



CATHARTICS

Cathartics are therapeutic agents which facilitate defecation. They are beneficial in constipation and for expulsion of intestinal parasites. They may be given for cleaning bowels before surgery.

The term laxative is used for mild cathartic whereas purgative is used for strong cathartics. Laxatives, cathartics and purgatives act by retaining fluid in the bowel. They are administered by oral route or rectal route.

In normal habits, peristalsis leads to defecation. The peristaltic waves stimulate bowel and relieve its contents. Constipation can also be caused by many factors like weakness of intestine, intestinal injury and use of certain drugs and diet etc. In constipation, faecal matter becomes dry and hard. Use of laxative or purgative (lubricants) gives relief in constipation by elimination of bowel contents

Classification

The cathartics can be considered under the following class

- Mild purgatives or laxatives
- Strong purgatives

Mild purgatives or laxatives

Mild purgatives or laxatives are those which promote defecation causing minimum adverse effects.

Bulk producing drugs- which promote evacuation by increasing the stools bulk volume and water contents e.g isapgol, agar-agar, methylcellulose, bran, psyllium seed, sodium carboxy methylcellulose

Stool softeners-which penetrate, lubricate and soften the stool e.g liquid paraffin.

Strong purgatives

Strong purgatives cause complete evacuation of the bowel and constipation usually follows for which a mild purgative is needed. These purgatives should not be used for constipation. They may be given in worm infection along with drugs killing worms and also to remove solid materials from intestines prior to x-ray examinations.

Irritant or stimulant purgatives- senna, aloe, cascara, rhubarb extract, castor oil, podophyllin

Saline cathartics (osmotic laxative) - sodium phosphate, potassium sodium tartarate, magnesium hydroxide, magnesium sulphate, sodium sulphate etc.



Cathartics Classification according to mechanism

Stimulant

In this, the drugs or chemicals act by local irritation on intestinal tract and bring stimulation of peristalsis activity. Since they act directly on intestine and stimulate peristalsis, they are called as stimulants. E.g drugs like senna, rhubarb, cascara, podophyllum, castor oil, aloe.

Bulk purgatives

These are the agents which increase bulk of intestinal contents. These are cellulose which swells when wet and due to increased bulk stimulate peristalsis. E.g Methylcellulose, sodium CMC, ispagol.

Lubricants

Substances like liquid paraffin, glycerine, mineral oils etc. act as lubricants and bring smooth clearance of the faecal material.

Saline cathartics

It acts by increasing osmotic load of intestine by absorbing large quantity of water and thus stimulates peristalsis. The saline cathartics are water soluble mainly inorganic chemicals and they are taken with plenty of water.

Magnesium Sulphate

Molecular Formula: MgSO₄.7H₂O

Molecular Weight: 246.48 g/mol

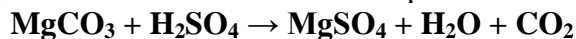
Synonym: Epsom salt, Bitter salt, Magnesium sulphate heptahydrate

IP Limit:

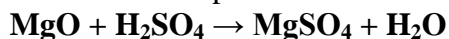
Magnesium sulphate contains not less 99.0 % and not more than 100.5% of MgSO₄ calculated on dried basis.

Preparation:

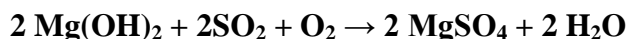
1. It is prepared from magnesium carbonate and dilute sulphuric acid.



2. It is prepared from Magnesium oxide and sulphuric acid.



3. It is prepared by the reaction of magnesium hydroxide, sulphurdioxide and oxygen.





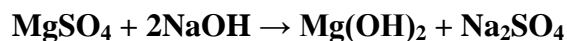
Properties:

Physical Properties:

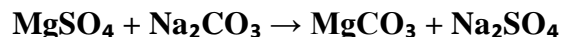
- Colourless crystals or a white crystalline powder.
- Odourless
- Magnesium sulphate provides both a bitter and a salty taste, depending on its concentration. At low levels it is associated with a salty taste compared to high levels where it is perceived as being bitter.
- It is highly soluble in water.
- It is sparingly soluble in alcohol.
- The density of Epsom salt (heptahydrate) is 1.68 g/cm³.
- The melting point of magnesium sulphate heptahydrate is 250⁰C.
- It effloresces in warm dry air.

Chemical Properties:

1. On heating it releases water and become anhydrous at 200⁰C.
2. It gives magnesium hydroxide and sodium sulphate on reaction with sodium hydroxide.



3. On reaction with Sodium Carbonate it gives magnesium carbonate and sodium sulphate.



Uses

- Magnesium sulphate is given orally in dilute solutions. About 5g gives rise to laxative effect to relieve constipation.
- One of the most popular uses of Epsom salt is in bath salts. Adding Epsom salt to bathwater helps soothe sore muscles and promote relaxation.
- Epsom salt is used as a soil amendment in gardening to provide magnesium and sulfur to plants.
- In agriculture, Epsom salt is used as a component in fertilizers to supply magnesium to crops.
- Epsom salt foot soaks are popular for relieving foot pain and discomfort.
- Magnesium sulphate is used in IV to control seizures in pregnant women.
- Magnesium sulphate is used as a prophylactic to prevent the onset of eclampsia and as an anticonvulsant to treat eclamptic seizures.



Sodium Orthophosphate

Molecular Formula: Na₂HPO₄.12 H₂O

Molecular Weight: 358.14 g/mol

Synonym: disodium hydrogen phosphate

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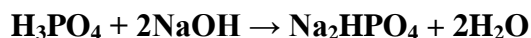
Sodium orthophosphate contains not less 98.5 % and not more than 101% of Na₂HPO₄ at 130⁰C.

Preparation:

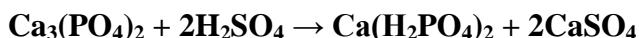
1. It is obtained by adding sodium carbonate to a hot solution of phosphoric acid. The solution is neutralised, concentrated and the crystals are separated out by centrifuging, washed and dried.



2. It is prepared by treating phosphoric acid with sodium hydroxide.



3. It is also obtained from calcium phosphate which is treated with sulphuric acid, yields calcium sulphate and monobasic calcium phosphate.



Now the filtrate is treated with sodium carbonate when dibasic calcium phosphate gets deposited leaving sodium phosphate in solution.



The solution is filtered off. The crystals of sodium phosphate are obtained by concentrating the solution and crystallisation.

Physical properties

- It is colourless and odourless.
- Saline taste.
- Soluble in water
- Insoluble in alcohol.
- It effloresces in air.

Chemical properties

When it is heated it get converted into sodium pyrophosphate by leaving a water molecule.





Uses

- It is a gastrointestinal agent used as saline cathartic.
- Used as pharmaceutical aid in the preparation of buffer solutions.
- Used as buffering agent

Kaolin

It is a native hydrated aluminium silicate which is freed from most of its impurities by dried. There are two types of Kaolin. They are Light Kaolin and Heavy Kaolin.

Molecular Formula: $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$

Molecular Weight: 258.09 gm/mol

Synonymn: China clay

Preparation

Kaolin is obtained from the breakdown of feldspar from granite rocks. It is obtained after the rock is mined, excavated and its impurities are washed off with water and then it is powdered. The rock is elutriated with water to separate large sized particle. The turbid liquid is permitted to settle down.

Finally, fractions of heavy kaolin (comprising large particles) and light kaolin (comprising small particles) are separated and dried.

Kaolin meant for pharmaceutical applications is usually purified by treating it with either hydrochloric or sulphuric acid or both and then washed thoroughly with water.

Properties

- It is light powder free from gritty particles with an earthy or clay like taste.
- It is odourless and having greasy or soapy to the touch.
- Colour of the kaolin may be tinted grey, yellow brown, blue or red due to the presence of various impurities.
- In the presence of moisture it appears dark coloured.
- Its fusion point lies between 1700-1800⁰C.
- It loses water on heating.
- It remains unaffected by dilute hydrochloric acid or nitric acid.
- Prolonged boiling or exposure to concentrated sulphuric acid may decompose kaolin.



Uses

- It is used in the treatment of dysentery and for symptomatic treatment of cholitis, cholera etc.
- It is used in the treatment of food and alkaloid poisoning, as it adsorbs toxins.
- It is used in the preparation of topical agents such as dusting powder, cosmetic preparations etc.
- It is also used in the preparation of kaolin poultice employed externally.

Bentonite

It is a colloidal hydrated aluminium silicate comprising of montmorillonite which occurs naturally. It is obtained from the naturally occurring sources. Bentonite is having SiO_2 , Al_2O_3 , Fe_2O_3 , CaO , MgO and some sodium and potassium.

Molecular Formula: $\text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot \text{H}_2\text{O}$

Molecular Weight: 549.07 gm/mol

Synonymn: Wilkinite, anti caking agent

Preparation

Bentonite deposits are normally exploited by quarrying. Extracted bentonite is distinctly solid even with a moisture content of approximately 30%. The material is initially crushed and if necessary activated with the addition of soda ash. Bentonite is subsequently dried to reach the moisture content of approximately 15%.

Bentonite is either sieved or milled. For special applications, bentonite is purified by removing the associated gangue materials or treated with acids to produce acid activated bentonite.

Properties

- It occurs as a very fine, pale or cream coloured powder or grayish white powder with a yellowish tint.
- It is odourless, free from grit and has slightly earthy taste.
- It is usually insoluble in water but swells to about 12 times its volume.
- It does not swell in organic solvents.
- The pH of 5% suspension of purified bentonite usually lies in the range of about 9.0-10.0.
- It is mostly stored in tightly closed containers.



Uses

- It is a good pharmaceutical aid and is used as a protective colloid to stabilise emulsions.
- Mainly it is used to suspend other insoluble powders.
- It finds use as an emulsifier for oil in water emulsions.
- It is also used as a base for many pharmaceutical preparations including plasters and ointments.
- It is an ingredient of calamine lotion which is used as a protective.