WELCOME

TO

This is an Education Platform

We Provide PDF Notes for Pharmacy Students

Web Site http://www.fdspharmacy.in/

You tube https://www.youtube.com/c/FDSpharmacy

Telegram https://t.me/Fdspharmacy

App https://play.google.com/store/apps/details?id=com.FDSPharmacyMedia.FDSPharmacy

E-mail fdspharmacyinfo@gmail.com

PHARMACEUTICS – I

UNIT 2

TOPIC :

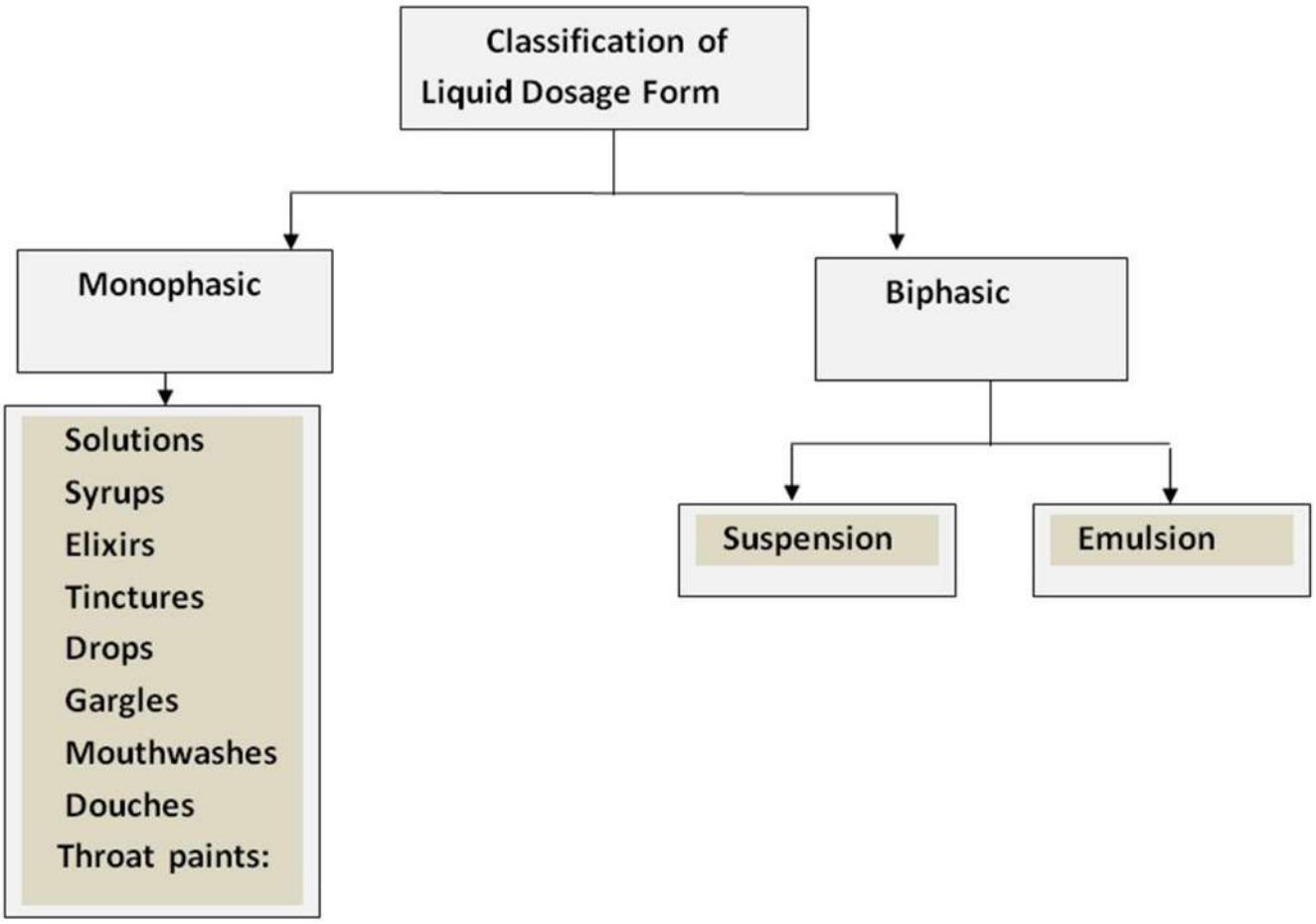
- **Liquid dosage forms :** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

Liquid Dosage form

→ These are those dosage form in which solution are in liquid form which are meant for internal, external or parenteral use.

→ It contain one or more soluble chemical substance in which solvent is used as a liquid it has maximum therapeutics response.

Classification



1. **Monophasic Systems**

These are true solutions where the drug is completely dissolved in a liquid medium.

a) Syrups

- Sweet, viscous oral solutions
- Contain sugar or sugar substitutes
- Example: Cough syrups (Paracetamol syrup)

b) Elixirs

- Clear, sweetened hydro-alcoholic solutions
- Example: Chlorpheniramine maleate elixir

c) Tinctures

- Alcoholic or hydroalcoholic solutions prepared from plant or animal extracts
- Example: Iodine tincture

d) Spirits

- Alcoholic solutions of volatile substances
- Example: Peppermint spirit

e) Drops

- Highly concentrated solutions meant for instillation
- Example: Eye drops, ear drops, nasal drops

2. ***Biphasic Systems***

These contain two phases: one dispersed in another (suspension or emulsion).

a) **Suspensions**

- Insoluble solid particles suspended in a liquid
- Require shaking before use
- Example: Antacid suspension, Paracetamol suspension

b) **Emulsions**

- Two immiscible liquids (e.g., oil and water)
- Stabilized using emulsifying agents
- Example: Cod liver oil emulsion, lotion

Advantages of Liquid Dosage Forms

- ✓ **Easy to Swallow**
  - Suitable for children, elderly, and patients with difficulty swallowing.
- ✓ **Faster Onset of Action**
  - Drug is already dissolved, leading to quicker absorption and action.
- ✓ **Flexible and Adjustable Dosing**
  - Dosage can be easily measured and adjusted as needed.
- ✓ **Better Taste Masking**
  - Flavors and sweeteners can be added to improve taste and patient compliance.
- ✓ **Suitable for Heat-Sensitive Drugs**
  - Some liquid forms avoid heat processing, preserving drug stability.
- ✓ **Useful for Large Dose Medications**
  - Drugs that require large doses can be easily administered in liquid form.
- ✓ **Multiple Routes of Administration**
  - Can be given orally, topically, rectally, or by injection.
- ✓ **Uniform Drug Distribution (in Solutions)**
  - Ensures consistent dosing as the drug is evenly dissolved.
- ✓ **Convenient for Special Conditions**

- Ideal for patients using feeding tubes, or those unconscious or vomiting.

Disadvantages of Liquid Dosage Forms

1. **Shorter Shelf Life**
   - More prone to degradation and microbial contamination compared to solids.
2. **Less Stability**
   - Sensitive to light, temperature, and moisture; may require preservatives.
3. **Bulky and Inconvenient to Carry**
   - Difficult to store and transport due to volume and weight.
4. **Need for Accurate Measurement**
   - Requires a measuring device (spoon, cup, syringe) for correct dosing.
5. **Unpleasant Taste or Odour**
   - Some drugs may still have a bad taste even after flavouring.
6. **Risk of Spillage or Leakage**
   - Bottles can spill, break, **or** leak, reducing dosage accuracy.
7. **More Expensive to Package and Transport**
   - Requires airtight, light-resistant containers, adding to cost.
8. **Dosing Errors More Likely**
   - Especially when used without proper measuring tools, leading to under/overdose.
9. **Requires Preservatives**
   - To prevent microbial growth, which may cause allergic **reactions** in sensitive individuals.
10. **Complex Manufacturing and Storage**

- Involves special equipment and storage conditions, increasing production cost.

Excipients used in Formulation of Liquid Dosage Forms

Solvents

- Solvents are the liquid media used to dissolve the active drug and other excipients, forming the base of the liquid dosage form.
- They act as the vehicle in which the drug is administered and play a crucial role in determining the solubility and stability of the drug.

Examples : Purified water, Ethanol, Propylene glycol, glycerin

Sweetening Agents

- Substances added to improve the taste and palatability of the liquid formulation, especially important in pediatric medicines.
- They help mask unpleasant tastes of drugs and increase patient compliance, especially in oral formulations.

Examples :

Natural: Sucrose, glucose, sorbitol

Artificial: Saccharin, aspartame, sucralose

Flavoring Agents

- Flavoring agents are substances added to mask the bitter or unpleasant taste and improve organoleptic appeal of liquid preparations.
- They help in taste masking, making the formulation more acceptable to patients, particularly children.

Examples : Orange, mint, vanilla, chocolate, banana

Coloring Agents

- Coloring agents are substances added to enhance the visual appearance and product identity.
- Color helps make the product visually appealing, aids in product recognition, and can indicate flavor or function.

Examples :

Synthetic: FD&C dyes (like sunset yellow, tartrazine)

Natural: Caramel, chlorophyll

Preservatives

- Preservatives are substances used to prevent microbial contamination and extend the shelf life of the liquid formulation.
- Since liquids are prone to microbial growth, preservatives are essential in multi-dose containers to maintain product safety.

Examples : Sodium benzoate, benzoic acid

Buffers

- Buffers are systems used to maintain the pH of the liquid formulation within a desired range.
  Maintaining pH ensures drug stability, comfort on administration (especially for eye drops or injections), and solubility of the active ingredient.

Examples : Citric acid + sodium citrate, Acetic acid + sodium acetate

Emulsifying Agents

- Emulsifying agents are surface-active substances used to stabilize emulsions by reducing interfacial tension between two immiscible liquids (like oil and water).
- They prevent phase separation and maintain uniform dispersion in emulsified liquid dosage forms.

Examples : Lecithin, acacia

Suspending Agents

- Suspending agents are excipients that increase viscosity and help keep solid particles suspended uniformly in the liquid.
- They prevent particles from settling too quickly, ensuring uniform dosing with each administration.

Examples : Bentonite, carboxymethylcellulose (CMC), xanthan gum

Antioxidants

- Antioxidants are substances added to prevent the oxidation of active ingredients, thus improving chemical stability.
- They protect the formulation from degradation, discoloration, and loss of potency, especially in oil-based or oxygen-sensitive formulations.

Examples : Ascorbic acid (Vitamin C),

Solubility Enhancement Techniques

→ Solubility enhancement techniques are methods used to increase the solubility and dissolution rate of poorly water-soluble drugs to improve their bioavailability and therapeutic effectiveness.

→ There are various techniques :

- PH adjustment
- Co-Solvent
- Particle Size reduction
- Solid dispersion
- Hydrotropy method

PH adjustment

→ A solubility of poorly soluble drug that is either a weak base of weak acid may be altered by adjusting the PH of the solution.

→ PH adjustment for improving the solubility in two ways :

- Salt Formation
- Addition of buffer to the formulation.

Co-Solvent

→ Use of a mixture of solvents (water + a co-solvent) to increase solubility of poorly water-soluble drugs.

→ Co-solvents improve solubility by changing the polarity of the solvent system.

→ **Common co-solvents** : Ethanol, propylene glycol, polyethylene glycol (PEG),

→ **Example**: **Diazepam injection** contains ethanol and propylene glycol as co-solvents.

Particle Size Reduction

→ Reducing the size of drug particles increases the surface area, thereby enhancing the dissolution rate and solubility.
→ Smaller particles dissolve faster due to increased interaction with the solvent.

Techniques:

- Micronization (producing micron-sized particles)
- Nanonization (producing nanoparticles)

Example: Micronized griseofulvin improves oral bioavailability.

Solid Dispersion

→ Dispersion of poorly soluble drugs into hydrophilic carriers in solid state to enhance dissolution and solubility.
→ The drug is molecularly dispersed in a soluble matrix, leading to faster release and better solubility.

Carriers used:
PEG (Polyethylene glycol), PVP (Polyvinylpyrrolidone), urea

Example : Itraconazole with PEG-6000 in solid dispersion form.

Hydrotropy Method

→ Addition of large amounts of hydrotropic agents to increase the solubility of poorly soluble drugs.
→ Common hydrotropes : Sodium benzoate, sodium salicylate, urea
→ Example : Theophylline solubilized using sodium benzoate.

FDSPharmacy
Learn and Educate