ASTRINGENT

An astringent substance is a chemical compound that tends to shrink or constrict body tissues and precipitate the protein and astringent form 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. They are usually applied to damaged skin topically or to the mucous membrane of GIT including the mouth.

ZINC SULPHATE

Molecular Formula: $ZnSO_4.7H_2O$

Molecular Weight: 287.53 g/mol

Synonymn: White vitriol, Goslarite

Standard: It contains not less than 99.0% and not more than 104% of $ZnSO_4.7H_2O$.

Preparation:

1. Zinc metal reacts with aqueous sulfuric acid to produce zinc sulphate.

$$\mathbf{Zn + H_2SO_4 + 7H_2O \rightarrow ZnSO_4.7\ H_2O + H_2}$$

2. Zinc sulfate is produced by treating high purity zinc oxide with sulfuric acid.

$$\mathbf{ZnO + H_2SO_4 + 6H_2O \rightarrow ZnSO_4.7\ H_2O}$$

3. Zinc sulphate also obtained by heating Zinc blende (Zinc sulphide) in presence of air.

$$\mathbf{ZnS + 2O_2 \rightarrow ZnSO_4}$$

Physical properties:

- It occurs as white powder or white granular in nature.
- It is Odorless and has an astringents and metallic taste.
- It efflorescent in dry air.
- It is easily soluble in water, insoluble in alcohol and soluble in glycerin.
- Aqueous solution of zinc sulphate is slightly acidic.
- Melting point for Zinc sulfate heptahydrate is 70 °C.

Chemical properties:

1. Dehydration of Zinc sulfate heptahydrate: On heating zinc sulphate heptahydrate at 50 ℃ it loses 5 molecules of water. At 100℃ it loses 1 molecule of water and on further heating at

450℃ it loses one molecule of water. On further heating at 750^0C it decomposes into sulphur dioxide and zinc oxide.

$$ZnSO_4\,7H_2O \xrightarrow{50^0\,C} ZnSO_4\,2H_2O \xrightarrow{100^0\,C} ZnSO_4\,H_2O \xrightarrow{450^0\,C} ZnSO_4 \xrightarrow{740^0\,C} SO_2 + ZnO$$

2. Zinc sulphate reacts with Barium chloride to form Barium sulphate and zinc chloride.

$$\mathbf{ZnSO_4 + BaCl_2 \rightarrow BaSO_4 + ZnCl_2}$$

Uses

- It is used as an astringent.
- It is used inOral Rehydration Therapy (ORT)
- Zinc sulphate is an inorganic compound and dietary supplement. As a supplement it is used to treat zinc deficiency.
- 0.25% Zinc sulphate used for ophthalmic purpose.
- Zinc sulphate acts as emetics.
- It is used as in electrolytes for zinc plating, as a mordant in dyeing, as a preservative for skins and leather.

ALUM

- They are white crystalline double sulfates of univalent and trivalent atoms.
- Alum is both a specific chemical compound and a class of chemical compounds.
- Many trivalent metals are capable of forming alums.
- The general form of an alum is $AM^{III}(SO4)2{\cdot}nH2O$, where "A "is an alkali metal or ammonium, "M^{III}" is a trivalent metal, and "n" often is 12.
- In general, alums are easily formed when the alkali metal atom is larger.

POTASH ALUM

Molecular Formula: $KAl(SO_4)_2{\cdot}12H_2O$

Molecular Weight: 474.07 g/mol

Synonymn: Aluminum potassium sulphate

Preparation:

Potash alum was obtained by adding a concentrated solution of potassium sulphate to a hot solution of an equimolecular proportion of aluminium sulphate. When the solution is concentrated and cooled, characteristic octahedral separated out.

$$\mathbf{Al_2(SO4)_3\,.18H_2O + K_2SO_4 \rightarrow\ 2KAl(SO_4)_2.12H_2O + 6H_2O}$$

Physical Properties:

- It occurs as colorless, transparent, crystalline structure.
- It readily dissolves in water and the solution thus obtained is slightly sweetish in taste.
- It is acidic in nature and an alum powder solution turns a litmus paper red.
- On heating, alum powder changes to liquid first and if heated further, then the salt starts swells up to form froths.
- In the places where large deposits of alum are found, they are extracted in a mine.

Uses:

- Alum is used as an adjuvant in many subunit vaccines, such as include hepatitis A, hepatitis B, and Diphtheria Tetanus Pertussis (DTP) in order to augment the body's response to immunogens.
- Alum in rock form is used as an aftershave. If it is rubbed on a freshly shaved face, its astringent property helps to prevent and reduce bleeding in minor cuts and abrasions.
- Alum's has a strong antibacterial property and so it is useful as a natural deodorant by inhibiting the growth of the bacteria responsible for body odor.
- Alum is listed as an ingredient of toothpaste or toothpowder and pharmaceutical aid.
- Alum acts also as a styptic to contract organic tissues and stop or reduce hemorrhage and bleeding.
- It is also used as an emetic agent to induce vomiting when a person has swallowed poison.