CHAPTER 5: PHARMACEUTICAL DOSAGE FORMS

Syllabus: Principles involved and procedures adopted in dispensing of: Typical prescriptions like mixtures, solutions, emulsions, creams, ointments, powders, capsules, pastes, jellies, suppositories, ophthalmic, pastilles, lozenges, pills, lotions, liniments, inhalations, paints, sprays, tablet triturates, etc.

Ques:

1. *How will you make simple syrup as per IP specifications.*
2. *How will you prepare collodion? Give the use of collodion.*
3. *What are solution dosage forms? How will you make liquor ammonium acetate fortes? How will you test the purity of the above product?*
4. *What are pharmaceutical formulations?*
5. *Give a systematic classification of dosage forms.*
6. *Give the methods of preparation of aromatic waters.*
7. *What is the difference between:*
    - *a) Elixir & Syrup*
    - *b) Solution & aromatic waters*
    - *c) Tinctures & extracts*
    - *d) Tinctures & Spirits*
    - *e) Sol & Gel*
    - *f) Lotion & Liniment*
    - *g) Dose & Dosageforms*
    - *h) Linctuses & Glycerites*
    - *i) Elixir & Linctus*
    - *j) Mixture & Lotions*
9. *Discuss the preparation and uses:*
    - *a) Lysol*
    - *b) Flexible collodion*
    - *c) Milk of magnesia*
    - *d) Syrup of Ferrous Iodide*
10. *What is the principle, method and equipment used in aromatic ammonia spirit.*
11. *What is the difference between dose and dosage*
12. *Name and define different parenteral liquid dosage forms.*
13. *How does the method of preparation vary for:*
    - *a) Camphor water & Dill water*
    - *b) Simple syrup & Invert syrup Syrup*
    - *c) Tinctures, Spirits, Gels, Elixir.*
14. *What are collodions? what are the constituents of such type of preparations? Differentiate between medicated and nonmedicated collodions. Define creams. What are the type of creams available? Give the advantages and disadvantages.*
15. *what do you mean by draughts? What are the essential characteristics of such type of preparations? Give your answer with suitable illustrations.*

DEFINITION OF DRUG

A drug may be defined as an agent, intended for use in the diagnosis, mitigation, treatment, cure or prevention of disease in man or in animals.

DOSAGE FORM

Drugs are rarely administered in their original pure state. They are converted into suitable formulation which are called **dosage forms**. Every dosage form is a combination of the drug and other non-drug components.

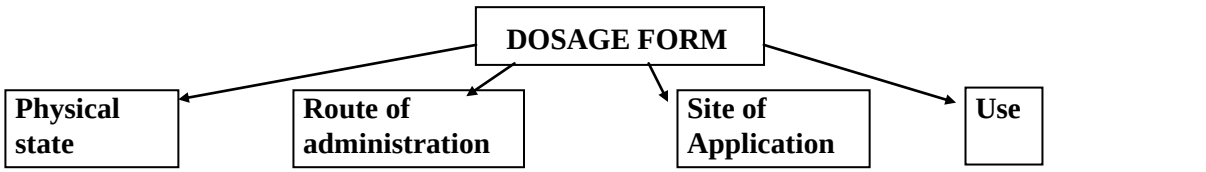
The non-dug components are known as "**additives**". The additives are used to give a particular shape to the formulation, to increase its stability and also to increase its palatability as well as to give more elegance to the preparation.

Ques. Why the drug should be converted into dosage forms ?

Ans. Transformation of drug into different dosage forms is done for the following reasons:

1. To protect the drug from oxidation (e.g. Vitamin C, Ferrous sulfate), hydrolysis (aspirin) and reduction. e.g. coated tablets, sealed ampoules.
2. To protect the drug from destructive effect of gastric juice (HCl) of the stomach after oral administration e.g. enteric coated tablets.
3. To provide a safe and convenient delivery of accurate dosage.
4. to conceal the bitter (e.g. chloramphenicol), salty or obnoxious taste or odour of a drug substance e.g. capsules, coated tablets and flavoured syrups etc.
5. To provide for the optimum drug action through inhalation therapy. e.g. inhalation aerosols and inhalants.
6. To provide for the drug into one of the body-cavities e.g. rectal suppositories.
7. To provide for the maximum drug action from topical administration sites. e.g. creams, ointments, ophthalmic preparations and E.N>T. (ear, nose and throat) preparation.
8. To provide sustained release action through controlled release mechanism. e.g sustained release tablets, capsules and suspensions.
9. To provide liquid dosage form of the drugs soluble in a suitable vehicle e.g. solutions.

CLASSIFICATION OF DOSAGE FORMS



Physical state	Route of administration	Site of Application	Use
(i) Solid	(i) Oral	(i) Skin	(i) Internal
(ii) Semisolid	(ii) Parenteral	(ii) Eye	(ii)External
(iii) Liquid	(iii) Rectal	(iii) Tooth	
(iv) Gaseous	(iv) Nasal	(iv) Hand	
		(v) Foot	
		(vi) Hair	
		(vii) Nose	

Route of administration	**Dosage forms**
Oral	Powders, tablets, capsules, solutions, emulsions, syrups, elixirs, magmas, gels, cachets, pills.
Parenteral	Solutions, suspensions, emulsions.
Transdermal	Ointments, creams, powders, pastes, lotions, plaster
Rectal	Suppositories, tablets, ointments, creams, douches, foams.
Urethral	suppositories
Sublingual	Lozenges, tablets
Intranasal	Solutions, sprays, inhalations.
Conjunctival	Ointments
Intra-ocular	Solutions
Intra-respiratory	Aerosols

Classification according to physical state:

DOSAGE FORM

SOLID	**SEMISOLID**	**LIQUID**	**GAS**	**MISCELLANEOUS**
Cachets	Creams	Applications	Aerosols	Transdermal drug
Capsules	Jellies	Aromatic water	inhalation	delivery systems
Powders	Ointments	Collodion		
Insufflations	Pastes	Draught		Sustained release drug
Dentrifices	Ophthalmic	Ear drops		delivery system
Effervescent	ointments	eye drops		
granules		Nasal drops		Ophthalmic drug
Lozenges		Elixirs		delivery systems.
Pessaries		Mixtures		
Tablets		Emulsions		Implants
Suppositories		Suspensions		
		Enemas		
		Gargles		
		Gels		
		injections		
		Irrigations		
		Linctuses		
		Liniments		
		Lotions		
		Mouthwashes		
		Spirits		
		Sprays		
		Syrups		
		Tinctures		
		Paints		

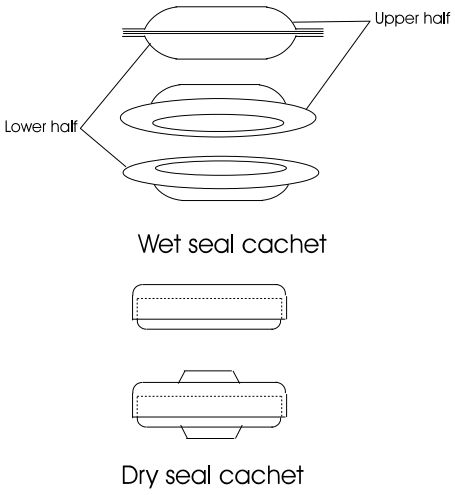
CACHETS

Cachets consists of a dry powder enclosed in a shell. The shell is prepared from a mixture of rice flour and water by moulding into suitable shape and then dried.

Two types of cachets are there:

(i) **Wet seal cachets:**

lower half of the cachet is filled with powdered drug. Then the flange of the empty upper half of the cachet is moistened with water, and pressed over the lower half. The cachet is dried for 15 minutes.



(ii)**Dry seal cachets:**

Drug powder is filled in the lower half and the upper half is pressed over it just like a capsule.

Use:

They are used for administering the drug with unpleasant taste and a large dose. Before administration, a cachet should be immersed in water for few seconds and then placed on the tongue and swallowed with water.

e.g. Sodium aminosalicylate cachets
Sodium aminosalicylate and isoniazid cachtets.

CAPSULES

Capsule are the solid unit dosage form of medicament in which the drug or drugs are enclosed in a practically tasteless, hard or soft soluble container of shell made up of gelatin.

Hard gelatin capsules are made up of two cylindrical halves, one slightly larger in diameter but shorter in length known as cap and the other slightly shorter in diameter but longer in length known as base.

Soft gelatin capsules are flexible in nature. They may be spherical, ovoid cylindrical or tubes. The small spherical capsules are also known as 'pearls'. soft gelatin capsules are used to enclose solids, semisolids or liquids.

for oral administration the capsule is placed on the tongue and swallowed with a drink of water.

Examples of hard gelatin capsules: Ampicillin capsules, multivitamin capsules.

Examples of soft gelatin capsules: chloramphenicol soft gelatin capsules.

DUSTING POWDER

These are meant for external application on to the skin and are generally applied in a very fine state of subdivision to avoid local irritation.

Dusting powders are of two types:

(i) Medical

(ii) Surgical

Medical dusting powders are mainly used for superficial skin conditions and for antiseptics, anti-pruritic, astringent, anti-perspirant, absorbent, protective and lubricant purposes.

e.g. dicophane dusting powder
zinc and salicylic acid dusting powder
zinc, starch and talc dusting powder.

Surgical dusting powders are used in body cavities, and also on major wounds as a result of burns and umbilical cords of infants. Surgical dusting powders must be sterilised before their use.

Dusting powders are generally prepared by mixing two or more ingredients on of which must be either starch, kaolin or talc as one of the ingredients of the formulations. Talc and kaolin are commonly used because they are chemically inert. however, since these materials are usually contaminated with pathogenic bacteria, these must be sterilised.

e.g. Neosporin powder.

INSUFFLATIONS

These are finely divided powders meant for introduction into the body cavities such as ears, nose, tooth sockets and vagina with the help of an apparatus known as 'insufflator', without which it will be difficult to apply the powders directly.

Insufflator sprays the powder into stream of finely divided particles all over the site of application. The following difficulties are generally faced while using the insufflators:

(i) It is difficult to obtain a measured quantity of the drug as a uniform dose.

(ii) It gets blocked when it is slightly wet or the powder used is wet.

Use: The insufflations are used to produce a local effect, as in the treatment of ear, nose and throat infection with antibiotics or to produce a systemic effect from a drug that is destroyed in the gastrointestinal tract.

DENTRIFICES (Tooth Powders)

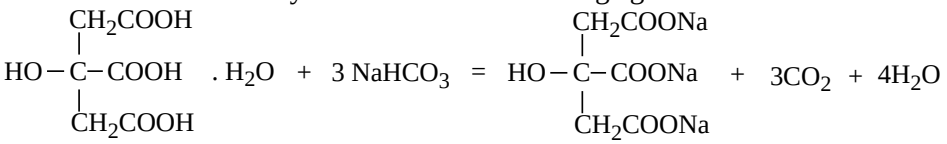
Dentrifices are preparations which are generally used with the help of tooth brush for cleansing the surfaces of the teeth. They are available in the form of fine powders and pastes.

They contain

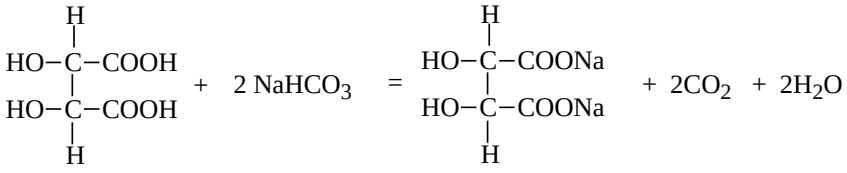
1. a suitable detergent or soap
2. some abrasive substance like calcium sulfate, magnesium carbonate, sodium carbonate in fine powder.
3. sweetening agent e.g. saccharin sodium
4. a suitable flavour e.g. peppermint oil, clove oil.

EFFERVESCENT GRANULES

The effervescent granules are specially prepared solid dosage form of medicament, meant for oral intake. they contain a medicament mixed with citric acid, tartaric acid and sodium bicarbonate. Sometimes saccharin or sucrose may be added as a sweetening agent.



Citric acid (monohydrate) Ttrisodium citrate



Tartaric acid Disodium tartarate

Ingredients used;

(i) Sodium bicarbonate: It reacts with the acids when the preparation is added to water. The evolved carbondioxide produces effervescence.

(ii) Citric acid and tartaric acid: The quantity of these is slightly more than is necessary to neutralise the sodium bicarbonate because effervescent preparations are more palatable if slightly acidic.

Tartaric acid is anhydrous but citric acid has one molecule of water of crystallization. heating liberates this water and the moist condition thus produced allows partial interaction between the acids and bicarbonates, during which more water is formed -

The water of crystallization of the citric acid and the water from the reactions makes the material coherent.

(iii) Medicaments: often inorganic salts containing water of crystallisation are incorporated. e.g. magnesium and sodium sulphates, sodium phosphate and lithium citrate.

Methods of preparation

There are two methods of preparation : 1. Hot method and 2. Wet method

Hot method: A large evaporating dish is heated on water bath. All the powders are taken in that hot dish to ensure rapid evaporation of water liberated from citric acid. Thus a coherent damp mass is prepared.

The water required for granulation is provided from two sources:

1. From one molecule of water of crystallisation of citric acid which is liberated during heating.
2. The water produced from the reactions of citric acid and tartaric acid with sodium bicarbonate.

Wet method: in this method the mixed ingredients are moistened with non-aqueous liquid (e.g. Alcohol) to prepare a coherent mass.

The coherent damp mass from both the methods is then passed through a No. 8 sieve and dried in an oven at a temperature not exceeding 60^0C. The dried granules are again passed through the sieve to break the lumps which may be formed during drying. The dried granules are packed in an air tight container.

Use: Before administration, the desired quantity is dissolved in water, the acid and bicarbonate react together producing effervescence.

The carbonated water produced from the release of carbondioxide serves to mask the bitter and saline taste of drugs.

More over carbondioxide stimulates the flow of gastric juice and helps absorption of medicament.

LOZENGES

Lozenges are solid dosage form of medicaments which are meant for slow dissolution in the mouth. Along with medicament they contain a sweetening agent, flavouring agent and a strong binding agent. They may be prepared either by moulding or by compression.

Examples are compound bismuth lozenges, liquorice lozenges.

PESSARIES

Pessaries are solid unit dosage form of medicament meant for introduction into vagina. The bases used for the manufacture of pessaries are such that at room temperature they retain the original shape but when inserted into the body cavity either it melts or dissolve in the cavity fluids to release the medicament.

They may be prepared either by moulding or by compression.

e.g. lactic acid pessaries, nystatin pessaries.

POWDERS

Powders are solid dosage form of medicament meant for internal and external use. The powders meant for internal use are known as oral powders whereas those meant for external use are known as dusting powders.

The powders may be simple or compound.

When the powders are dispensed in large quantities in a container and the patient is asked to measure a specified quantity as a dose then these powders are known as bulk powders.

e.g.

1. Bulk powder for internal use;
   - e.g. Compound sodium chloride and dextrose oral powder.
   - Compound rhubarb oral powder
2. Bulk powder for external use;
   - e.g. Snuffs
   - Talc dusting powders
   - Tooth powder.

TABLETS

Tablets are unit solid dosage form of medicament or medicament with or without suitable diluents. They are prepared usually by compression.

Tablets are generally meant for oral administration but may be used by other routes of administration.

e.g. aminophylline tablets
paracetamol tablets
antacid tablets.

SUPPOSITORIES

Suppositories are special shaped solid dosage form of medicament for insertion into body cavities other than mouth. These products are so formulated that after insertion, they will either melt of dissolve in the cavity fluids to release the medicament.

Suppositories vary in shapes, sizes and weights. General suppositories from 1 to 2 gm are prepared with either cocoa-butter or glecero- gelatin base.

e.g. aminophylline suppositories
glycerol suppositories.

SEMISOLID DOSAGE FORMS

CREAMS

Creams are viscous liquid or semisolid emulsions intended for application to the skin i.e. for external use.

Creams are of two types, aqueous creams and oily creams. In case of aqueous creams the emulsions are oil-in-water type and in case of oily creams emulsions are of water-in-oil type.

Due to the presence of water soluble bases they can be easily removed from the skin.

The aqueous creams have a tendency to grow bacterial and mold growth, therefore a preservative must be added in their formulation.

e.g. cetomacrogol cream, cetrimide cream, hydrocortisone cream, zinc cream BPC.

Advantages of creams:

1. Creams are more acceptable to the patients because they are less greasy and are easier to apply.
2. They interfere less with skin functions.
3. o/w type of creams (superior to w/o type) can be rub onto the skin more readily and are easily removed by washing. w/o can be spread more evenly.
4. o/w type of cream are less likely to soil clothes.
5. Evaporation of water from o/w type of cream causes cooling sensation.
6. o/w creams absorbs the discharges from the wound (liquid exudate) very quickly.
7. w/o creams (e.g. cold creams) restricts evaporation from the skin, it can be used on non-weeping surfaces to prevent dehydration (in dry season), restore suppleness (softness) - this property is said to be 'emollient'.

Disadvantages:

1. Since it is a semisolid preparation and containing oil in large amount, some of which are inedible, hence creams are not used for internal use. Basically creams are meant for application onto the skin.
2. the aqueous phase is prone to the growth of molds and bacteria hence preservatives should be used.
3. Sometimes rancidification of oils take place.

JELLIES

Jellies are transparent or non-greasy semisolid preparations meant for external application to the skin or mucous membrane. They are used for medication or lubrication purposes.

e.g. contraceptive jellies (spermicidal action)
ichthammol jelly etc.

they are used for lubricating catheters, surgical gloves and rectal thermometers.
The gelling agents may be gelatin, or a carbohydrate such as starch, tragacanth, sodium alginate or cellulose derivative.

OINTMENTS
Ointments are the soft semisolid, greasy preparations meant for external application onto the skin or mucous membrane (rectum and nasal mucosa).
They usually contain a medicament dissolved, suspended or emulsified in the base.
Ointments are used for their emollient and protective action to the skin.
e.g. compound benzoic acid ointment, cetrimide emulsifying ointment

PASTES
Pastes are semisolid preparations meant for external application to the skin. they generally contain large amount of finely powdered solids such as starch, zinc oxide, calcium carbonate etc.
They provide a protective coating over the areas to which they are applied.
The base may be anhydrous (liquid or soft paraffin) or water-soluble (glycerol or a mucilage). Their stiffness make them useful as protective coatings.
e.g. magnesium sulfate paste.,
zinc and coal tar paste

OPHTHALMIC OINTMENTS
Ophthalmic ointments are meant for application to the eye. They should be sterile and free from irritation. They should be packed in sterile containers which should keep the preparation sterile until whole of it is used up.
e.g. atropine eye ointment
chloromycetin eye ointments

Difference between paste and ointments;

Paste	Ointment
1. Contains a large amount of (50%) of finely powdered solids. As a result they are often very stiff.	1. Ointments contain very less amount of powdered solids. They are soft.
2. When applied on the skin the paste adhere well and remain confined in the area of application.	2. Ointments are less viscous, hence spread beyond the area of application.
3. They are porous so the perspiration (sweat)can escape through it.	3. Non-porous - hence perspiration cannot escape through it.
4. They are less greasy than ointments.	4. More greasy than pastes.

LIQUIDS
APPLICATIONS:
Applications are liquid or viscous preparations intended for application to the skin. usually, they are suspensions or emulsions.
Most of the official preparations contain paraciticides and are intended for only a limited number of applications.
They should be dispensed in coloured fluted bottles in order to distinguish them from preparations meant for internal use. The container should be labeled “FOR EXTERNAL USE ONLY”.
Examples of applications are calamine application compound B.P.C.
dicophane application B.P.C.

MONOPHASIC LIQUID DOSAGE FORMS

Monophasic liquid dosage forms are represented by true or colloidal solutions.

The components of the solution which is present in a larger quantity is known as "solvent", whereas the component present in a smaller quantity is termed as "solute".

Classification

1. Liquid for internal use e.g. syrups, elixirs, linctus, drops and draughts.
2. Liquids for external use which are of two types:
   (a) Liquids to be applied to the skin e.g. liniments and lotions etc.
   (b) Liquids meant for body cavities e.g. gargles, throat paints, mouth washes, eye drops, eye lotions, ear drops, nasal drops, sprays and inhalation.

1. AROMATIC WATERS

Aromatic waters are also known as medicated waters. They are dilute, usually saturated, aqueous solutions of volatile oils (e.g. peppermint oil, cinnamon oil) or volatile substances (e.g. camphor).

Uses:

(i) Some of them have a mild therapeutic action but
(ii) mainly they are used as flavouring agents in preparations meant for internal use.

Name	**Concentrated preparation**	**Dilution (by volume)**		**Use**
		Concentrated	**Water**	
Anise water	Conc. Anise Water	1	39	Flavour Carminative Mild expectorant
Camphor water	Conc Camphor Water	1	39	Flavour Carminative Mild expectorant
Caraway Water	Conc. Caraway Water	1	39	Flavour Carminative
Chloroform Water	Double Strength Chloroform Water	1	1	Preservative Flavor
Dill Water	Conc. Dill Water	1	39	Flavor Carminative (in gripe water)
Peppermint Water	Conc. Peppermint Water	1	39	Carminative Weak preservative

Aromatic waters are prepared by two IP methods:

(1) *Solution*

* Essential oil is shaken with 500 times its volume of Purified Water.

The shaking is repeated several times during a period of 30 minutes. The mixture set aside for 12 hrs or overnight and then filtered.

* Alternatively, the oil may be triturated with a sufficient quantity of powdered talc or of Keiselghur, or of pulped filter paper and 500 times its volume of purified water and filtered.

(2) *Dilution from concentrated waters*:

One part (by volume) of concentrated water is diluted with 39 parts of Purified Water.

e.g. Preparation of Camphor Water

Formula:

Camphor	1gm
Alcohol 90%	2 ml
Purified Water q.s.	1000 ml

Camphor is dissolved in Alcohol (90%) and then the solution is added drop by drop to the purified water.

After each addition the mixture is shaken well until the camphor is dissolved. . If required the excess camphor was filtered out.

e.g. Preparation of Cinnamon Water Concentrated B.P.C.
Cinnamon oil is dissolved in the alcohol and then sufficient purified water was added in successive small portions, to produce 1000 ml. The mixture was shaken vigorously after each addition. Small amount of purified talc was suspended in water and a filter bed is prepared on the filter paper. The filter bed was dried and then the solution was filtered through it.

SYRUPS
Syrups are liquid oral preparations in which the vehicle is a concentrated aqueous solution of sucrose or other sugar.
N.B. Syrups generally are not issued directly to the patients when it is issued to the patients:
(i) if it is clear it is called elixir and
(ii) if it is suspension it is called mixtures.

- *Simple syrup IP* is a saturated solution of sucrose in purified water. The concentration of sucrose is 66.7 % w/w.
- Syrup containing medicinal substances are called *medicated syrups* and those containing aromatic or flavoured substances are known as *flavoured Syrup*.

Advantages of syrups
1. Syrups retards oxidation because it is partly hydrolyzed into reducing sugar such as dextrose and levulose.
2. It prevents decomposition of many vegetable substances. Syrups have high osmotic pressure which prevents the growth of bacteria, fungi and molds which are the chief causes of decomposition in solutions of vegetable matter.
3. They are palatable. Due to the sweetness of sugar it is a valuable vehicle for the administration of unpalatable substances.

The syrups may be divided into two categories:
(a) Syrups prepared by simple solution or admixture

e.g. *Simple Syrup IP*

Sucrose		667 g
Purified water q.s.		1000

Method: Sucrose is added to water and dissolved by heating. The solution is cooled and the required volume is made up with the required amount of water.

e.g. *Ginger Syrup IP*

Strong Ginger Tincture	50 ml
Syrup, sufficient to produce	1000 ml

Both are mixed thoroughly.
(b) Syrups made by a process of extraction

e.g. *Tolu Syrup IP*

Tolu balsam	12.5 g
Sucrose	660 g
Purified Water q.s.	1000 g

Procedure: Boiling purified water is added to Tolu balsam contained in a tared vessel. The vessel is covered lightly and the contents are boiled gently for half an hour.
Purified water is added to adjust the specified weight.
The mixture is cooled, filtered and sucrose is added. Heated on a water bath to dissolve the sucrose. Finally sufficient purified water is added to produce the required weight.

ELIXIRS

Definition: Elixirs are clear, liquid, oral preparations of potent or nauseous drugs. They are pleasantly flavoured and usually attractively coloured and are very stable.

- Elixirs usually contains *potent drugs*, such as antibiotics, antihistamines and sedatives.
- *Vehicles* used in elixirs are alcohol, glycerol and propylene glycol.
  They are used
  (i) for the production of clear solution. Essential oils from flavoring agents may produce faint opalescence, hence alcohol 10 – 20% is useful for keeping oils in solution.
  (ii) When potent medicaments of low solubility is required to be dispensed, a mixture of solvents that will give complete solution is used.
  e.g. Phenobarbitone is virtually insoluble in water but a clear product can be made by dissolving it in alcohol and then diluting with glycerol and water.
  e.g. One part of paracetamol is soluble in 70 parts of water, 7 parts of alcohol, 9 parts of propylene glycol or 40 parts of glycerol. In paracetamol elixir a mixture of alcohol, propylene glycol and glycerol is used as vehicle.

Other adjuncts used are:

(i) *Chemical stabilizers*

e.g. Neomycin Elixir B.P.C. is adjusted to pH 4 to 5 with citric acid to minimize the darkening that occurs on storage.

e.g. Disodium edetate should be incorporated to sequester heavy metals that catalyse decomposition of antibiotic.

(ii) *Colouring agents*

e.g. Amaranth	Magenta red
Tartrazine	Saffron
Green S	Green

(iii) *Sweetening agents*

e.g. Sucrose syrups, glycerol, sorbitol solution, invert syrup and saccharin sodium are used.

(iv) *Flavours*

e.g. Blackcurrant Syrup in Chloral Elixir
Concentrated Raspberry Juice with invert syrup
Lemon spirit with syrup and invert syrup.
Compound Orange Syrup

(v) *Preservatives*

- 20% alcohol, propylene glycol or glycerol are preservative
- Syrup is self-preservative due to high osmotic pressure
- The most common additional preservative in chloroform; it is used in the form of double strength water.
- Some times the preparations contain benzoic acid and methyl parahydroxy benzoate.

LINCTUSES

Linctuses are viscous, liquid, oral preparations that are usually prescribed for the relief of cough.

- They contain medicaments which have demulcent (which soothes the inflammed mucous membrane preventing contact with air in the surroundings), sedative or expectorant action. The viscous vehicle soothes the *sore* membrane of the throat.
- The usual dose is 5 ml. Linctuses should be taken in small doses, sipped and swallowed slowly without diluting it with water in order to have the maximum and prolonged effect of medicaments.
- Simple Syrup is generally used as a vehicle. For diabetic patients Sorbitol solution is used instead of Simple Syrup.

GLYCERIN OR GLYCERITES

Glycerites are the viscous preparations in which the drug is dissolved in glycerin with or without heating. They are generally used as antiseptic or anti-inflammatory preparations.

e.g. icthammol glycerin
tannic acid glycerin
phenol glycerin

COLLODION

Collodions are liquid preparations meant for external application to the skin. They are convenient for application on small cuts and abrasions and are also used when a prolonged contact between the skin and the medicament is required.

- The vehicle is volatile and evaporates on application to the skin, leaving a flexible, protective film covering the site.
- *Preparations*
  Volatile solvents used are ether and alcohol.
  Film producing ingredient is pyroxylin (nitrocellulose)
  Plasticizer giving the flexibility is castor oil.

Preparation

The solution is made by shaking the ingredients in a closed container, allowing to stand for few days while impurities settle and then decanting the supernatant liquid, because the solution is too volatile for filtration.

Storage

Collodions are stored in small light-resistant, well closed containers.

LINIMENT

Liniments are liquid, semi-liquid or occasionally semi-solid preparations intended for application on the skin.

They may be alcoholic or oily solutions or emulsions.

Most are massaged onto the skin e.g. counter-irritant type.

Some are applied on warm dressing or with a brush. e.g. analgesic and soothing type.

Liniments must not be applied to broken skin because they would be very irritating.

e.g. Soap Liniment BPC
Camphor Liniment BP
Methyl salicylate liniment BPC

Alcohol is the main *vehicle*. In increases the penetration of counter-irritant molecules through skin.

LOTIONS

Lotions are liquid preparations for external application without friction.

They are either dabbed on the skin or applied on a suitable dressing and covered with water proof material to reduce evaporation.

e.g. Copper and zinc sulfate lotion is used for impetigo
Zinc sulfate and salicylic acid for ulcer
Salicylic acid lotion for dandruff
Salicylic acid and mercuric chloride lotion for follicular infection

N.B. Copper and Zinc sulfate have astringent action.
Salicylic acid has keratolytic action.

GELS

Gels are aqueous colloidal suspensions of the hydrated forms of insoluble medicaments e.g. aluminium hydroxide gel, used as antacid.

EXTRACTS

Extracts are concentrated preparations containing the active principles of vegetable or animal drugs. The drugs are extracted with suitable solvents and the product is concentrated o one of three types of extract –

Liquid Extract of which 1 ml usually contains the active constituents from 1 g of drug.
Dry Extract obtained by completely removing the solvent under, reduced pressure.
Soft Extract obtained by evaporation to a plastic mass.

TINCTURES

These are alcoholic preparations containing the active principles of vegetable drugs.
They are weaker than extracts.
They are usually prepared by maceration and percolation, or may be prepared by dissolving the corresponding liquid extract of chemical substances (e.g. iodine) in alcohol or hydroalcohol solvent.

e.g. Belladonna tincture
Aromatic cardamom tincture
Iodine tincture

SPIRITS

Spirits are alcoholic or hydroalcoholic solutions of *volatile* substances.
Most are used as *flavouring* agents but a few have medicinal value.
e.g. Chloroform Spirit, Lemon Spirit, Compound Orange Spirit.

INFUSIONS

(i) *Fresh Infusions* are made by extracting vegetable drugs for a short time with cold or boiling water (cf. making of tea). They quickly deteriorate as a result of microbial contamination and therefore must be used within 12 hours.
(ii) *Concentrated infusions* are made by cold extraction with 25 % alcohol. The alcohol preserves the product for an indefinite period.
Dilution of 1 part of concentrated infusions with 10 parts of water gives a preparation corresponding fresh infusion.

e.g. Concentrated Compound Gentian Infusion
concentrated Senega Infusion.