

Unit - IVth

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Expectorant

Expectorants are the drugs that help in removing sputum from respiratory track by increasing the volume of fluid that have to be expelled from respiratory track by coughing.

e.g → ammonium chloride, potassium iodide.

Classification:-

(1) Sedative expectorants:-

These are stomach irritant expectorants which are able to produce their effect through stimulation of gastric reflux.

e.g → compounds such as antimony potassium tartarate, ammonium chloride.

(2) Stimulant:-

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 → Lemon, Eucalyptus.

Note → Ammonium chloride →

• Already discuss in acidifiers in page (1)st.
Here we discuss only assay.

Assay:-

It was previously assayed by precipitation titration by Volhard's method.

weigh accurately quantity (0.2g) of NH_4Cl

Dissolved in 40 ml H_2O

↓
Acidified with HNO_3 (3 ml)

↓
Add some of N/10 ammonium thiocyanate using ferric sulphate as indicator.



→ Each ml of 0.1N $\text{AgNO}_3 = 0.005349 \text{ gm}$ of NH_4Cl .

→ Potassium iodide →

Molecular formula → KI

Molecular weight → 166.

→ It is having not less than 99% of potassium iodide.

• Preparation:-

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



• Properties:-

(1) Colourless, odourless.

(2) Having a saline & bitter taste.

(3) Soluble in water, alcohol & glycerol.

• Identification test:-

It gives the reaction of potassium and of iodides.

• Uses:-

(1) Used as expectorants & for the treatment of thyroid.

(2) In laboratory it is also used as reducing agent & used in preparing solution of iodine.

e.g → Complex Iodide.

• Storage:-

It should be stored in well closed container.

* Emetics *

→ An emetic is a drug which induces vomiting. Emetics act either directly by stimulation of the chemoreceptor trigger zone, located in the area of postrema of medulla oblongata or by reflex action of irritant on gastrointestinal tract.

Examples:- inorganic compounds e.g. copper sulphate, sodium chloride, zinc sulphate and antimony potassium tartrate show emetic effect. The clinical value of emetics, these days, has been lessened by the stomach tube - a safer and more effective tool for emptying the stomach.

Emetics are contraindicated in debilitated patients and in poisoning caused by corrosive or petroleum products.

* Copper sulphate *

• Molecular formula:- $\text{CuSO}_4 \cdot \text{H}_2\text{O}$

Molecular weight :- 249.7 g

→ It contains not less than 98.5% and not more than 101% of copper sulphate.

• Properties:-

(1) It is blue crystalline granules or powder.

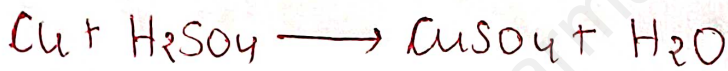
(2) Soluble in water, insoluble in alcohol.

(3) Acidic in nature.

• Preparation:-

It is obtained by treating granulated copper in presence of air with sulphuric acid the solution is filtered & evaporated.

Collect the colour precipitated.



• Identification test:

It gives reaction which are characteristic of copper and sulphate.

• Test of purity: It has to be tested for acidity and solution of arsenic & iron and specially for lead and zinc.

• Assay: An accurately weight quantity of copper sulphate is dissolved in water.

↓
To this a slight excess of potassium iodide is added, followed by acetic acid.

↓
The liberated iodine is titrated with standard sodium thiosulphate solution by using starch as indicator.

↓
The titration is continued until faded blue colour obtained.

↓
2 gm of potassium thiocyanate is added and titration is continued until the blue colour disappears.



→ 1 ml of 0.1 mol sodium thiosulphate is equal to 0.02457 gm of copper sulphate.

• Storage:

It has to be protected from air, water and moisture. So it is stored in air tight well closed container.

• Uses:

(1) It is used as emetic agent.

(2) It is used in treatment of Phosphorus poisoning (as antidote).

(3) It also finds used externally as astringent and also as fungicide.

Sodium Potassium Tartarati

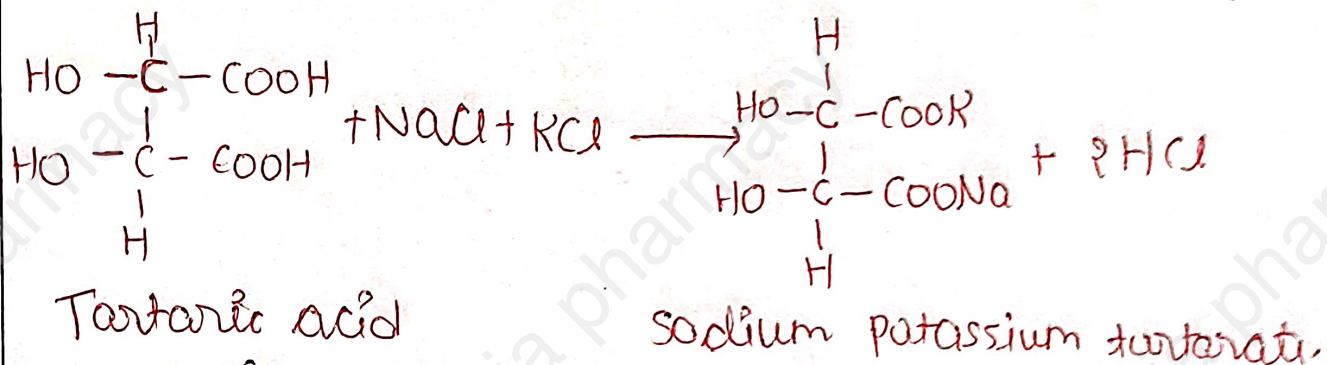
Molecular formula $\rightarrow C_4H_4KNaO_6 \cdot 4H_2O$

Molecular weight $\rightarrow 283.26$

\rightarrow In 1672, Rochelle and Sighelli discovered this compound.

• Preparations:-

It is prepared by the reaction of tartaric acid with sodium and potassium chloride with the evolution of HCl gas.

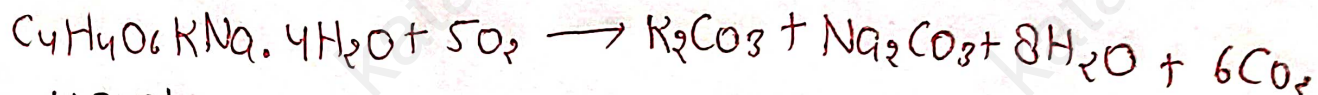


• Properties:-

- ① It is a white crystalline powder available in prismatic crystal form.
- ② Odourless and have cooling saline taste.
- ③ It effervesces in dry air.
- ④ It is freely soluble in water and insoluble in alcohol.

• Identification test:-

When its salt is heated, it emits the odour of burning sugar and leaves a residue behind. The residue produced is alkaline to litmus paper and gives effervescence with mineral acids.



• Uses:-

- ① Used as a saline cathartic.
- ② Depending upon dose, it is also used as mild laxative.
- ③ It can also be used as diuretic & urinary alkaliser.
- ④ It is used as food additive, as a stabilizer in meat and cheese products.

Hematinics

→ These are the agents which are required for the formation of blood cells and also used in the treatment of anemia.

→ The main haematinics are iron, Vitamin B₁₂ and Folate ions.

→ These agents increase the number of erythrocytes or haemoglobin content in the blood.

e.g → ferrous sulphate, ferrous gluconate.

• Anaemia:- It is a disorder occurs in human body characteristic by decrease haemoglobin in blood to level below the normal range.

→ This disorder or condition may occur due to decrease in RBC production or increase.

Ferrous sulphate

Molecular formula → $FeSO_4 \cdot 7H_2O$

Molecular weight → 278 g.

→ It contains not less than 98% and not more than 103% of ferrous sulphate.

• Preparations:-

It is obtained by adding slight excess of iron to dilute sulphuric acid, iron gets dissolved to form ferrous sulphate and hydrogen gas is evolved. The liquid is then concentrated and cooled to get crystals.



• Properties:-

- ① It occurs as odourless bluish-green crystals or powder.
- ② Its taste is metallic and astringent.
- ③ It effloresces in dry air.
- ④ It is completely soluble in water & insoluble in alcohol.

⑤ on exposure to moisture, it gets oxidised and becomes brown in colour.

• Identification test:-

Aqueous solution of ferrous sulphate gives all the colour reactions of ferrous ion and sulphate ion.

• Uses:-

- ① It is used as haematinic i.e. promote the formation of haemoglobin.
- ② Used in the treatment of anaemia caused by iron deficiency.
- ③ Used in the manufacturing of ink and in photography.
- ④ It also possess disinfectant property.

• Storage:-

Must be stored in air tight containers.

✱ Ferrous gluconate ✱

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

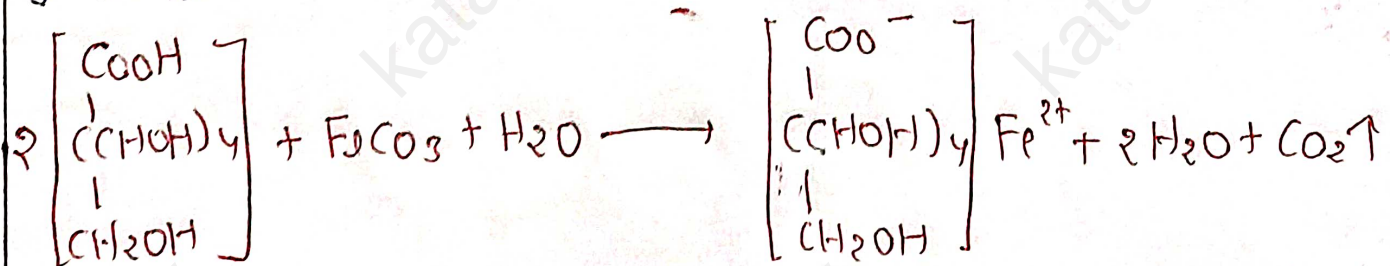
Molecular weight:- 482.18.

→ It contains not less than 95% of pure ferrous gluconate.

• Preparation:-

It can be prepared by double decomposition reaction between calcium gluconate & ferrous sulphate.

→ Calcium sulphate is insoluble and filtered off. The filtrate is concentrated to get grey colour particles of ferrous gluconate.



Gluconic acid

Ferrous gluconate

• Properties:-

- ① It is a fine yellowish grey or pale greenish yellow powder.
- ② It has an odour like burnt sugar.
- ③ It is slowly soluble in water, rapidly soluble in warm water & insoluble in alcohol.
- ④ Its aqueous solution is acidic in nature.

• Identification test:-

It gives the reaction which are characteristics of ferrous salts.

• Uses:-

- Used as haematinics.
- It is much safer than ferrous sulphate and can be used in anaemia with lesser side effects.
- Ferrous gluconate is used in the form of tablets or elixirs.

• Storage:-

It should be stored in an tight containers protected from light.

Poison and antidote

• Poison:- It may be defined as any substance that leads to unwanted effects on human body.

- The most common poisoning occur because of heavy metal as the environment is getting richer in heavy metals or metallic contamination of food & water.
- The poisoning can also occurs because of insecticides or pesticides.
- The poisoning can also occurs because of excessive use of drugs (drug overdose).

• Antidotes :-

Antidotes are the agents which are used to reverse stop or counteract the action of poisons. Cyanide produces a rapid onset of toxicity which must be vigorously and immediately treated to prevent toxic syndrome. To obtain better protection, a series of newer antidotes either alone or in conjunction with the conventional treatments have been examined.

→ on the basis of their mechanism of action, antidotes can be classified as follows.

(1) Physiological antidote :-

It acts by producing the effect opposite to that produced by the poison which means to counteract the effect of poison physiologically.

Example :- sodium nitrite is used to treat cyanide poisoning.

(2) Chemical antidote :-

It acts by combining with the poison and thus, changes the chemical nature such that the poison can not act anymore.

Example :- sodium thiosulphate is used to treat cyanide poisoning.

(3) Mechanical antidote :-

It acts by preventing the absorption of poison in the body or expelling out the poison by elimination through urine or emesis.

Example :- Activated charcoal.

• Cyanide poisoning :-

It normally occurs when taken internally for suicidal purpose or accidentally. Cyanide ion combined with ferric ion of cytochrome oxidase as the enzyme is responsible for electron transfer reaction. This leads to stoppage of cellular respiration and metabolic reactions immediately.

→ In cyanide poisoning, sodium nitrite and sodium thiosulphate injection are given to counteract the effect of the cyanide poison.

Sodium thiosulphate

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

Molecular weight: 248.189.

→ It contains not less than 99% and not more than 101% of $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$.

Preparation:-

① It can be prepared by boiling sodium sulphite with sulphur.



② It can also be prepared by passing sulphur dioxide into sodium sulphite solution.



Properties:-

① It occurs as large, transparent prismatic crystalline powder.

② It effervesces in dry air.

③ It is practically soluble in water and insoluble in alcohol.

Identification test:-

Add few drops of iodine solution to 10% w/v solution of sodium thiosulphate. The solution will appear colourless.

Uses:-

→ Mainly used as antidote in cyanide poisoning.

→ Topically, it is used as an antifungal agent.

→ Used as a standard titrant in iodimetric analysis.

Activated charcoal

→ It is a residue from the destructive distillation of various organic materials treated specially to increase its absorptive power.

• Properties:-

→ It is a fine black, odourless tasteless powder free from gritty matter.

→ Activated carbon is usually derived from charcoal and is sometimes utilized as biochar.

→ Those derived from coal and coke are referred as activated coal and activated coke respectively.

• Uses:-

→ It is used as an absorbent in the treatment of diarrhoea.

→ It is also used as an antidote in drug poisoning.

→ Activated carbon is used in gas purification, gold purification, metal extraction, water purification, medicine, sewage treatment, air filters in gas masks and respirators, filters in compressed air and many other applications.

Sodium Nitrite

Molecular formula:- NaNO_2 .

Molecular weight:- 69.0

→ It contains not less than 97% and not more than 101.0% NaNO_2 with reference to substance dried over silica gel.

• Properties:-

→ Yellow or white crystalline powder.

→ Have saline taste, freely soluble in water but less soluble in alcohol.

→ Odourless in nature.

• Preparation :-

It is prepared by reaction between nitrogen oxide gas and oxygen in sodium carbonate solution.

The solution is concentrated and the crystalline product is collected.

• Assay :- weigh accurately 1 gm sample and dissolve in 100 ml water solution. In a volumetric flask take 40 ml of 0.1 mol/l KMnO_4 solution, add 10 ml water, and 5 ml conc. H_2SO_4 . In this add 10 ml of solution. A shake and allow the mixture to stand for 5 min, then add 25 ml of 0.05 M oxalic acid solution and warm the mixture at 80°C and titrate the excess oxalic acid against 0.02 M KMnO_4 while hot, perform a blank along side.

1 ml of 0.02 M KMnO_4 is equivalent to 3.4498 mg NaNO_2 .

• Uses :-

- (1) It is used as a food preservative.
- (2) It has relaxant action on smooth muscles.
- (3) Preventing rusting of surgical instruments.
- (4) Mainly used in cyanide poisoning.

Astringent

→ An astringent substance is a chemical compound that tends to shrink or constrict body tissues and precipitate the protein and astringent from protective layer on the surface.

→ Due to their protein action, astringents are able to reduce the cell permeability.

→ This reduces local edema, exudation and inflammation.

• Characteristics :-

- (1) Affect only the superficial layer, Reduce cellular permeability.

(2) Make the surface mechanically strong, decrease exudation.

(3) protect from external irritation.

(4) possess local styptic and local antiseptic action.

• Types of Astringent :-

(1) Vegetable astringent :- Tannic acid, Gallic acid.

(2) Metallic astringents :-

- Aluminium salts.

- zinc salts.

(3) Miscellaneous :- very cold water, Alcohol.

• Indications :-

(1) swollen, inflamed and/or leaky tissues.

(2) They are used to treat diarrhoea or dysentery.

(3) During minor bleeding like Menorrhagia.

(4) They promote healing process.

(5) They decrease sweating and possess deodorant properties.

Zinc sulphate

Molecular formula :- $ZnSO_4 \cdot 7H_2O$

Molecular weight :- 287.54 g.

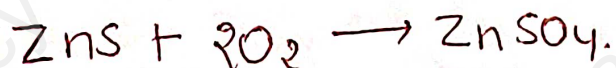
→ It is having not less than 55.6% and not more than 61% of zinc sulphate.

• Preparation :-

(1) It is prepared by the action of dilute sulphuric acid on zinc oxide.



(2) It is also obtained by heating zinc sulphide in the presence of air.



• Properties:-

- (1) Colourless, odourless and metallic taste.
- (2) It effloresces in dry air.
- (3) It is soluble in water and glycerine but insoluble in alcohol.

• Storage:- stored in well closed container in a cool place.

• Uses:-

Mainly used as astringents.

- when used internally, it acts as emulic agent.
- It also has protein precipitation activity.

Potash Alum

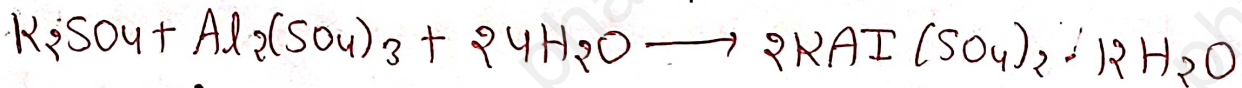
Molecular formula → $KAl(SO_4)_2 \cdot 12H_2O$

Molecular weight → 474.33 g.

→ It is a double salt, having an amount of aluminium equivalent to not less than 99.5% of Alum.

• Preparation:-

It is prepared by adding a concentrated solution of potassium sulphate to a hot solution of equimolar proportions of aluminium sulphate.



• Properties:-

- (1) It occurs as large, colourless crystals.
- (2) It is odourless and sweet astringent in taste.
- (3) It is soluble in water but insoluble in alcohol.

• Identification test:-

Its aqueous solution gives the reaction of sulphate and aluminium.

• Uses:-

- (1) Used as an astringent, antiseptic.
- (2) It is having protein precipitation properties.
- (3) It is also used as a pharmaceutical aid.

• Storage:-

It should be stored in air tight containers.