

ASTRINGENTS

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

Mechanism of action:

- Due to protein precipitation action, astringents are able to reduce the cell permeability. Astringents also inhibit the transcapillary movement of plasma proteins. This helps to reduce local edema, exudation and inflammation. Mucous secretion is also found to get reduced.
- When applied topically, astringents in low concentrations are found to stimulate growth of a new tissue. While in high concentrations, astringents bring about corrosive effect on contact with tissue.
- The protein precipitation brought by astringents is due to the presence of metallic ions having large charge/radius ratio or strong electrostatic fields.
- The metal would form complex with various polar groups present on the protein or an enzyme. This complexation of important functional groups at the active site of protein or an enzyme causes a drastic change in the properties of protein.

Astringent compounds exhibits:

1. Styptic action i.e., stopping of bleeding by coagulation of blood and constriction of small capillaries.
2. Anti- inflammatory by decreasing supply of blood to the tissues.
3. Antiperspirant by decreasing secretion of perspiration by reducing pore size of skin
4. Antimicrobial by protein precipitation mechanism.

Characteristics of astringents:

- Affect only the superficial layer. Reduce cellular permeability.
- Make the surface mechanically strong, decrease exudation.
- Protect from external irritation.
- Possess local styptic and local antiseptic action.
- May interfere with the function of pain receptors. The pain relieving action is mild.
- Constrict the blood vessels to stop bleeding.

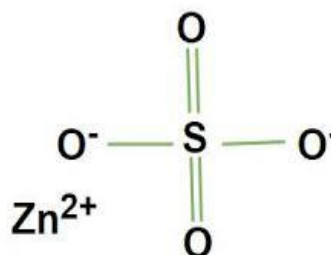
Types of astringents:

1. **Vegetable astringents:** Tannic acid, Gallic acid

2. **Metallic Astringents:**

- Aluminum salts: Alum [$\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$], Aluminum chloride (AlCl_3), Aluminum acetate
- Zinc salts: Zinc chloride (ZnCl_2), Zinc sulfate (ZnSO_4)
- Ferric chloride (FeCl_3)
- Strontium chloride
- Silver nitrate (AgNO_3)
- Copper sulfate (CuSO_4)

3. **Miscellaneous:** Very cold water, Alcohol

**Zinc sulphate: (ZnSO_4)**

Synonym: White vitriol

Molecular weight: Anhydrous Zinc sulfate (ZnSO_4) -----161.47 g/mol

Zinc sulfate monohydrate ($\text{ZnSO}_4 \cdot \text{H}_2\text{O}$) ----- 179.47 g/mol

Zinc sulfate heptahydrate ($\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$) -----287.53 g/mol

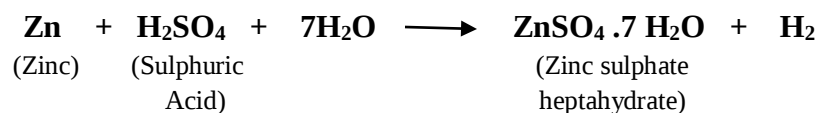
As a mineral $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ is known as “GOSLARITE”

Properties:

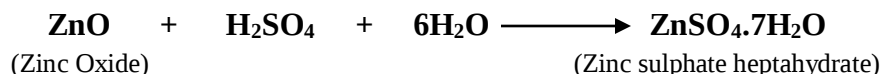
- **Appearance :** White powder or White granular in nature
- **Odor :** Odorless
- **Taste :** Astringents and metallic taste
- **Density :** Anhydrous Zinc sulfate: 3.54 g/cm³ ; Zinc sulfate heptahydrate: 2.072 g/cm³
- **Melting point :** 680⁰C; Decomposes: Anhydrous Zinc sulfate: 100⁰C; Zinc sulfate heptahydrate: 70⁰C
- **Solubility in water :** 57.7 g/100 mL, at 20⁰C; In aqueous solutions with a pH < 5
- **Refractive index :** 1.658 (Anhydrous Zinc sulfate), 1.4357 (Zinc sulfate heptahydrate)

Preparation:

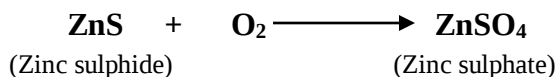
1. The reaction of the Zn metal with aqueous sulfuric acid reacts to form zinc sulphate



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



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

**Uses:**

- In medicine 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.
- 0.25% Zinc sulfate used for ophthalmic purpose. Also used in wound healing.
- Zinc sulfate acts as emetic, especially in narcotics poisoning.
- It is used as in electrolytes for zinc plating, as a mordant in dyeing, as a preservative for skins and leather.

Side effects:

- Side effects may include abdominal pain, vomiting (2-8 mg/Kg of body weight), headache and tiredness.

Storage: Stored in a well closed container in cool place.

Potash Alum: (KAl (SO₄)₂·12H₂O)

Molecular weight: 474.07 g/mol

Synonyms: Potassium aluminum sulphate

It is a double aluminum sulphate and potassium sulphate with 12 moles of water for hydration.

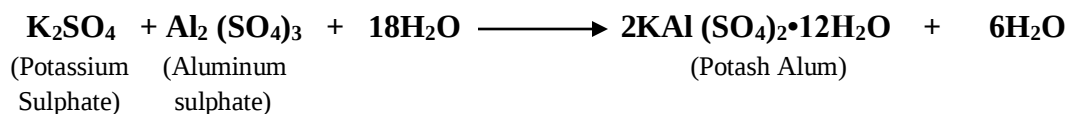
Standards: The amount of aluminum equivalent to not less than 99.5% of alum.

Properties:

- **Appearance:** It occurs as a large octahedral colorless crystals or small white crystals or powder.
- **Odour:** Odorless
- **Taste:** Sweetish or Strong astringent taste.
- **Solubility:** Soluble in water.

Preparation:

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



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.

