CATHARTICS

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DEFINITION

- Cathartics are drugs used to relieve constipation or bring out defecation. The term laxative is used for mild cathartic whereas purgatives is used for strong cathartics.

In normal habits, peristalsis lead to defecation.
The peristaltic waves stimulate bowel and relieve its contents.
By ignoring the urge to defecate or for psychological reasons leads to constipation.

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.

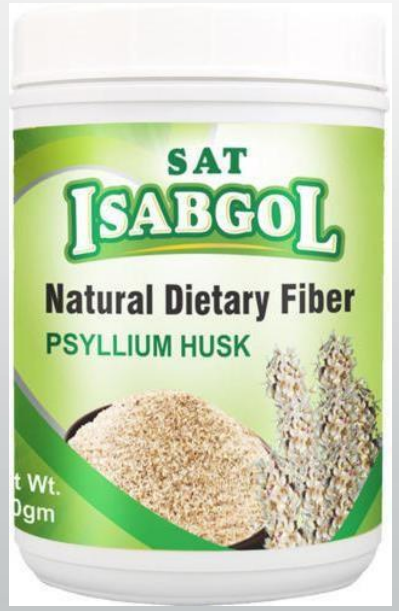
Use of laxative or purgative (lubricants) gives relief in constipation by elimination of bowel contents.

Classification

The cathartics/laxatives can be considered under the following class-

Mild purgatives or laxatives

Strong purgatives



- **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 softners-which penetrate, lubricate and soften the stool e.g liquid paraffin
- **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 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 act 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 swell when wet and due to increased bulk stimulate peristalsis.
  E.g methylcellulose, sodium CMC, ispgol

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

- **Saline cathartics-** Fourth category are known as saline cathartics. It acts by increasing osmotic load of intestine by absorbing large quantity of water and thus stimulate peristalsis. The saline cathartics are water soluble mainly inorganic chemicals and they are taken with plenty of water.

Magnesium sulphate ($MgSO_4.7H_2O$)

MOL WT- 246.5

It is having not less than 99% and not more than 100% of magnesium sulphate.

Preparations-

- It is obtained by the action of dilute sulphuric acid on magnesium carbonate or magnesium oxide.

  $MgCO_3 + H_2SO_4 \longrightarrow MgSO_4 + H_2O + CO_2$

  The solution is filtered and the filtrate is evaporated to crystallization.
- It is manufactured by the action of sulphuric acid on magnesite or dolomite.

$MgCO_3.CaCO_3 + 2H_2SO_4 \longrightarrow MgSO_4 + CaSO_4 + 2CO_2 + 2H_2O$

The liquid is filtered and the filtrate is evaporated to crystallization.

Properties-

It occurs as odorless crystals having a cool, saline bitter taste. It effloresces in warm dry air.

It is soluble in water and sparingly soluble in alcohol. When gently heated, it loses some of its water of hydration and gets converted into the monohydrate which becomes anhydrous at 200^0C.

Uses-

Magnesium sulphate is given orally in dilute solutions. About 5g gives rise to laxative effect. Due to bitter and nauseating taste it is given in fruit juices.

The mechanism of action is that magnesium sulphate does not get absorbed from intestinal tract and thus retains water. The hydrostatic pressor is able to promote peristalsis movement of bowel. It is used in patients with impaired renal function.

Dose- 10-15g

Sodium Orthophosphate ($Na_2HPO_4.\ 12H_2O$)

MOL WT- 358.14

It is dodecahydrate of disodium hydrogen orthophosphate. It contains not less than 98.5% and not more than 101.0% of Na_2HPO_4.

Preparation-

1.It is obtained by adding sodium carbonate to a hot solution of phosphoric acid.

$$H_3PO_4 + Na_2CO_3 \longrightarrow Na_2HPO_4 + H_2O + CO_2$$

The solution is neutralized, concentrated and the crystals are separated out by centrifuging, washed and dried.

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

$$Ca_3(PO_4)_2 + 2H_2SO_4 \longrightarrow Ca(H_2PO_4)_2 + 2CaSO_4$$

Properties-

It occurs in the form of colorless transparent crystals, having a saline taste. It is odorless and effloresces in air. It is soluble in water but insoluble in alcohol. On heating over 300^0C it is converted into sodium pyrophosphate.

$$2\ Na_2HPO_4 \longrightarrow Na_2P_2O_7 + H_2O$$

Uses-

It is used as a saline laxative. It is a cathartic and buffering agent.

Storage-

It is stored in tightly closed containers.

Protective & Adsorbent

These are commonly used for the treatment of diarrhoea which is caused by bacterial toxins .
Diarrhoea can lead to dehydration and electrolyte imbalance
An antidiarrheal preparation contains protein adsorbents and antibacterial agents
Protective and adsorbents adsorb toxins, bacteria and viruses and provide a protective coating along intestinal mucosa.
Example : KAOLINE

Kaolin ($Al_2O_3.2SiO_2.2H_2O$)

- It is a native hydrated aluminium silicate which is freed from most of its impurities by dried.
- **Preparation-**
- It is prepared from natural clay by powdering and separating particles by electrical sedimentation. It must be purified from gritty particles and other impurities.
- **Properties-**
- It is light, white powder free from gritty particles. It is odourless, tasteless and having greasy or soapy to the touch.
- **Uses-**
- It finds use in mixtures which are intended for dysentery, diarrhoea and for symptomatic treatment of cholitis, cholera etc.
- It is used in the treatment of food and alkaloid poisoning, as it adsorbs toxins.
- It finds use in dusting powder, cosmetic preparations etc.

Bentonite ($Al_2O_3.4SiO_2.H_2O$)

- It is a colloidal hydrated aluminium silicate 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.
- **Properties-**
- It occurs as a very fine, pale or cream coloured powder. It is odourless, free from grit and has slightly earthy taste. It is almost insoluble in water but swells to about 12 times its volume after neutralisation.
- **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.
- **Swelling factor-**
- It is measured by dropping from the top. Add 2g of bentonite in 10 portions at intervals of 2minutes to 100ml of water in a 100ml graduated cylinder about 3cm in diameter. Allow each portions to settle before adding the next and let it stand for 1day. Bentonite swells up at the bottom and it should occupy an apparent volume of not less than 24ml.