
Chapter 13

Syrups, Elixirs, spirits and tinctures are prepared and used for the specific effect of the medicinal agents that they carry.

The medical agents are intended to provide systemic effects.

They are soluble in aqueous systems and their absorption from the gastrointestinal tract into the systemic circulation may be expected to occur more rapidly than from suspension or solid dosage forms of the same medicinal agent.

The finer the powder, the greater the surface area, which comes in contact with the solvent and the more rapid the dissolving process.

Other solvents, such as acetone, ethyl oxide, and isopropyl alcohol, are too toxic to be permitted in the pharmaceutical preparations to be taken internally.

Alcohol with water forms a **hydroalcoholic** mixture that dissolves both alcohol-soluble and water-soluble substances, a feature especially useful in the extraction of active constituents from crude drugs.

Alcohol is frequently used with other solvents, such as glycols and glycerins to reduce the amount of alcohol required. It is also used in liquid products as an antimicrobial preservative alone or with parabens, benzoates, and sorbates.

OTC oral products intended for children under:

6 years of age: 0.5%

6 to 12 years old: 5.0%

Over 12 years of age: 10%

Glycerin is a colorless, odorless, viscous liquid that is widely used in pharmaceutical formulations. It is miscible with both water and alcohol. Because of its viscosity, solutes are slowly soluble in it unless it is rendered less viscous by heating. Also have preservative qualities, stabilizer and solvent.

Isopropyl rubbing alcohol is about 70% by volume isopropyl alcohol, the remainder consisting of water with or without color additives, stabilizers and perfume oils. Also act as a vehicle for topical products.

Diluted alcohol is prepared by mixing equal volumes of 50% alcohol UPS and 50% purified water. (Ideal solution)

Alcohol UPS 94.9-96% is used as solvents, good water miscibility, good dissolution power. Undesired pharmacological action.

Propylene Glycol is a viscous liquid, is miscible with water and alcohol. It is a useful solvent with a wide range of applications and frequently substituted for glycerin.

Purified water is water from any source that is physically processed to remove impurities. Distilled water and deionized water have been the most common forms of Purified water.

Sorbitol solution UPS contains 64% by weight of the polyhydric alcohol sorbitol.

Ora-Plus-for extemporaneous compounding of syrups.

Ora-Sweet SF- is sugar free

The main methods used in the preparation of purified water are distillation, ion exchange and reverse osmosis.

Distillation method- the first portion of aqueous distillate (about the first 10-20%) must be discarded because it contains many foreign volatile substances usually found in urban drinking water, the usual starting materials.

Ion exchange method (**demineralized, deionized**)- no heat, ease of operation and maintenance, cation exchange resins and remove the cations from the water. Anion exchange resins remove anions from the water.

Reverse Osmosis- pressurized steam of water passed parallel to the inner side of the filter membrane core. Also removes virtually all viruses, bacteria, pyrogens, organic molecules and ions.

Preparation of solution:

1. Mixing
2. Temperature- heating excepts with exothermic solutions and heat sensitive solutes.
3. Reducing particle size is recommended- increases the surface area of the solute.

Oral solutions: usually contains sweetener, colorant, flavoring agent of preservatives. Information about solubility and stability is crucial.

Dry Mixtures: have insufficient stability in aqueous solution to meet extended shelf-life periods.

Examples: (Cloxacillin, Penicillin V, KCl)

Oral rehydration solutions: for treatment of mild volume. Depletion 5-10% of the total body weight.

-Based on the fact that glucose is actively absorbed from the small intestine even during diarrhea. This glucose absorption is coupled with sodium and water absorption.

Bicarbonate and **citrate** ion used to help treat metabolic acidosis.

Syrups: concentrated aqueous preparations of sugar or sugar substitute with or without flavoring agent and medicinal agent.

- Sweet and viscous
- Sucrose is commonly used (60-80%, maximum 85%)
- Flavored and unflavored.
- used to mask taste and order of liquid medications.
- medicated syrup are commercially prepared from starting materials.

Components of Syrups:

1. Sucrose as the sugar or substitutes (Glycerin, Sorbitol, dextrose, non-glycogenic methylcellulose + artificial sweetening agent) used to provide sweetness and viscosity.
 - When the syrup is swallowed, only a portion of the dissolved drug actually makes contact with the taste buds, the remainder of the drug being carried past them and down the throat in the viscous syrup.
2. Thickening agent.
3. Antimicrobial preservatives- to protect syrup against microbial growth varies with the proportion of water available for growth.
 - a. Benzoic acid 0.1-0.2%
 - b. Methylparaben, propylparaben 0.1%
 - c. Sodium benzoate 0.1-0.2%
4. Flavoring agent- to render the syrup pleasant tasting and water-soluble.
 - a. Examples: volatile oil, vanillin
5. Colorants: water soluble, non-reactive with the other syrup components, color stable at pH range
6. Simple syrup NF syrup (stable, crystallization resistant) (85%w/v, 65%w/w) made up of 85g of sucrose and purified water.
 - a. Concentrated sugar solutions are quite resistant to microbial growth because of the unavailability of the water required for the growth of microorganisms
 - b. No need for additional preservatives.

Syrup Preparation:

<p>Solution of the ingredients with the aid of heat:</p>	<p>Advantages:</p> <ol style="list-style-type: none"> 1. Desired to prepare the syrup as quickly as possible. 2. Can be used for thermostable medications and non-volatile materials. <p>Disadvantages:</p> <ol style="list-style-type: none"> 1. When the syrup is greatly overheated, it becomes amber colored as the sucrose caramelizes. Sugar inversion may happen.
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	2. Decomposition by heat, syrup cannot be sterilized by autoclaving.
Solution of the ingredients by agitation without the use of heat:	Advantages: 1. The product has maximum stability. 2. Through placing all ingredients in a vessel larger than the volume of the syrup than agitation of the mixture. 3. Medication dissolved in the minimum solvent than incorporated into the syrup. Disadvantages: 1. Time consuming.
Addition of sucrose to a prepared medicated liquid:	Advantages: Disadvantages:
Percolation of medication or sucrose:	Advantages: 1. Preparation of extractive of the drug and then the preparation of the syrup. Disadvantages:

Elixirs are clear, sweetened hydroalcoholic solutions intended for oral use and are usually flavored to enhance their palatability. 10-12% alcohol self-preserving.

1. Non-medicated elixirs are employed as vehicles, and medicated elixirs are used for the therapeutic effect of the medicinal substances they contained.

2. Compared with syrups, elixirs are usually less sweet and less viscous because they contain a lower proportion of sugar and consequently are less effective than syrups in asking the taste of medicinal substances.

3. Due to their hydroalcoholic character, elixirs are better able than aqueous syrups to maintain both water-soluble and alcohol-soluble components in solutions.

4. Elixirs are preferred to syrups.

5. Because of their usual content of volatile oils and alcohol, elixirs should be stored in tight, light-resistant containers and protected from excessive heat.

6. Elixirs have higher dissolution ability and is easier to prepare.

Elixirs contains:

1. Alcohol, water and maybe co-solvents as glycerin.
2. Flavoring/sweetening agent
 - a. Examples: sucrose, glycerin, saccharin.

Non-medicated elixirs can be used to dilute the existing medicated elixirs and as flavored vehicle for extemporaneous compounding.

1. When used to dissolve medication that alcohol content of the elixir would be slightly higher than the amount required to dissolve the medication.

2. When used to dilute an elixir the concentration of alcohol in the non-medicated elixir should be close to the elixir to be diluted.

3. Aromatic elixir, compound benzaldehyde elixir.

Medicated elixirs are for therapeutic benefit for the ease of dose adjustments.

- Antihistaminic elixirs
- Mostly as base amine prepared as salt (interaction with acid), pH is critical when diluted.

Disadvantages: alcohol content ranges from 5-40%. Can't be use of children.

Elixir preparation:

1. Simple agitation.
2. Prepare alcoholic solution and aqueous solution then add aqueous to alcoholic.
3. Filter if needed.

Tinctures are alcoholic or hydroalcoholic solutions prepared from vegetable materials or from chemical substances.

Tinctures contain alcohols in amounts of ranging from 15%-80%.

1. The alcohol content protects against microbial growth and keeps the alcohol-soluble extractives in solutions.
2. Must be stored in tight-resistant containers and protected from sunlight.
3. Tinctures cannot be mixed successfully with liquids too diverse in solvent character because the solute may precipitate.