

# Pharmaceutical Technology

## Lecture-14

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Preparation of syrups

By

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# Preparation of Syrups

- Syrups are most frequently prepared by one of four general methods, depending on the physical and chemical characteristics of the ingredients. Broadly stated, these methods are
  1. solution of the ingredients with the aid of heat, or so-called hot process,
  2. solution of the ingredients by agitation without the use of heat or the simple admixture of liquid components,
  3. addition of sucrose to a prepared medicated liquid or to a flavored liquid, and
  4. percolation of either the source of the medicating substance or the sucrose. Sometimes a syrup is prepared by more than one of these methods, and the selection may simply be a matter of preference on the part of the pharmacist. Many of the official syrups have no officially designated method of preparation.

# Solution with the Aid of Heat

- Syrups are prepared by this method when it is desired to prepare the syrup as quickly as possible and when the syrup's components are not damaged or volatilized by heat.
- In this method, the sugar is generally added to the purified water, and heat is applied until the sugar is dissolved. Then, other heat-stable components are added to the hot syrup, the mixture is allowed to cool, and its volume is adjusted to the proper level by the addition of purified water.
- If heat-labile agents or volatile substances, such as volatile flavoring oils and alcohol, are to be added, they are generally added to the syrup after the sugar is dissolved by heat, and the solution is rapidly cooled to room temperature.

- The use of heat facilitates rapid solution of the sugar and certain other components of syrups; however, caution must be exercised against becoming impatient and using excessive heat.
- When heat is applied in the preparation of a sucrose syrup, some inversion of the sucrose is almost certain. The speed of inversion is greatly increased by the presence of acids, the hydrogen ion acting as a catalyst to the reaction.
- Should inversion occur, the sweetness of the syrup is altered because invert sugar is sweeter than sucrose, and the normally colorless syrup darkens because of the effect of heat on the levulose portion of the invert sugar.



- When the syrup is greatly overheated, it becomes amber colored as the sucrose caramelizes. Syrups so decomposed are more susceptible to fermentation and to microbial growth than the stable, undecomposed syrups.
- Because of the prospect of decomposition by heat, syrups cannot be sterilized by autoclaving.
- The use of boiled purified water in the preparation of a syrup can enhance its permanency, and the addition of preservative agents, when permitted, can protect it during its shelf life.
- Storage in a tight container is a requirement for all syrups.

# Solution by Agitation Without the Aid of Heat

1. To avoid heat-induced inversion of sucrose, syrup may be prepared without heat by agitation. Syrup made without heat is practically colorless
  - On a small scale, sucrose and other formulative agents may be dissolved in purified water by placing the ingredients in a vessel larger than the volume of syrup to be prepared, permitting thorough agitation of the mixture.
  - This process is more time consuming than the use of heat, but the product has maximum stability
2. Sometimes, simple syrup or some other non medicated syrup, rather than sucrose, is employed as the sweetening agent and vehicle. In that case, other liquids that are soluble in the syrup or miscible with it may be added and thoroughly mixed to form a uniform product.
  - Example: glycyrrhiza syrup (Licorice syrup)

- When solid agents are to be added to a syrup, it is best to dissolve them in minimal amount of purified water and incorporate the resulting solution into the syrup.
- When solid substances are added directly to syrup, they dissolve slowly because the viscous nature of the syrup does not permit the solid substance to distribute readily throughout the syrup to the available solvent and also because a limited amount of available water is present in concentrated syrups.



# **Addition of Sucrose to a Medicated Liquid or to a Flavored Liquid**

- Occasionally, a medicated liquid, such as a tincture or fluidextract, is employed as the source of medication in the preparation of syrup.
- Many such tinctures and fluidextracts contain alcohol-soluble constituents and are prepared with alcoholic or hydroalcoholic vehicles.
- If the alcohol-soluble components are desired medicinal agents, some means of rendering them water soluble is employed.



- However, if the alcohol-soluble components are undesirable or unnecessary components of the corresponding syrup, they are generally removed by mixing the tincture or fluidextract with water, allowing the mixture to stand until separation of the water-insoluble agents is complete, and filtering them from the mixture.
- The filtrate is the medicated liquid to which the sucrose is added in preparation of the syrup. If the tincture or fluidextract is miscible with aqueous preparations, it may be added directly to simple syrup or to flavored syrup.
- Examples of syrups prepared by this method:
  1. Cherry syrup
  2. Roseberry syrup
  3. Orange syrup and
  4. Tolu Balsam syrup

# Percolation

- In the percolation method, either sucrose may be percolated to prepare the syrup or the source of the medicinal component may be percolated to form an extractive to which sucrose or syrup may be added.
- This latter method really is two separate procedures: first the preparation of the extractive of the drug and then the preparation of the syrup.
- An example of a syrup prepared by percolation is ipecac syrup, which is prepared by adding glycerin and syrup to an extractive of powdered ipecac obtained by percolation.
- This syrup is categorized as an emetic with a usual dose of 15 mL.

- Syrup is made by dissolving sucrose in boiling water or preferably without heat by percolation with purified water about 465 mL total. Cotton is packed loosely in the neck of the percolator to remove mechanical impurities such as lint.
- The cotton is moistened after packing and before the sucrose is placed in the percolator, so that the first concentrated syrup will pass through satisfactory.
- In making small quantities, it is always necessary to pass the percolate through the percolator several times before all the sucrose is dissolved and get syrup has sp.gr. 1.313.
- Advantage: this process has the advantage of requiring little attention and it is well suited to manufacture of large quantities of syrup.