Pharmaceutical Aids

Introductions :- For the production of drugs various techniques such as purification, filtration, adsorption, solubilization, absorption, suspension and emulsification are employed.

→ A number of natural products are used in these techniques. Flavouring, colouring, coating and perfuming agents are used in drug industries.

→ These agents posses little or no therapeutic value, but they are used in the preparation of many pharmaceutical products. These agents are called as pharmaceutical aids which may be of plant, animal, mineral or synthetic origin.

→ In pharmaceutical industry starch and Guar gum are used as a disintegrating agent.

→ Glucose and sucrose are sweeting and coating products.

→ Acacia and Tragacanth are credited as binding, suspending and emulsifying agents.

→ Mucilages like Ispaghol and linseed act as demulcent and soothing agents.

→ Gelatin is a suspending agent and used for making capsules.

→ Absorbent cotton, jute, Hemp, flax, wool, silk, viscose and Alginate are used to prepare fibres for ~~coating~~ filtering and surgical dressings.

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→ Shellac is used for coting confections and medicinal tablets.

(1.) Spermaceti

Uses :- (1) It is used as a pharmaceutical aid for cold creams and as a base for ointments, cerates and an emulsion with egg yolk or expressed almond oil.
(2) It is also used in manufacture of candles, soaps, cosmetics, laundry wax, finishing and lustering linens.

(2.) Kaolins

Uses :- (i) Heavy kaolin is used enternally as a dusting powder, poultice, carrier of heat, filtering and cleaning agent.
(ii) Fine kaolin is used internally as an absorbent and to coat irritated intestinal mucosa in case of diarrhoea, dysentery and intestinal fermentation.
(iii) They are also used to manufacture porcelain, pottery, colour lakes, plaster material.

(3.) cochineal

Uses :- (i) It is used as a colouring agent for food products, drugs and toilet preparations.
(ii) Carmine and carminic acid are used for manufacture of red and pink inks and lakes.

(4.) Shellac

Uses :- (i) shellac is used for coating confections and medicinal tablets; finishing leather, grinding wheels, sealing wax, cements, records paper; for stiffening hats.

⑤ lard

Uses :- (i) lard is an emollient and used as a base for ointments and cerates.
(ii) lard oil is used as an antifoaming agent in the fermentations and as a tablet lubricant, illuminant, oiling wool and to manufacture soap.

⑥ Wool fat

Uses :- It is used for the filtration of oils, fats, syrups and in the form of the Berkefeld filter for sterlization.

⑦ prepared chalk

Uses :- (i) chalk is used as an absorbent and antacid.

⑧ Fuller's Earth (Multani Mitti)

Uses :- (i) It is used in refining oils, greases, lard, liquid fractions of petroleum including crude naptha, crude kerosene and shale oil.
(ii) In laboratory, it is used to detect colouring matter added to butter and whisky.
(iii) In india, it is used as a substitute for soap in washing clothes and hair and in refining vegetable oils.

ASBESTOS

(Sangresha; shankha palita; Kalnar; Ratinara.)

→ Asbestos is the commercial name given to various silicate minerals which can be easily split into flexible fibres, capable of being felted or spun together.

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→ The fibres are light, fire-resistant, heat, sound and electrical insulators, and non-corrosive.

→ These properties make asbestos technically a very valuable material.

→ Asbestos is used mainly in the manufacture of asbestos cement products and textile products and also in many other industries.

→ There are three modes of occurence of asbestos minerals :-

① Cross-fibre, with fibres at right angles to the walls of the veins;

② Slip-fibre, with long fibres parallel or oblique to the walls of the vein, but of poor quality;

③ Mass-fibre, with interlaced, unoriented, aggregate of fibres, sometimes radially arranged.

→ The comercial varieties of Asbestos are :-

① Chrysotile or fibres Serpentine ($3MgO \cdot 2SiO_2 \cdot 2H_2O$) :- It is a hydrated silicate of magnesium, usually containing small percentage of iron oxide and alumia.

→ A brownish green, lamellar variety of serpentine is called antigorite.

② Amosite [$Fe_5Mg_2Si_8O_{22}(OH)_2$] :- It is a long-fibre variety of iron-rich antho-phyllite; the length of the fiber is normally 10-30 cm.

→ It is resistant to acids. The superior grade fibres are used for spinning purposes.

③ Crocidolite or blue asbestos [$Na_2O \cdot Fe_2O_3 \cdot 3FeO \cdot 8SiO_2 \cdot H_2O$]

→ It is a sodium iron silicate, usually containing a small percentage of magnesium and a little lime.

→ It is mainly used as an insulator and in asbestos cement products. When infiltered with silica, the variety is sold as Cat's Eye or Tigers Eye for ornamental use.

④ Tremolite [$Ca_2Mg_5Si_8O_{22}(OH)_2$]:- It is a silicate of magnesium and calcium.

→ It is a White to dark grey, mineral.

→ It is used for the manufacture of boiler lagging (insulation material) and for filtration purposes.

⑤ Actinolite [$Ca_2(Mgfe)_5Si_8O_{22}(OH)_2$]:- It is a silicate of magnesium and calcium with iron. It is a green coloured mineral of little commercial importance.

⑥ Anthophyllite [$(Mgfe)_7Si_8O_{22}(OH)]_2$:- It is a magnesium iron silicate. It is of White to grey colour, sometimes yellowish-brown, with a vitreous lustre.

Uses:- (i) Asbestos finds several uses in industry.

(ii) Asbestos fabrics and asbestos-cement products are the largest uses of the mineral.

(iii) Asbestos cloth is used for making protective clothing, blankets for fire fighting filter aids, conveyors for carrying hot material, and oven and furnance insulations.

TALC and STEATITE

→ Steatite is a purer variety of talc which is the softest and the most common hydrated magnesium silicate mineral; a slightly impure variety of talc is termed soapstone.

→ Commercially, the terms steatite, talc and soapstone are used for the same mineral, commonly referred to as talc.

Talc :- $[H_2Mg_3(SiO_3)_4]$; MgO - 31.70%, SiO_2 - 63.50%, H_2O - 4.80%.

→ It is an apple-green to white or silvery-white, or greenish-grey or dark-green mineral, crystallizing in orthorhombic or monoclinic system.

→ There are several varieties of talc. steatite is a massive and high-grade variety of talc.

Pyrophyllite $[H_2Al_2(SiO_3)_4]$ It is an aluminium analog of talc.

↔ Talc (including steatite and pyrophyllite) is produced in various countries of the wold. The USA and Japan are the largest talc-producing countries, followed by Russia, France, india and china.

Grades and classification :- Talc is classified according to its colour and softners.

→ Whiter varieties are preferred to dull and other tinted varieties.

→ There is no standard basis for classifying the material. However, in Rajasthan, it is classified into 4- different grades:-

i) Grade-I :- Talc of pure white appearance and smoth feel and free from grit.

ii) Grade-II :- Tinted variety which may be blue or green.

iii) Grade-III :- off-colour variety, having smooth feel.

iv) Grade-IV :- or DDT variety - White or off colour with grit.

Uses :- i) Talc of very good quality finds use in many cosmetics and pharmaceutical preparation, such as- soaps, creams, tablets, pills and other products.

(ii) Massive Talc is also used in the manufacture of pencils or crayons.

(iii) pulverized talc is used in such industries as paper, ceramics, cosmetics insekicides, paint, rubber and textile.

(iv) Talc is largely used in paints. High grade foliated talc is used as an inert-extender and as a pigment.

(v) Talc is widely used as a filler and for dusting, especially in rubber.

Colouring and Flavouring

→ A formulation contains a mixture of pharmacological active constituents and other ethical or technical required material such as colouring matters, flavourings, stabilizers, emulsifiers, thickeners, tablet disintegrants, preservetive and coatings.

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→ Under EEC rules, for appropriate foods, such additives must be included in the labelling.

→ For medicinal purposes these additives are controlled by the Drug and cosmetic Act.

→ The additives used in standard medicinal practice are covered, and used in herbal preparations, may be included in the EEC list.

In some cases eg: Raspberry syrup and cherry syrup, the preparation may have the dual role of colourant and flavouring.

→ The oils of clove and peppermint are used as flavours but the former has antibacterial, and the later, carminative properties.

→ Natural gums, which are widely used as thickening, emulsifying and suspending agents have, in larger doses, a therapeutic action.

Natural Colourants

Colourant	source	shade
(i) Chochineal	Dactylopius	Red
(ii) Beetroot powder (betanin)	Beta vulgaris	Red
(iii) carmine powder	Dactylopius coccus	Purplish-red
(iv) Saffron (crocin)	croces sativus	yellow-orange.
(v) Annatto (bixin)	Bixa orellana	Yellow-orange.
(vi) Carotenes	various sources, eg, carrot root	orange.

Colouring agent

→ The essential requirements of a medicinal colourant are nontouicity and stability. The effect of pH on colour, solubility in water and oils and stability to light, heat and sugars are to be considered.

(a) ANNATTO :- It is obtained from Bixa orellana.

Uses :- (i) Bixin and norbixin are quite stable to pH changes, light exposures and oxidation reactions.

(ii) Annato is generally employed in india for colouring butter and cheese.

(iii) In other ~~cold~~ countries annato are used for colouring margarin.

(iv) It is also used for colouring citrus juices, concentrates, drinks, candies and fish, especially salmon.

(b) Marigold flowers :-

Uses :- The comonon english garden marigold, calendula officinalis is used to treat colds and cough.

(c) Red beetroot :-

Uses :- It is widely used as a nontonic food and pharmaceutical colourants.

(d) Monascus :- It give a food colourant used in chinese cooking.

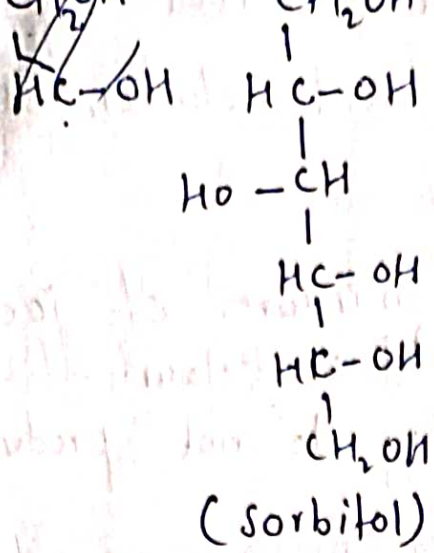
(e) Red poppy petals :- It is used in the form of a syrup for colouring and sweetening liquid medicines.

(f) Red rose petals :- Rosa gallica, are used for preparing the acid infusions of rose. The drug is mildly astringent. The infusions are used as a ~~convient~~ convenient vehicle for gargles containing alum or tannin.

Sweeting agents

→ Our body's metabolism demands a continuous supply of its primary fuel, glucose.
→ There are two forms of sugar in the food we eat, namely, naturally occuring sugars in fruits and dairy products and added sugars in many processed foods.
→ Sugar adds calories, which, if eaten more than required will cause weight gain.
→ Weight gain increases the risk of getting heart disease, diabetes, high blood pressure or even some types of cancer.
→ Sweeting agents to sucrose are used for medical purposes (eg; for diabetics) and for diet improvement.
→ Saccharin is the most widely used substitute. However, important natural products are :-

(a) Sorbitol :- (i) Sorbitol solution (sorbital liquid) contains 70% of mainly sorbitol and is used as a sweeting agents and vehicle in elixirs, linctuses and mixtures.
(ii) It is used as an ingredient in toothpastes, chewing gums, and other noncaloric sweetner in dietetic beverages.



(sorbitol)

(b) Steviaside :- used in soft drink and food industries

(c) Stevia :- (i) Stevia is an herb that has been used as a sweetener in south America for hundreds of years and currently being heralded as a good substitute (not available in india).

(ii) stevia is safe for use with children, is non-glycemic and is plaque-retardant (no cavities).

FIBres

→ Natural and artificial fibres are used in surgical dressings. The natural fibres are obtained from vegetables sources (eg. cotton, flax, Hemp and jute) or from animal sources (eg. Wool and silk).

→ Some fibres, eg:- Nylon and Terylene are synthetic fibres prepared from long chain molecules of polymers.

→ Asbestos and glass are obtained from mineral sources.

→ A number of vegetable fibres have importance in pharmacy, particularly as components of surgical dressings and for the manufacture of artificial fibres and haemostatic dressings.

Tests of vegetable and regenerated carbohydrate fibres :-

i) With Molisch reagent they produce voilet colour.
ii) On heating with aqueous picric acid solution they are not stained permanently.
iii) With chlor-zinc iodine or a mixture of iodine and sulphuric acid they yield blue colour.
iv) On boiling with Millon's reagent they do not produce red colour.

Test of Animal fibres

i) on ignition they produce disagreeable odour.
ii) They are dissolved in 5% aqueous potassium hydroxide solution.
iii) They respond positively with Millon's test.
iv) They are stained permanently with picric acid.

COTTON, RAW COTTON

→ cotton consists of the epidermal trichomes of the seeds of Gossypium herbaceum, Gr. barbadense and other cultivated species of Gossypium (Malvaceae).

① ABSORBENT COTTON :-

i) It is used for surgical dressings.
ii) cotton is also used in textile industry

② Jute :-

i) Jute is used to prepare medicated tows, as a filtering and straining medium and to make gunny bags, yarns and ropes.

③ Hemp :- Hemp is used to manufacture rope, twine and sail-cloth.

④ Flex :- It is used as a filtering medium.

⑤ Wool :- Wool is used to prepare crepe bandages and dressings and as a medium for filtration and staining.

⑥ Silk :- Silk is used for making ligatures and sieves.

Regeneration fibres

→ Regenerated fibres are prepared from naturally occuring polysaccharides.

① Viscose :- Viscose rayon is used to manufacture fabrics, surgical dressings, absorbent wool, enzyme and cellophane.

② Methylcellulose :- In pharmacy

i) Methylcellulose is used to increase the viscosity and to stabilize lotions, suspensions, pastes, opthalmic preph & some ointments.

ii) In medicine it is used as a hydrophilic colloid, laxative in chronic constipation and to curb appetite in obese persons as it gives a feeling of fullness.

iii) It is also used as a substitute for water-soluble gums, to render paper grease proof, in adhesives, as thickening agent in cosmetics.

iv) Hydroxyethyl cellulose :- It is used as a thickening agent and as an ingredient in some formulations for artificial tears.

(V.) Hydroxypropylcellulose is a hydroxypropyl ether of cellulose. It is used as a stabilizer and thickener in liquid preph and as a binder and film coating in tablet formulations.

(3) Cellulose Acetate :- C.A. rayon is used to manufactur rubber and celluloid, substitutes, non-flammable photographic and cinema films, airplane dopes etc.

(4) Pyroxylin (cellulose nitrate) :- It is used for making flexible colloidion BP.

(5.) Oxidized cellulose :- used as an absorbable haemostati in surgery,

(6.) Alginate fibres :- They are used internally in neurosurgery, endural and dental surgery to be subsequently absorbed. Externally, they are used (eg :- for burns or sites from which skin grafts have been taken) to arrest bleeding.

Synthetic fibres

→ S.f. are produced by polycondensation of organic molecules which are more stronger than the natural fibles.

(1) Nylon :- Nylon is used to prepare filter cloth, sieves, non-absorable sutures, nylon syringes, film, textile fibres, monofilament, tire cord, fishing lines and tow ropes.

(2.) Terylene (Dacron) :- Terylene is used in the same way as nylon.

(3.) Orlon :-

(4.) Polyethylene :- used as laboratory tubing, in making protheses, packing materials and textile.

Surgical Dressings

→ A material used to protect a wound and a heal is called a surgical dressings.

→ They remove wound enudates from the site, prevent infection, give physical protection to the healing wound and mechanical support to the supporting tissues.

→ Surgical dressings are classified as :-

i) primary wound dressings :- P.W.D. are applied over the wound surface to absorb pus, mucus and blood.

ii) Absorbent :- Absorbent cotton is widely used to absorb wound secretion. other absorbent materials are rayon wool, cotton wool, gauze pads, nursing pads. They are used in the shape of balls or pads.

iii) Bandages :- A bandages is a material which holds dressings at the required site, applies pressure or supports an injured part or checks haemorrhage.

→ The bandage may be elastic or non-elastic in nature.

iv) Adhesive tapes :- surgical adhesive tapes may be a rubber-based adhesive or an acrylate adhesive.

→ Rubber adhesive tapes are cheap, superior and provide strength of backing.

→ Adhesive tapes are used to reduce skin trauma.

(v.) Protectives :- P. are employed to cover wet dressings, poultices and for retention of heat.

→ They prevent the escape of moisture from the dressings.

→ Some protectives are plastic sheeting, rubber sheeting, waxed oil-coated papers and plastic-coated papers.

Sutures and ligatures

→ A surgical suture is a thread or string used for sewing or stiching together tissues, muscles and tendons with the help of a needle.

→ If these threads or fibres are used to tie a blood vessel to stop bleeding without the use of a needles, then they are digested in animal tissues eg:- catgut, kangaroo tendon and synthetic polyesters.

→ These are 2-types of sutures

① Absorable sutures

② Non " "

① Absorable sutures :- (a) surgical catgut

→ catgut is a sterlized fibre or strand prepared from callagen of connective tissues obtained from healthy animals like sheep and cattle.

(b) Synthetic polyesters :- These sutures ~~are~~ have high tensile strength and degradated by hydrolysis and absorbed in the tissue.

(2) Non-absorable sutures :- Non-absorble sutures are not affected by the fluid and remained unchange for a long period.

→ They are removed after healing of the wounds. silk, cottons, nylon and metalli sutures are classified as non-absorable sutures.

a) Silk sutures :- Silk sutures are prepared by spinning ~~and~~ or twisting silk fibres into a single strand of varying diameters.

→ The strands are sterilized and boiled with water so soften them.

b) Cotton Sutures :- C.S. have uniform size and recommended in critical part where strength of the sutures is required for long them.

c) Nylon Sutures :- The microfilaments of nylon are braided into strands of required diameter.

→ These sutures are strong, water resistant and used in skin and plastic surgery

d) linen sutures :- A linen suture is cheap, very strong under moist condition but not uniform in diameter.

e) Metallic sutures :- M. wires of silver or stainless steel are used as surgical aid.

→ These wires are available as mono-filaments, twists and braids.