

# SOLID

ISHITA  
KANODIA

## POWDERS

## EFFERVESCENT POWDERS

## GRANULES

## TABLETS

## CAPSULES

## SPANSULES

### POWDERS

#### simple

- contains 1 drug

#### mixture

- contains  $\geq 2$  drugs

→ dried & finely pulverised form of drug

- aspirin powder
- dusting powder
- Sodium bicarb. powder

### EFFERVESCENT POWDERS

- powder + sodium bicarbonate / citric acid / tartaric acid
- effervesce with evolution of  $\text{CO}_2$  when dissolved in water which makes it more palatable
- available in tablet form
- Eno salt
- dispirin (dispersible aspirin tablet)

### GRANULES

- small aggregates of powder held together by starch / alcoholic spray
- vit.  $\text{D}_3$  granules

### TABLETS

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

### CAPSULES

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

### 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

### Ordinary

#### Lozenges

#### Sugar-coated

#### TABLETS

#### Film-coated

#### Pellets

#### Long Tablets

#### Enteric-coated

### ORDINARY TABLETS

- uncoated
- Aspirin
- Paracetamol

### SUGAR-COATED

- coated by sugar to make them more palatable
- Chloroquine
- Metronidazole

### 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
- Coftum (cefuroxime)
- Dilgard (diltiazem)

### LOZENGES

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

### ENTERIC-COATED

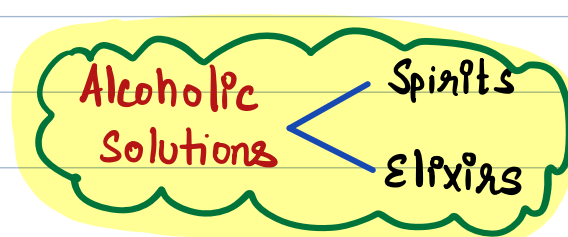
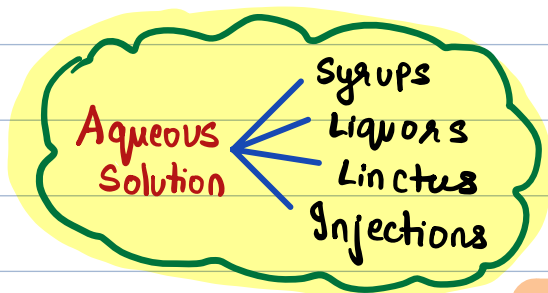
- coating of cellulose / acid phthalate / shellac / keratin
- resistant to gastric acid but dissolves at intestinal pH
- incidence of gastric irritation is ↓
- Diclofenac - EC
- Ecosprin - 75 (enteric coated aspirin)

### LONG TABLETS (RETARD / SUSTAINED RELEASE)

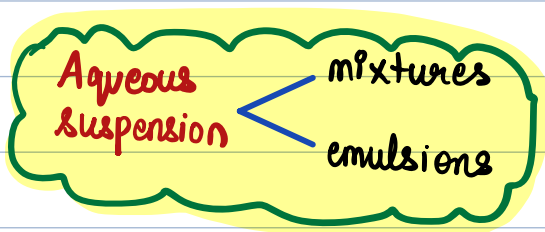
- aggregated drug particles have individual coating with diff. inert resins so that each coating dissolves at diff. time intervals to provide uniform, sustained release (∴ low incidence of side effects)
- K Gard [KCl]
- Depin retard (nifedipine)
- Diclofenac - SR

# Liquid

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



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

- Procalys enema
- Soap water enema

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

- Camphor
- Turpentine

## 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

**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

**DEPOT INJECTION:** longer-acting injectable preparations.

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

**CREAM:** semi-solid, emulsion

→ contains > 20% water & volatile oil (2/0.1)  
< 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

**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

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

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# Special Dosage Forms:

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

**INHALANT:** liquid preparations containing drug to be inhaled as vapour

- contents may be poured into a jug of boiling water & inhaled
- solid inhalants like **Fental (sodium cromoglycate)** are inhaled by turbo spin inhalers
- Karvol inhalant
- tincture benzoïn inhalation

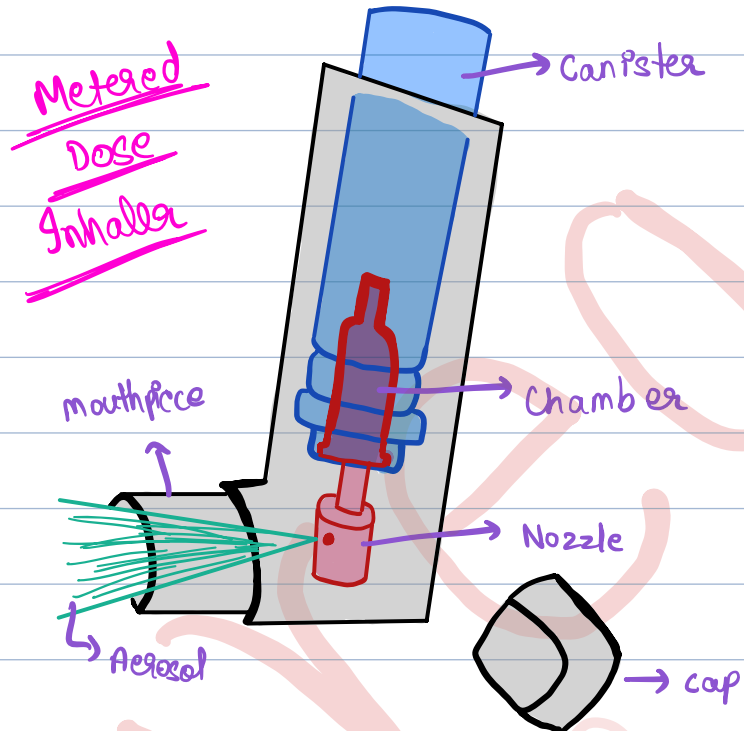
**AEROSOLS:** devices in which drug dissolved in a liquid is put inside a cylindrical container (nebulizer) & is then filled with a propellant gas (air/oxygen) under pressure

- 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 micronized powder mist.

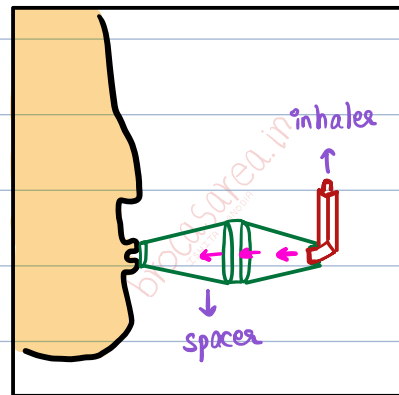
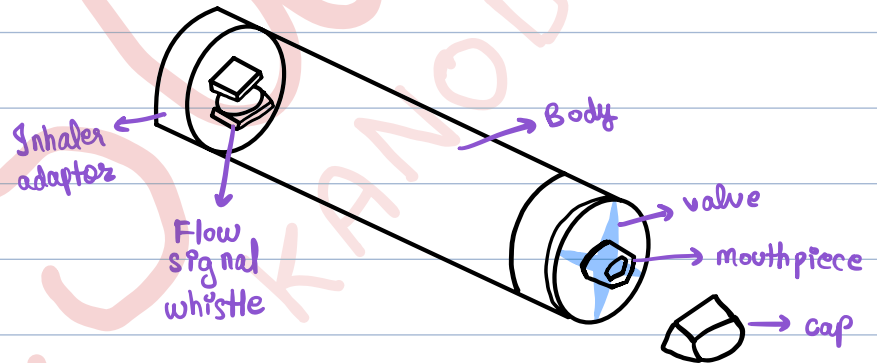
- tiotropium metered spinhaler

**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):

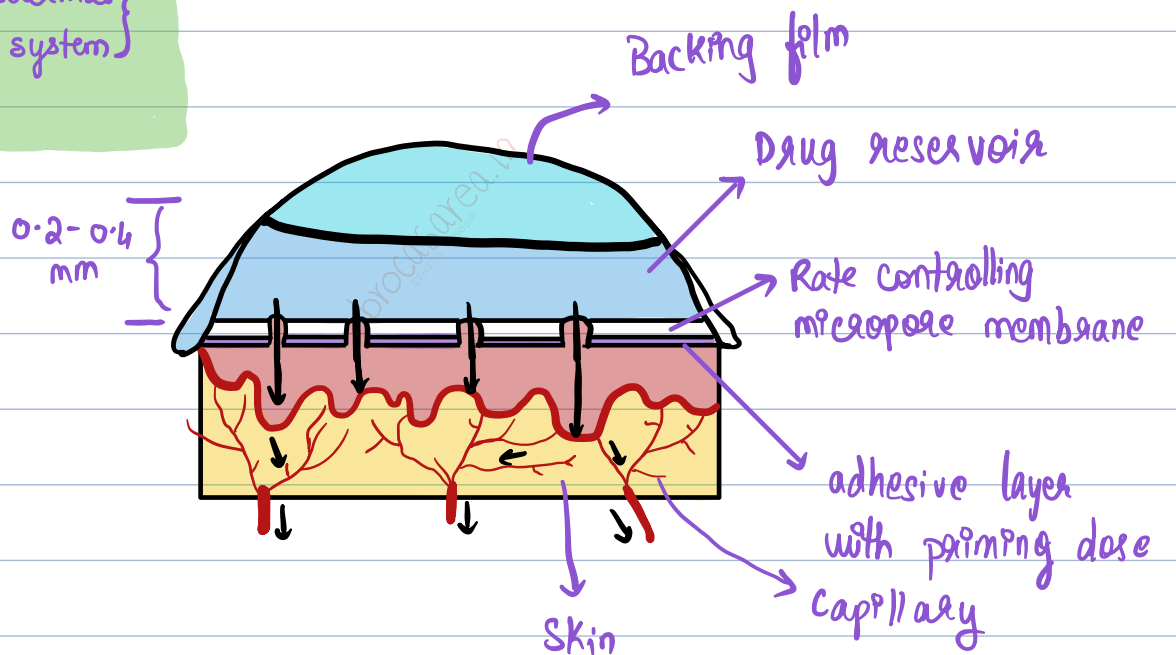
- drug + glycerine / gelatin / hard soap / cocoa butter
- solid at room temperature ; melt at body temperature
- **suppositories:** bullet-shaped
- Dulcolax suppositories
- Glycerine suppositories
- Candizole-T pessaries
- pessaries:** conical
- Bougies:** pencil-shaped



## 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
- Erythrocytes
- Ocusert
- Progesterone IUDs

## 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

## LIPOSOME DRUG CARRIERS: nanosized

- vesicular structures consisting of an aqueous core surrounded with phospholipid layers.
- these can transport both hydrophilic & hydrophobic drugs

## CONTROLLED DRUG DELIVERY MODULES:

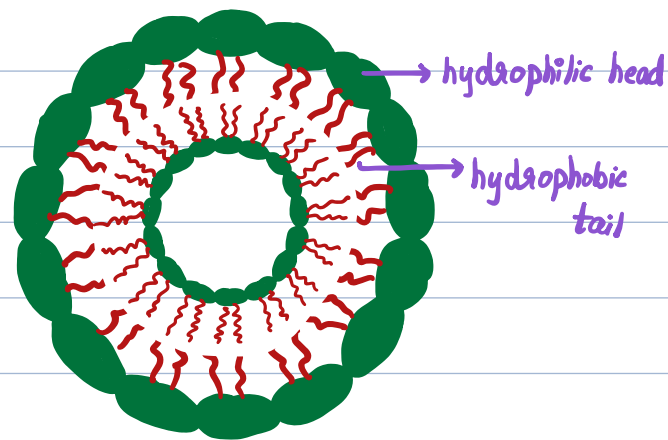
- these are drugs which are formed by embedding the drug within a polymeric matrix so that it gets slowly released to the body over a long period of time
- drug-polymer complex may be formulated into tablet, capsule or any other suitable formulation.

## 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

## 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 isotonicity is adjusted, the erythrocyte shrinks thus, encapsulating the drug within
- these erythrocytes can be suspended in normal saline solutions for preparing injections



## 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

