

# *UNIT IV*

## *Miscellaneous Compounds*

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# Expectorants

- Expectorants are Drugs that help in removing sputum from the respiratory tract either by:- increasing the fluidity (or reducing the viscosity) of sputum

OR

- increasing the volume of fluids that have to be expelled from the respiratory tract by coughing



# Expectorants

- Cough , a productive reflex help to expel irritant matter from the respiratory tract
- It may be Productive Or Non Productive



# Classification of Expectorants

**According to their mechanism of action...**

- 1) Sedative expectorant
- 2) Stimulant expectorant

## **Sedative Expectorants**

- These are stomach irritant expectorants which are able to produce their effect through stimulation of gastric reflexes. e.g. Bitter drugs – Ipecac, Senega, Indian Squill
  
- Inorganic Compounds – Antimony potassium tartrate, Ammonium chloride, Sodium citrate, Potassium iodide

# Stimulant Expectorants

- These are the expectorants which bring about a stimulation of the secretory cells of the respiratory tract directly or indirectly. Since these drugs stimulate secretion, more fluid in respiratory tract and sputum is diluted.
- e.g. Eucalyptus, Lemon, Anise



# AMMONIUM CHLORIDE

*Mol. Formuls :- NH<sub>4</sub>Cl*

*Mol. Weight :- 53.49*

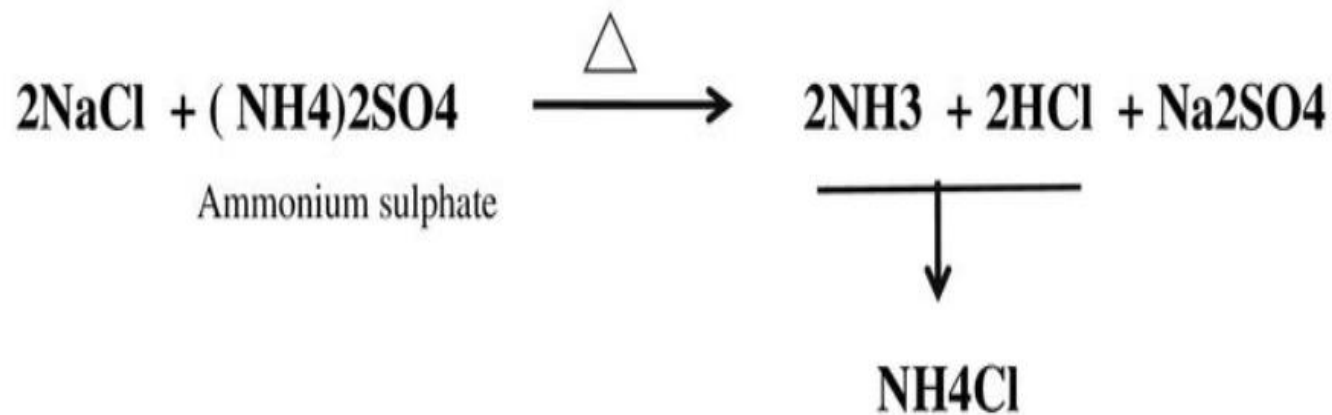
## Preparation:

Ammonium chloride is made by reacting hydrochloric acid with ammonia the solution is evaporated to dryness.



The Product is Purified by recrystallisation or by sublimation .

Ammonium chloride is also prepared by heating ammonium sulphate with sodium chloride.



## Properties:-

Ammonium chloride ( $\text{NH}_4\text{Cl}$ ) is a weak inorganic acid, exists as a white crystalline powder or fine crystals.

As ammonium chloride is freely soluble in water.

It is an odorless.

A solution of contain 0.8 % W/V of Ammonium chloride is Isotonic with serum.



## Uses :

As expectorant in cough preparations.

As acidifying agent to correct metabolic alkalosis. **Metabolic alkalosis** is a metabolic condition in which the pH of tissue is elevated beyond the normal range (7.35–7.45). Symptom neuromuscular irritability, tetany, abnormal heart rhythms coma, seizures,



# Potassium Iodide

*Mol. Formula :- KI*

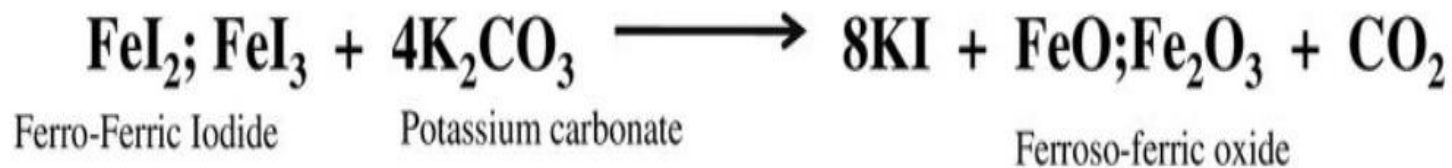
*Mol. Weight :- 166*

## Preparation:-

Industrial methods of Preparation



Ferro-Ferric Iodide



## Properties:-

Colorless; odorless; transparent or opaque crystal or white granular power.

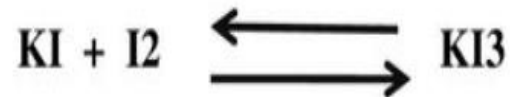
It has saline and bitter taste.

It is soluble in water ( 1gm in 0.7 ml)

Glycerin ( 1gm in 2 ml)

Alcohols ( 1gm in 23 ml) and Acetone ( 1gm in 75 ml)

Aqueous solution of KI dissolves Iodine to form KI<sub>3</sub>



## Use:-

It is use in expectorant cough.

It is also mild antifungal activity.

Supplying iodine for treatment of thyroid deficiency.



# Emetics

- These are the drugs which give rise to forced emesis by which
- the contents of the stomach get expelled through the oral cavity.
- They are very important in cases of Poisoning.



# Mechanism of action

The emetics act by 2 types:

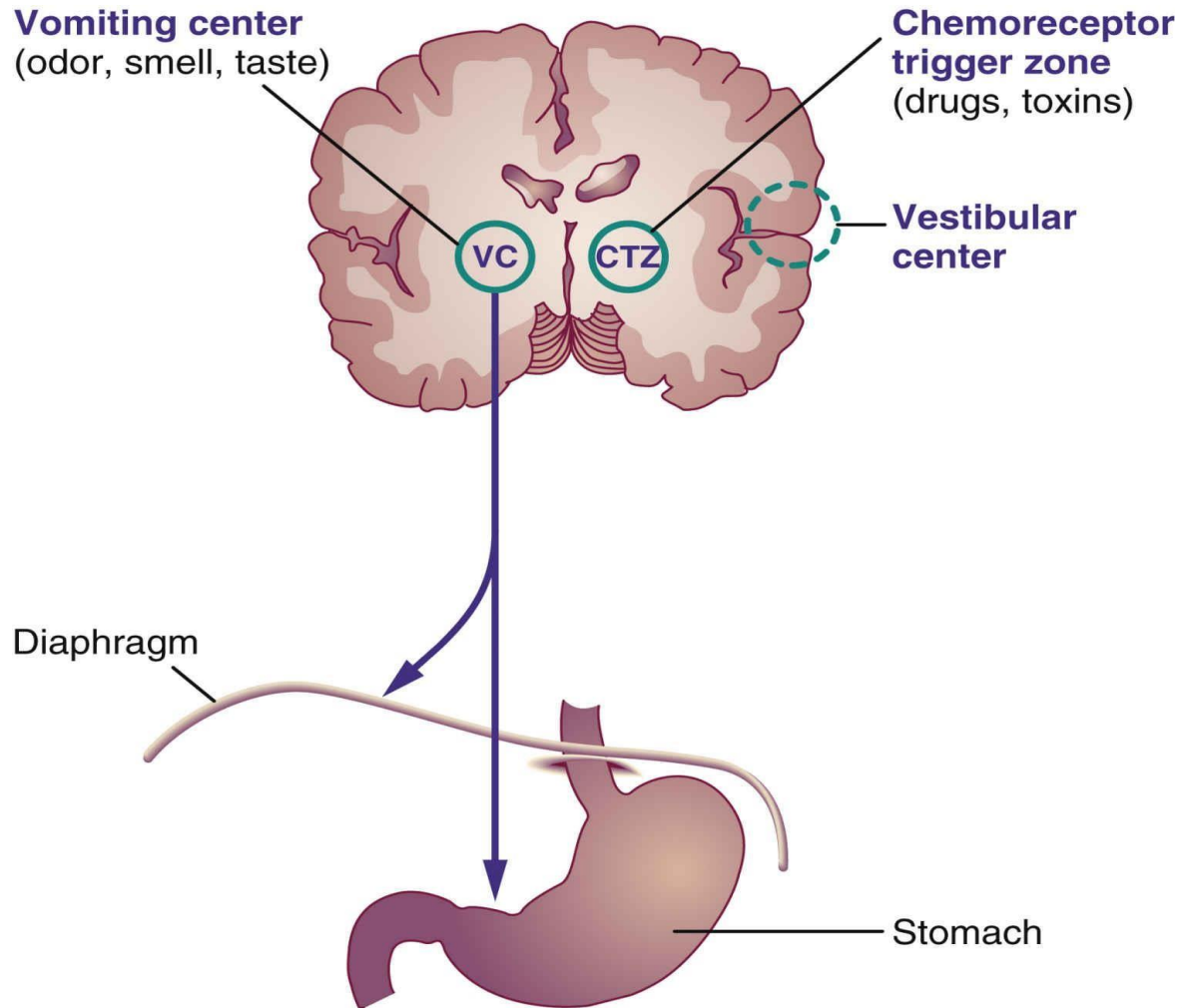
➤ **Locally acting emetics:** by local irritation of gastric mucosa. e.g.

Ammonium bicarbonate, Ipecacuanha

➤ **Centrally acting emetics:** directly on the Chemoreceptor Trigger Zone (CTZ) in the floor of IV th ventricle in medulla e.g.

Apomorphine & Morphine

# Cerebral Centers Affecting Vomiting



## Uses of Emetics

- Vomiting is primarily considered to be a respiratory function, its ultimate result would cause the evacuation of the stomach thus emetics produces a reflux action by which TOXIC substances gets expelled in case of poisoning.
- Emetics are sometimes added to cough preparations in low doses to stimulate flow of respiratory tract secretions.

## Natural Emetics



- Salt water • Warm water – mild emetic • 2 spoonful of common salt in 1 pint of warm water
- Mustard seed • 1 table spoonful ground mustard seeds in half-pint of warm water • Strong coffee is one of the best domestic stimulants, especially after a narcotic poison



Syrup & Suspension

# Copper sulphate

*Mol. Formula :-* **CuSO<sub>4</sub>.5H<sub>2</sub>O**

*Mol. Weight :-* **249.7**

## **Preparation:-**

It is obtained by roasting copper containing sulphide ore in presence of air, or by heating copper in furnace with Sulphur.

The mixture of copper sulphate and CuO formed, which is treated with H<sub>2</sub>SO<sub>4</sub> it will give the ppt of Copper Sulphate.



## Properties:-

Cupric sulfate, or copper sulphate, is the inorganic compound with the chemical formula  $\text{CuSO}_4(\text{H}_2\text{O})_x$ , where  $x$  can range from 0 to 5. The pentahydrate ( $x = 5$ ) is the most common form.

It exists in bright blue crystalline granules or powder.

Anhydrous copper sulfate is a white powder.

It exothermically dissolves in water and solution is acidic to litmus paper.



## **Storage**

It has to be protected from air, heat and moisture.

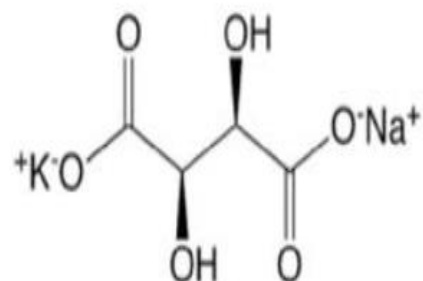
## **Uses.**

It finds use as an emetic in a dose, of 300 mg in 30 ml of water.

# Potassium sodium tartrate

$\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$

282.1



**Preparation :- Potassium bitartrate** with 68 % **tartaric acid** first dissolved in water then **saponified with hot NaOH** [caustic soda] to pH 8, decolorized with activated charcoal, filtered. The filtrate is evaporated at 100 °C. The salt is separated from the mother liquor by centrifugation

## Properties:-

It is a large colorless monoclinic needles.



## Uses.

It finds use as an emetic in water.

It has been used medicinally as a laxative [increase bowel movements].

It has also been used in the process of silvering mirrors.

# Haematinics

➤ **Haematinic** - a medicine that increases the hemoglobin content of the blood

OR

➤ A hematinic is a nutrient required for the formation of blood cells in the process of hematopoiesis

➤ The main hematinics are iron, B12, and folate



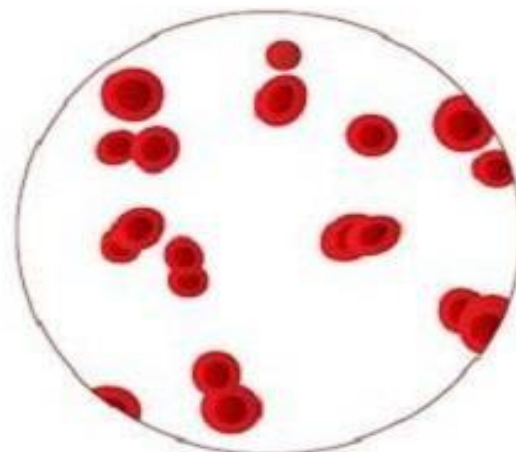
# Anaemia.....

Anemia is a medical condition in which the red blood cell count or hemoglobin is less than normal.

Anemia is caused by either a decrease in production of red blood cells or hemoglobin, or an increase in loss (usually due to bleeding) or destruction of red blood cells.



**Normal**



**Anemia**

# IRON



- Total Iron in human body is 2.5-5gm.
- Iron tablets can help restore iron levels in your body. If possible, you should take iron tablets on an empty stomach, which helps the body absorb them better.
- Iron supplements may cause constipation or black stools.

- **Dietary Source:-**

- Red meat, pork and poultry
- Seafood, Beans
- Dark green leafy vegetables, Dried fruit, breads and pastas
- Peas, egg yolk, Milk Apple



# TOP 10 FOODS RICH IN IRON

IRON RICH FOOD:



CHICKEN



LIVER



BROCCOLI



DRIED BEANS/  
GREEN PEAS



PORK



BEEF



POTATOES  
WITH SKIN



SPINACH



EGG YOLK



IRON  
FORTIFIED  
CEREALS



RAISINS



CLAMS



DRIED  
APRICOT



WATERMELON

# Ferrous Sulphate

*Mol. Formula :- FeSO<sub>4</sub>.7H<sub>2</sub>O*

*Mol. Weight :- 278.0*

## Preparation:-

It is obtained by dissolving iron in excess of dil. Sulphuric acid. After effervescence ceases, filter and cool.

The green colour crystal formed. All the procedure should be carried free from exposure to air as ferrous sulphate is easily oxidized and crystals get coated with brownish yellow ferric sulphate.



## Properties:-

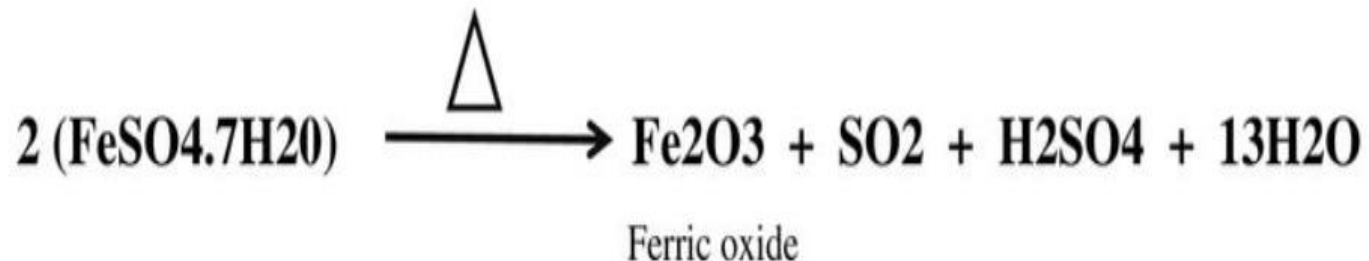
It occurs in the form of greenish crystal or crystalline powder.

Astringent taste.

As ferrous sulphate is oxidized and crystal get coated with brownish yellow ferric sulphate in air.

Soluble in water and insoluble in alcohols.

Ferrous sulphate when heated decomposes to yield ferric oxide, sulphur dioxide and sulphuric acid.



Ferrous sulphate react with sodium carbonate solution, CO<sub>2</sub> is evolved

# Ferrous Gluconate :

- **Advantages :**

1. It causes less gastric irritation than most of the other commonly used inorganic ferrous salts. (e.g.  $\text{FeSO}_4$ ).
2. It is obtained commercially as tablet, capsule & elixir.
3. It is also utilized for intramuscular injection.
4. It has a good bioavailability.



**ANTI-DOTES**

# Anti-Dotes

- **Poison, any substance that when introduced into or absorbed by a living organism causes illness or death.**
- **Anti-Dotes is an agent which counteracts poisons**

## Classification of Anti-Dotes

**Physiological:-**Producing opposite effects to that poison  
e.g, Sodium nitrite in Cyanide poisoning

**Mechanical:-** Prevent Absorption of Poison e.g, Activated  
Charcoal

**Chemical:-** Change chemical nature of poison. e.g, Sodium  
thiosulphate in cyanide poisoning

## Sodium nitrite, USP

NaNO<sub>2</sub>

Mol. wt. 68.99

**Preparation :-** This is manufactured by passing of nitrogen oxide gas (NO) obtained during the catalytic oxidation of ammonia and oxygen in sodium carbonate solution. The solution is concentrated to crystallize out the product.



**Properties.** Sodium nitrite occurs in the form of white granular powder or as a white crystal having a saline taste.

It is water soluble, sparingly soluble in alcohol,

when exposed to air it deliquesces and gets slowly oxidised to sodium nitrate.

It is easily decomposed by the acidification with dilute sulphuric acid.

Chemically it acts as reducing agent and gets oxidised in acidic medium.

## Uses :-

It is mainly used as antidote in cyanide and has a hypotensive effect.

It has relaxant action on smooth muscles used as a vasodilator.

It prevents rusting of surgical instruments by immersing them in a dilute solution and it is also used as food preservative.

# Sodium Thiosulphate

$\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$

284.2

## Preparation:-

It is obtained from soda ash, sulphur dioxide and sulphur.

Sodium carbonate [Soda ash] is Dissolved in hot water and then passed sulphur dioxide. The resulting solution of bisulphite liquor is treated with a further quantity of soda ash which is then made to heat with sulphur.

The solution is then concentrated, allowed to settle and is crystallized.



## Uses

- It is used together with oral rehydration therapy (ORT) and an astringent.
- Zinc sulfate is an inorganic compound and dietary supplement. As a supplement it is used to treat zinc deficiency
- The main application is as a coagulant in the production of rayon.

# Activated Charcoal

## Preparation.

Commercially, it is obtained as a residue during destructive distillation of various organic matters or from burning of organic materials in a special manner. The coarse material is crushed and powdered.

## Properties.

It is a fine black, odourless, tasteless powder having smooth touch and free from gritty particles. It is almost insoluble in usual solvents. The fine powder provides more surface area for adsorbent properties.



## **Action and Uses.**

It is a general type of adsorbent use in poisoning.

Adsorbs heavy metals and also adsorbs drugs such as hypnotics, sedatives, alkaloids etc. and also gases like carbon monoxide, carbon dioxide, nitrous oxide etc.

It is normally employed in the ratio of 5 : 1 or 10 :1 (charcoal to poison). It is administered in the form of tablets. It also finds use in diarrhoea to adsorb toxins.

# ASTRINGENTS

# Astringents

- Astringents is a substance that cause the contraction or shrinkage of tissue that dry up secretions
- Astringent act as protein precipitant
- Astringents is applied to skin, mucous membrane and does not destruct the tissue
- Zinc oxide and calamine are astringents used in lotions, powders and ointments

## Use of Astringents

- If you suffer from oily skin, **astringent** can help improve your skin's appearance by minimizing pores and drying up oily skin
- **Astringent** is usually applied after cleansing, but before moisturizing
- The alcohol-based product can also help remove bacteria and leftover traces of cleanser or makeup
- An **astringent** is also **used** to improve blood circulation and tighten the skin besides ... One such example is the Stolin Gum **astringent** aimed at total **oral** hygiene

# Inorganic Astringents

- ✓ Salt of Iron, Zinc, Manganese, Iron and Bismuth.
- ✓ Aluminium Sulphate
- ✓ Alum
- ✓ Zinc Chloride
- ✓ Zinc Sulphate
- ✓ Zirconium Oxide
- ✓ Zirconium Silicate

## Potassium alum

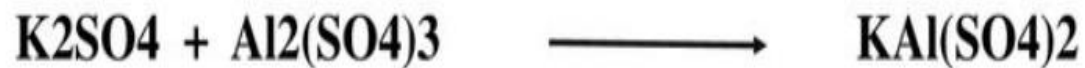
$KAl(SO_4)_2$



474.38

### Preparation:-

Potassium alum industrially prepared by adding potassium sulfate to a concentrated solution of aluminium sulfate.



## Uses

- Potassium alum is used in medicine mainly as an astringent (or styptic) and antiseptic.
- Potassium alum was also used topically to remove pimples and acne.
- It has been used to stop bleeding in cases of hemorrhagic cystitis.

# Zinc Sulphate

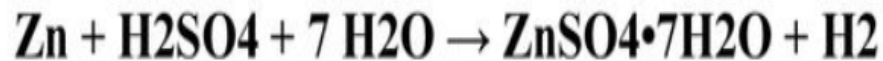
ZnSO<sub>4</sub>

161.47

## Preparation:-

Zinc sulfate is produced by treating virtually any zinc-containing material (metal, minerals, oxides) with sulfuric acid.

The reaction of the metal with aqueous sulfuric acid:



Pharmaceutical-grade zinc sulfate is produced by treating high-purity zinc oxide with sulfuric acid:



The solution is then concentrated, allowed to settle and is crystallized.

## Uses

- It is used together with oral rehydration therapy (ORT) and an astringent.
- Zinc sulfate is an inorganic compound and dietary supplement. As a supplement it is used to treat zinc deficiency
- The main application is as a coagulant in the production of rayon.