

SOLID

POWDERS

EFFERVESCENT POWDERS

GRANULES

TABLETS

CAPSULES

SPANSULES

POWDERS

- simple
- mixture
- contains 1 drug
- contains ≥ 2 drugs

→ dried & finely pulverised form of drug

- aspirin powder
- dusting powder
- Sodium bicarb. powder

CAPSULES

- tasteless gelatin containers
- gelatin shell dissolves in GIT to release the drug for its absorption into circulation
- Hard gelatin capsule:** encloses powdered drug • amoxycillin
- Soft gelatin capsule:** encloses oily drug • vit. E

EFFERVESCENT POWDERS

- powder + sodium bicarbonate / citric acid / tartaric acid
- effervesce with evolution of CO_2 when dissolved in water which makes it more palatable • Eno salt
- available in tablet form • dispirin (dispersible aspirin tablet)

SPANSULES

- long acting capsules
- coloured beads of drug granules inside a capsule
- these beads are coated with diff. resins which dissolve at diff. time intervals
- iron formulations like Fefol
- Isomack Retard (isosorbide dinitrate)
- Angispan - TR

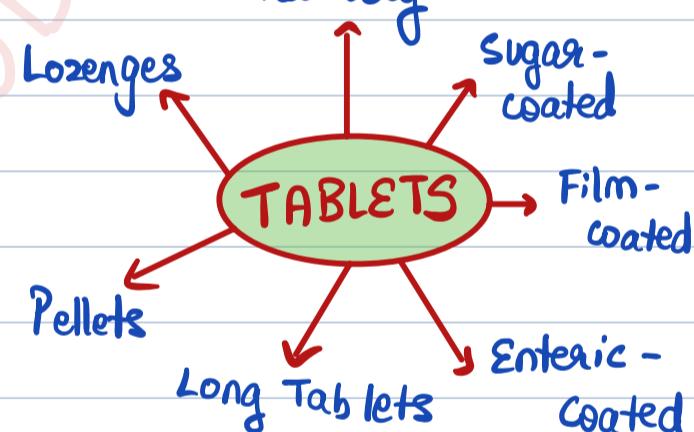
GRANULES

- small aggregates of powder held together by starch / alcoholic spray
- vit. D₃ granules

TABLETS

- powdered / granulated form of drug compressed under heavy pressure into round / disc-like structures

Ordinary



ORDINARY TABLETS

- uncoated
- Aspirin • Paracetamol

SUGAR-COATED

- coated by sugar to make them more palatable
- Chloroquine • Methronidazole

PELLETS

- sterile sphere implanted s.c.
- long duration drug release
- testosterone pellets

FILM-COATED

- transparent film coating of gelatin / cellulose derivatives so that tablet size / weight remains unaffected, but unpleasant taste is masked
- Ceftum (cefuroxime)
- Dilgard (diltiazem)

LOZENGES

- drug tablet + sugar + gum
- for chewing to provide local effects in mouth / throat
- cough Lozenges [strepsils]

ENTERIC-COATED

- coating of cellulose / acid phthalate / shellac / keratin
- resistant to gastric acid but dissolves at intestinal pH
- incidence of gastric irritation is ↓
- Diclofenac - EC • Enzaq - Forte
- Ecosprin - 75 (enteric coated aspirin)

LONG TABLETS (RETARD / SUSTAINED RELEASE)

- aggregated drug particles have individual coating with diff. inert resins so that each coating dissolves at diff. time intervals to provide uniform, sustained release (∴ low incidence of side effects)
- K Gard [KCl] • Diclofenac - SR
 - Depin retard (nifedipine)

Liquid

- Aqueous Solution
- Depot Injection
- Aqueous Suspension
- Alcoholic solution
- Drops
- Enema
- Liniments
- Lotion
- Tincture
- Ointment
- Cream
- Gel
- Paste
- Plaster

Aqueous Solution
↳ Syrups
↳ Liquors
↳ Linctus
↳ Injections

Alcoholic Solutions
↳ Spirits
↳ Elixirs

AQUEOUS SOLUTIONS

Syrup: drug in conc. sugar soln + flavouring agent + permitted colours

- Cough Syrups
- Vitamin Syrups

Liquor: aqueous solution of medicinal substances which are gases / volatile / sublimable. • H_2O_2 soln.

- Liquor ammonia
- Iodine solution

Linctus: viscous, syrupy ; drug + demulcent (menthol)

↳ for soothing effect in sore throat locally • Cough Linctus

Injections: sterile soln. + preservative ; parenteral use
• digoxin • xylocaine

→ some injections are supplied as dry powders in sterile vials

[To be mixed with water / Ringer Soln. / Dextrose etc. before use
• procaine - penicillin • chloramphenicol

DEPOT INJECTION:

longer-acting injectable preparations.

→ drug is dissolved in oily base from which it is released slowly (prolonged duration)

- Testosterone depot
- Anadrol depot [fluphenazine]

AQUEOUS SUSPENSION:

Mixture: solid drug dispersed homogeneously in water
• Antidiarrhoeal mixtures
• Milk of magnesia

Emulsion: ≥ 2 immiscible liquids dispersed together
• Castor oil • Liquid paraffin
• Cod liver oil • Milk (naturally occurring)

PLASTER: drug in a resinous base, spread over a muslin cloth

→ preparation is hard at room temperature but is sticky at body temperature

- zinc oxide plaster
- Band-Aid
- Belladonna plaster

Aqueous Suspension
↳ mixtures
↳ emulsions

ENEMA: medicated liquid for rectal administration for evacuation of colon.

- Procyclidine enema
- Soap water enema

LINIMENTS: to be rubbed on the skin with friction
↳ contains camphor (counterirritant)
→ used as pain relief / rubefacient

- Camphor
- Turpentine

LOTIONS: for local application without rubbing
→ as antiseptic / astringent / antipruritic / soothing
• Zinc calamine • Povidone iodine scrub

TINCTURE: hydroalcoholic soln. of inorganic substances
• tinct. iodine • tinct. benzoin

OINTMENTS: semi-solid ; drug in greasy base
• Soframycin • Chloramphenicol eye ointment
• Atropine eye ointment

ALCOHOLIC SOLUTION:

Spirit: 10% v/v soln. of volatile essential oil + alcohol
• chloroform • spirit ammonia aromaticus

Elixir: drug + sugar syrup/glycerol + higher proportions of alcohol
• Cough elixir • Lanoxin elixir (digoxin)
• Vit B complex elixir • Theophylline elixir

DROPS: small amount of highly conc. drug soln.
→ pediatric formulations
• vitamin drops
• sulfacetamide eye drops
• gentamycin ear drops

CREAM: semi-solid, emulsion
→ contains > 20% water & volatile oil (2-10%)
< 50% hydrocarbons, polyols (as vehicles)

→ for external application to skin or mucous membrane

GEL: drug dissolved in liquid & then dispersed in some gelling agent (soft gelatin)
• contraceptive gels
• aluminium hydroxide gel

PASTE: prepared with an adhesive material (starch) or foaming agent (carbomethyl cellulose)
• zinc oxide paste
• tooth paste

Special Dosage Forms:

- Inhalants
 - Pessary
 - Spacer Device
- Aerosols
 - Bougie
 - Transdermal Patch
- Suppository

INHALANT: liquid preparations containing drug to be inhaled as vapour
 → contents may be poured into a jug of boiling water & inhaled
 → solid inhalants like **Fintal (sodium cromoglycate)** are inhaled by turbo spn inhalers
 • **Kerol inhalant** • **tincture benzoin inhalation**

AEROSOLS: devices in which drug dissolved in a liquid is put inside a cylindrical container (nebulizer) & is then filled with a propellant gas (air/oxygen) under pressure

- if one push releases a metered dose of drug → **Metered Aerosol**
- **Salbutamol metered aerosol**
 - **terbutaline " "**

Spinhaler: aerosol device in which drug is packed in the form of a powder & released (upon activation of an appropriate valve system) in the form of microfine powder mist.

- **tiotropium metered spinhaler**

Spacer Device: infants & young children often have difficulty in coordinating the use of inhaler
 ∴ spacers can be attached to an inhaler
 (a face mask may be attached to the spacer if necessary)

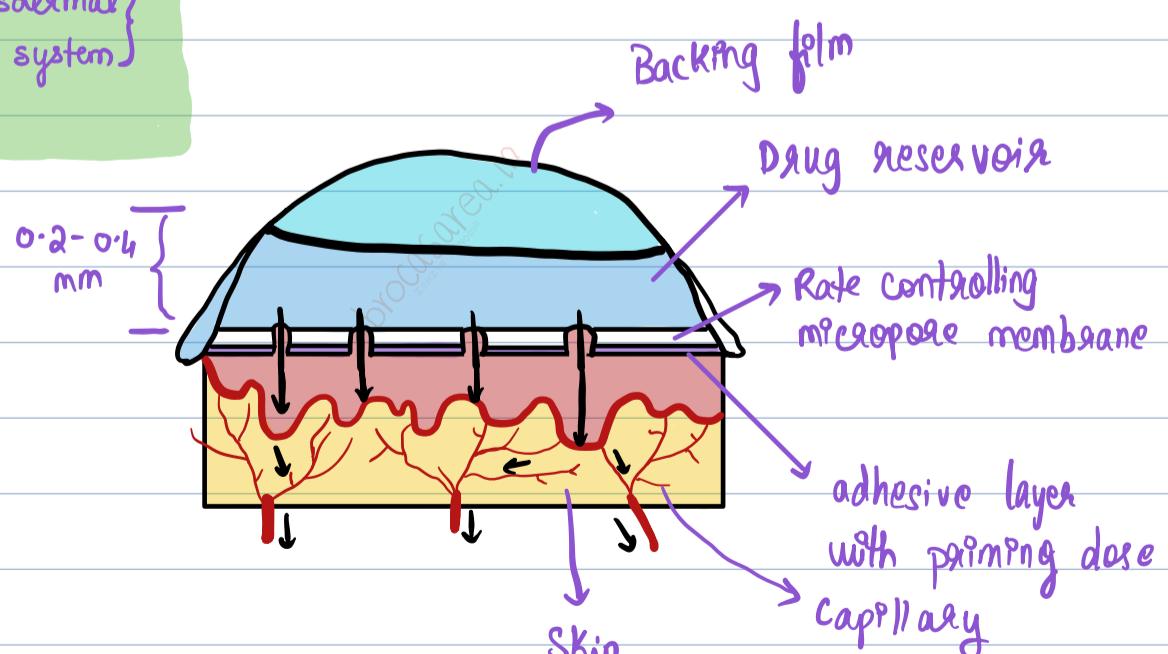
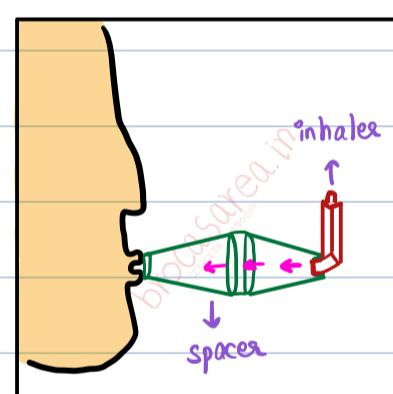
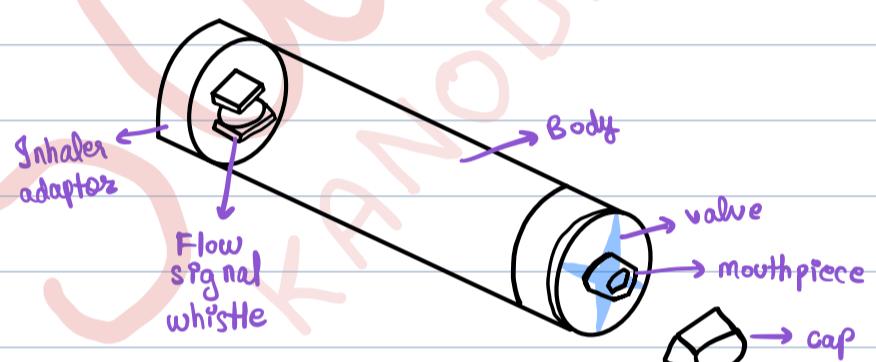
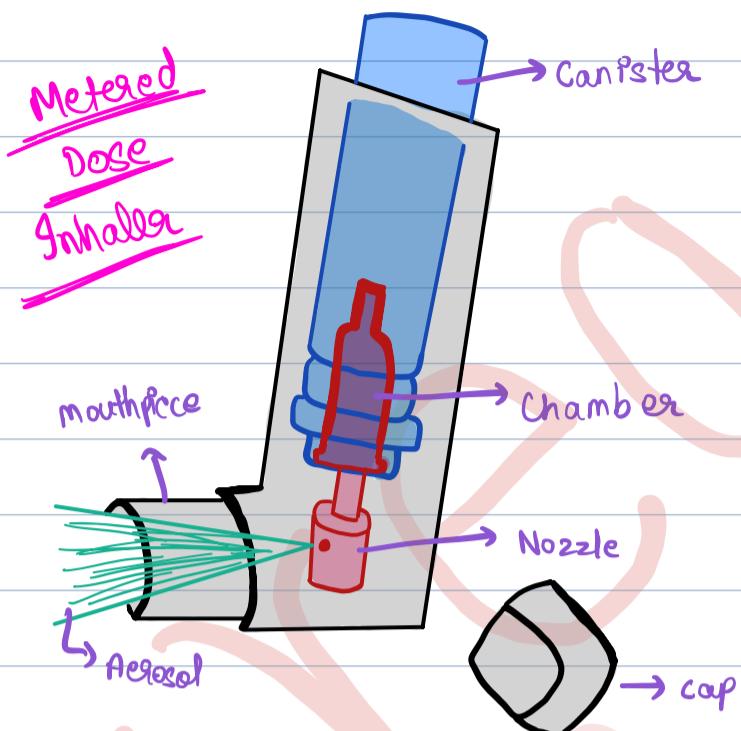
SUPPOSITORY (rectal), PESSARIES (vaginal), BOUGIES (urethral):

- drug + glycerine / gelatin / hard soap / coca butter
- solid at room temperature ; melt at body temperature
- **suppositories:** bullet - shaped
 - **Dulcolax suppositories**
- **peessaries:** conical
- **Bougies:** pencil - shaped
 - **Glycerine suppositories**
 - **Candizole - T pessaries**

TRANSDERMAL ADHESIVE PATCH:

drug is incorporated into a polymer which is bonded to an adhesive plaster
 → drug is delivered at the skin surface by diffusion (for percutaneous absorption into circulation)
 → provides smooth & steady plasma conc. of drug for 1-3 days
 → bypasses first - pass metabolism

- **Nitroderm - TTS (nitroglycerine)**
 - **Estraderm - TTS (estradiol)**
 - **Nicotinell - TTS (nicotine)**
- {TTS = transdermal therapeutic system}



New Drug Delivery Systems:

- Implants
- Films & strips
- Liposome drug carriers
- Controlled Drug Delivery modules

IMPLANTS:

- hypodermic tablets ; placed under the skin by a minor surgery in order to release drugs over prolonged periods of time
- useful in hormone therapy

FILMS & STRIPS: meant for topical application

for slow release of drug

- Types - zero order release films
 - Buccal strips
 - Spray Bandages

CONTROLLED DRUG DELIVERY MODULES:

- these are drugs which are formed by embedding the drug within a polymeric matrix so that it gets slowly released to the body over a long period of time
- drug-polymer complex may be formulated into tablet, capsule or any other suitable formulation.

ERYTHROCYTES: can allow drug to circulate in the body for a long time which helps slow release of drug into serum

- released erythrocytes are put into a hypotonic medium, so they can easily get swollen
- aqueous solution of drug is added to this hypotonic medium so that the drug is absorbed into the erythrocyte
- when osmoticity is adjusted, the erythrocyte shrinks thus, encapsulating the drug within
- these erythrocytes can be suspended in normal saline solutions for preparing injections

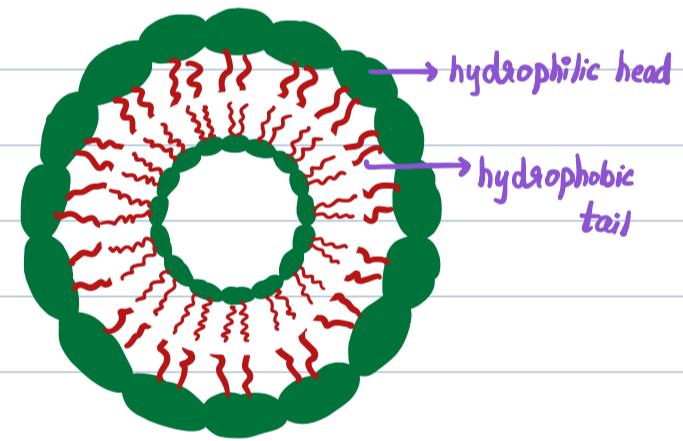
LIPOSOME DRUG CARRIERS: nanosized

vesicular structures consisting of an aqueous core surrounded with phospholipid layers.

- these can transport both hydrophilic & hydrophobic drugs

OCUSERT: ocular inserts through which the drug is delivered at a near constant rate

- minimizes side effects by avoiding excessive absorption peaks
- pilocarpine (ocuserts Pilo) commercialized in 1975
- designed to be placed in the lower cul-de-sac to provide a weekly dose of pilocarpine
- near zero-order rate delivery is based on the selection of a non-eroding copolymer membrane enclosing the drug reservoir



PROGESTASERT IUDs: T-shaped device made of polyethylene frame

that measures 32mm horizontally & vertically

- there is a silicone reservoir containing dispersed levonorgestrel or progesterone on vertical stem & further enclosed in a sleeve of rate-controlling membrane of ethylene-vinyl copolymer
- prevents pregnancy up to 5 yrs by steadily releasing small amount of progesterone directly into the uterus
- works by thickening the cervical mucosa so that sperms have more difficulty to swim through uterus
- for some women, it may also prevent ovulation

