammonia gas.



- **Ammonium chloride** also reacts with alkali metal **carbonates** at elevated temperatures, giving **ammonia and alkali metal chloride**.

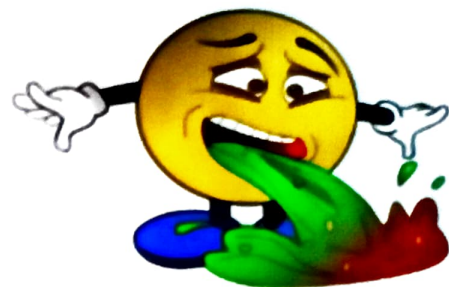


❖ USES

- **Ammonium chloride** is a **nitrogen source** in fertilizers e.g. **chloro ammonium phosphate**.
- It is used as an **expectorant** in **cough medicine**.
- Its **expectorant action** is caused by **irritative action** on the **bronchial mucosa**.
- **Ammonium chloride** is used as a **systemic acidifying agent** in treatment of severe **metabolic alkalosis**.
- It is also used as an **flavouring agent**.
- It is used in the **textile and leather industry** in **dyeing, tanning, textile printing** and to **luster cotton**.
- It is used in hair **shampoos** as a **thickening agent**.

EMETICS

- Emetics are the **drugs** which give **rise to forced regurgitation (emesis)** by which the contents of the **stomach get expelled** through the oral cavity.



- Emetics constitute a valuable **part of treatment** in **poisoning cases**. E.g. **Antimony potassium tartarate**.

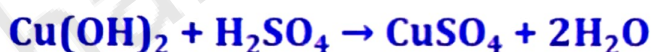
➤ COPPER SULPHATE

- Molecular formula – **CuSO₄.5H₂O**
- Molecular weight – **159.6**
- Synonym – **blue vitriol**



❖ PREPARATION

- It is prepared by **dissolving cupric oxide**, or **cupric hydroxide**, **cupric carbonate** in **dilute H₂SO₄**



❖ PROPERTIES

- Its **hydrated salt** is **blue in colour** but **anhydrous salt** is colourless.
- It **readily dissolves** in water but is **insoluble in alcohol**.

❖ USES

- It is used as a **germicide and insecticide** in agriculture.
- A mixture of **copper sulphate** and lime, commonly known as **Bordeaux mixture**, is used as **fungicide**.
- It is used in **electroplating**, calico printing and in **electrical batteries**.

➤ SODIUM AND POTASSIUM TARTARATE



- Molecular formula - $C_4H_4NaKO_6$
- Molecular weight - 210.158
- Synonyms - Rochelle salt

❖ PROPERTIES

- It occurs as **colourless crystals**, **saline in taste**, **soluble in hot water** and **insoluble in alcohol**.

❖ USES

- It is **used as laxative**.
- It has also been used in the process of **silvering mirrors**.

HAEMATINICS

- **Haematinics** are substances required in the formation of **blood** and are used for **treatment of anaemias**.
- These drugs increase the number of **red blood cells** and the amount of **hemoglobin** to normal level and above when they are **below normal**.
- **Anaemia occurs** when the balance between **production and reduction** of **red blood cells** is disturbed



(a) **Due to blood loss**

(b) **Impaired red cell** formation due to

(i) Deficiency of essential factors: **Iron, folic acid vitamin B12**

(ii) **Bone marrow depression, erythropoietin deficiency**

(c) **Increased destruction** of **RBCs (Haemolytic anaemia)**

❖ TREATMENT OF ANAEMIA

1. In every **severe anaemia** treatment when hemoglobin is **7 gm percent** or below due to any cause, **blood transfusion** is necessary.
2. In **microcytic anaemia** and **hypochromic anaemia** iron is required specifically to be administered along with **iron rich diet**.
3. In **macrocytic anaemia** due to any cause, liver extract **vitamin B₁₂**, **folic acid** each alone or in combination are used.
4. In **pernicious anaemia**, **vitamin B₁₂** is specifically needed for treatment.
5. In all cases of **anaemia** side by side with the **treatment of anaemia**, **symptomatic treatment** should be given with **dietary supplements**.

➤ FERROUS SULPHATE

- Molecular formula – **FeSO₄.7H₂O**
- Molecular weight – **278**
- Synonyms – **green vitriol**



❖ PREPARATION

- When iron is treated with **dilute H₂SO₄**, **iron** dissolve and **form ferrous sulphate** and hydrogen gas is liberated.



❖ PROPERTIES

- It occurs as **transparent**, pale **bluish green crystalline powder**.
- Odourless **metallic in taste**, very soluble in **boiling water**, **freely soluble in water** but practically **insoluble in alcohol**.
- When it is treated with **ceric ammonium sulphate** in **acidic medium**, it reduces ceric iron.



❖ USES

- It is used as **haematinic** in the treatment of iron **deficiency anaemia**.
- It is also used to **dye fabrics** and in **tanning leather**.

➤ FERROUS GLUCONATE

- Molecular formula - $C_{12}H_{22}FeO_{14} \cdot 2H_2O$
- Molecular weight - 482.17

❖ PROPERTIES

- It occurs as **yellowish grey fine powder**, burnt sugar like **odour**, **soluble in water** and **insoluble in alcohol**.

❖ USES

- It is used as iron source in treatment of **various anaemias**.



POISON AND ANTIDOTE

➤ POISON

- A **poison** can be described as 'any substance which when introduced into or **absorbed** by a **living organism**, destroys **life or injures health**'.



➤ ANTIDOTE

❖ TYPES OF ANTIDOTES

✓ Chemical antidotes

- The **antidote** that changes the **chemical nature** of the **poison**, e.g. **sodium thiosulphate** is a **chemical antidote**, which converts the **systemically toxic cyanide** to the **non-toxic thiocyanate**.

✓ Mechanical antidotes

- The antidote that **prevents absorption** of the poison, e.g. **activated charcoal** is a **mechanical antidote**, which absorbs the poison, prior to its **absorption across** the intestinal wall.

✓ Physiological antidotes

- The **antidote that counteracts** the effects of the poison by producing other effects, e.g. **sodium nitrite** is a **physiological antidote**, which converts **Haemoglobin** into **methemoglobin** in order to **bind cyanide**.

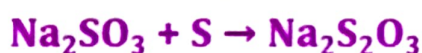
➤ SODIUM THIOSULPHATE

- Molecular formula – $\text{Na}_2\cdot\text{S}_2\text{O}_3\cdot 5\text{H}_2\text{O}$
- Molecular weight – **248.2**
- Synonym – **Sodium hyposulphate**



❖ PREPARATION

- It can be prepared by **boiling sodium sulphite** with **Sulphur**.



- It can be obtained by **mixing sulphide liquors** sodium carbonate by passing SO_2 gas.



❖ PROPERTIES

- It occurs in the form of **large colourless crystals**.
- It is **odourless** and is having an **alkaline taste**.
- It is **soluble in water** but insoluble in alcohol.
- **Sodium thiosulphate** when acidified with **hydrochloric acid**, it decomposes to give **Sulphur dioxide, water and Sulphur**.



❖ USES

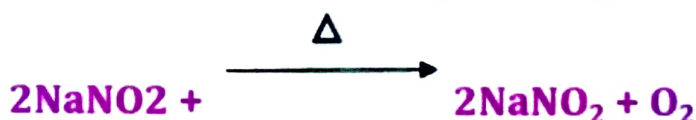
- It is used in the treatment of **cyanide poisoning**. It is also used to **treat parasitic skin diseases**.

➤ SODIUM NITRITE

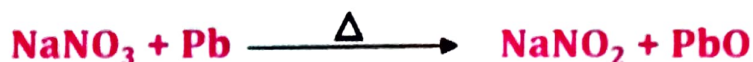
- Molecular formula – NaNO_2
- Molecular weight – **69.00**
- Synonym – **Nitrous acid, Sodium salt**

❖ PREPARATION

- It can be prepared by **strongly heating sodium nitrite**.

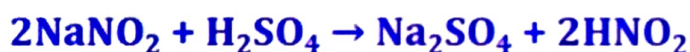


- It is **more conventinely** made by heating the **nitrite with metallic lead**.



❖ PROPERTIES

- It is **odourless, colourless** to slightly **yellow crystals**.
- Its **taste in saline**.
- It is **water soluble** and **sparingly soluble** in alcohol.
- **Sodium nitrite** is easily decomposed by the **acidification** with **dilute sulphuric acid**.



- It also act as a **reducing and oxidizing agent**.



❖ USES

- It is used in treatment of **cyanide poisoning** in **conjugation** with **sodium thisulphate**.

➤ ACTIVATED CHARCOAL

- **Charcoal** is a **dark grey** residue **consisting of carbon** and any remaining ash obtained by **removing water** and other **volatile constituent** from **animal and vegetable** substances.

❖ PREPARATION

- It is prepared by **burning wood** in absence of air. The residue obtained consists of **nearly pure carbon**.

❖ PROPERTIES

- It is **fine black, odourless & tasteless powder**.
- It is free from **grilly matter**.
- It is **insoluble in water** of other **organic solution**.

❖ USES

- Used as an **emergency antidote** in many of **poisoning**.
- Used as **protective and adsorbent**.

ASTRINGENTS

- These are the compounds which bring about **protein precipitation** and form a **protective layer** on the **surface** and hence **stop bleeding** by **constricting the blood vessels**.
- It has **local styptic** and **antiseptic action**.
- **Astringents** applied over the **wound in small quantity** to Stimulate the growth of **new tissues** but in **higher concentration** it produces irritation.

❖ MECHANISM

- The **protein precipitation** brought about by **astringents** is due to presence of metallic ion having large charge or form **electrostatic field**.
- The metal would form complex with **various polar** groups present on the **protein or an enzyme**.
- This complexation of important **functional groups** at the action site of protein Causes a **drastic change** in the properties of proteins.

❖ ASTRINGENT HAVE OTHER USES TO

- They are **used to diarrhea**.
- They also possess **deodourant** properties.
- They **decrease sweating** and make the **skin rougher**.
- They promote **healing process**.

➤ ZINC SULPHATE

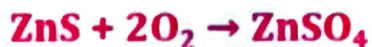
- Molecular formula – **ZnSO₄.7H₂O**
- Molecular weight – **287.54gm**

❖ PREPARATION

- It is prepared by action of **dilute sulphuric acid** on **zinc oxide**.



- It is also obtained by **heating zinc sulphide** in the **presence of air**.



❖ PROPERTIES

- **Colourless, odourless** and **metallic taste**.
- It effloresces in **dry air**.
- It is **soluble in water** and **glycerine** but **insoluble in alcohol**.

❖ USES

- Mainly used as **astrigent**.
- When use internally , it acts as **emetic agent**
- It also have **protein precipitation activity**.

➤ POTASH ALUM

- Molecular formula – **KAl(SO₄).12H₂O**
- Molecular weight – **474.33g**
- Synonyms – **Aluminium potassium sulphate**

❖ PREPARATION

- It is prepared by adding a **concentrated solution** of **potassium sulphate** to a **hot solution** of equimolar properties of **Aluminium sulphate**.



❖ PROPERTIES

- It occurs as **large colourless crystals**.
- It is **odourless** and sweat astrigent in taste
- It is **soluble in water** but **insoluble in alcohol**.

❖ USES

- Uses as an **astrigent, antiseptic**.
- It is having **protein precipitation properties**
- It is also used as a **pharmaceutical aid**