



*Pharmaceutical Technology for
3rd year students/ Lec 9*

By:

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Extracted products

Methods of extraction



Extraction

- ❖ It was realized very early in history that, plant & animal tissues contain chemical substances which provide relief & treatment for different disease states.
- ❖ ***Extraction;*** is the separation of medicinally active portions of plant or animal tissues from the crude drugs through the use of selective solvents.

- **Certain pharmaceutical preparations are prepared by extraction, i.e., by withdrawal of desired constituents from crude drugs through the use of selected solvents in which the desired constituents are soluble.**
- ***Crude drugs:*** are vegetable or animal drugs that have undergone no other processes than collection, cleaning, and drying.



Extraction Efficiency

- ✓ In order to get **efficient extraction** of active principles with **maximum selectivity**, a different procedures & solvent systems can be used.
- ✓ The solvent systems used in extraction are selected on the basis of their **capacity to dissolve the maximum amount of desired active constituents** and the **minimum amount of undesired constituents**.
- ✓ The active constituents of a plant drug are of the same general chemical type, similar solubility characteristics, and can be simultaneously extracted with a single solvent or a single solvent mixture.

✓ The process of extraction requires that the solvent system **penetration ability into the cellular material to dissolve the desired ingredients with minimum of undesired material.**

✓ The process of liquid movement through the crude drug is **Diffusion controlled.**

✓ **Rate of penetration** by diffusion of the solvent is enhanced by;

1- increasing the exposure surface area by comminution

2- agitation & replacement the solvent

3-Pre-soaking the dried cellular material

4-Increasing the time of exposure to the solvent

✓ *Solvents (menstrum)*

1. Water

- ❑ Although water has a great solvent action on such plant constituents as sugars, gums, starches, coloring principles, and tannins, most of these are not particularly desirable components of an extracted preparation.

❑ Disadvantages of using water as a sole solvent :

First; most active plant constituents are **complex organic chemical** compounds that are **less soluble** in water than in **alcohol**.

Second; water has a **great solvent action** on such plant constituents as sugars, gums, starches, coloring principles, and tannins, most of these are not particularly desirable components of an extracted preparation.

Third; water also tends to extract plant principles that separate upon standing in the extractive, leaving an undesired residue, and

Fourth; unless preserved, aqueous preparations serve as an excellent growth media for molds, yeasts, and bacteria. When water alone is employed as the menstruum, alcohol is frequently added to the extractive or to the final preparation as an antimicrobial preservative

2-Hydroalcoholic mixtures

- ❑ Hydroalcoholic mixtures are the most versatile and the most widely employed menstrua.

- ❑ A hydroalcoholic menstruum generally provides inherent protection against microbial contamination and helps to prevent the separation of extracted material on standing.

3-Alcohol

- ❑ is used alone as a menstruum only when necessary because it is more expensive than hydroalcoholic mixtures.

3- Glycerin

- ❑ Is a good solvent for many plant substances,
- ❑ Its occasionally employed as a cosolvent with water or alcoholic menstrua because of its ability to extract and then prevent inert materials from precipitating upon standing so it has especial usefulness in preventing separation of tannin and tannin oxidation products in extractives.
- ❑ Because glycerin has preservative action, depending on its concentration in the final product, it may contribute to the stability of a pharmaceutical extractive.

Extraction Methods for Preparing Solutions

- ❑ The principal methods of drug extraction are *maceration* and *percolation*.

- ❑ Generally, the method of extraction selected for a given drug depends on several factors:
 - 1/ the nature of the crude drug,
 - 2/ its adaptability to each of the various extraction methods, and
 - 3/ the interest in obtaining complete or nearly complete extraction of the drug.

- ❑ Frequently, a combination of maceration and percolation is actually employed in the extraction. The drug is macerated first to soften the plant tissues and to dissolve much of the active constituents, and percolation separates the extractive from the marc.

Maceration



1- Maceration: (*Latin macerare, meaning to soak*)

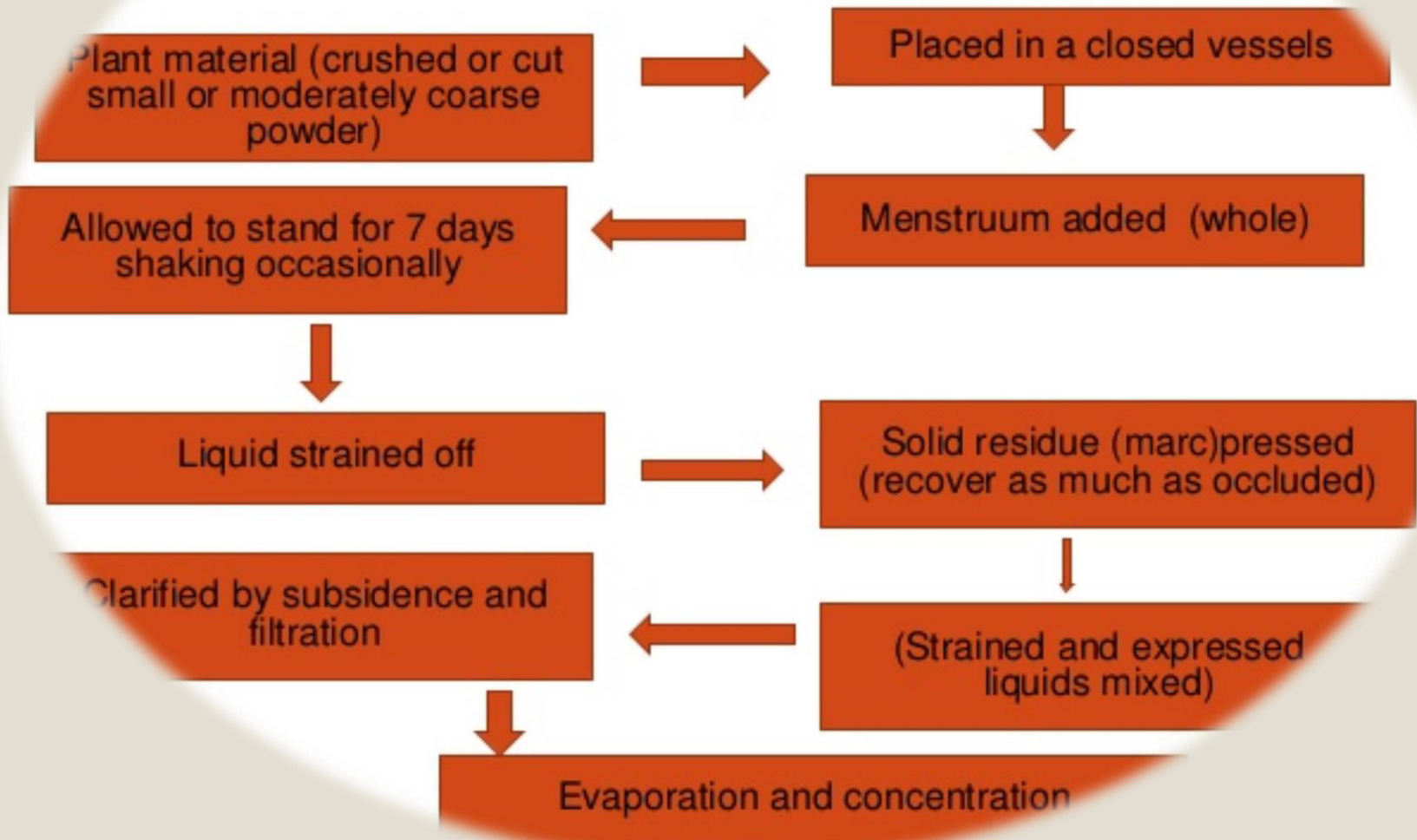
A process in which the comminuted drug is permitted to soak in the menstruum with or without application of heat until the cellular structure is softened & penetrated by the menstruum & the soluble constituents are dissolved.

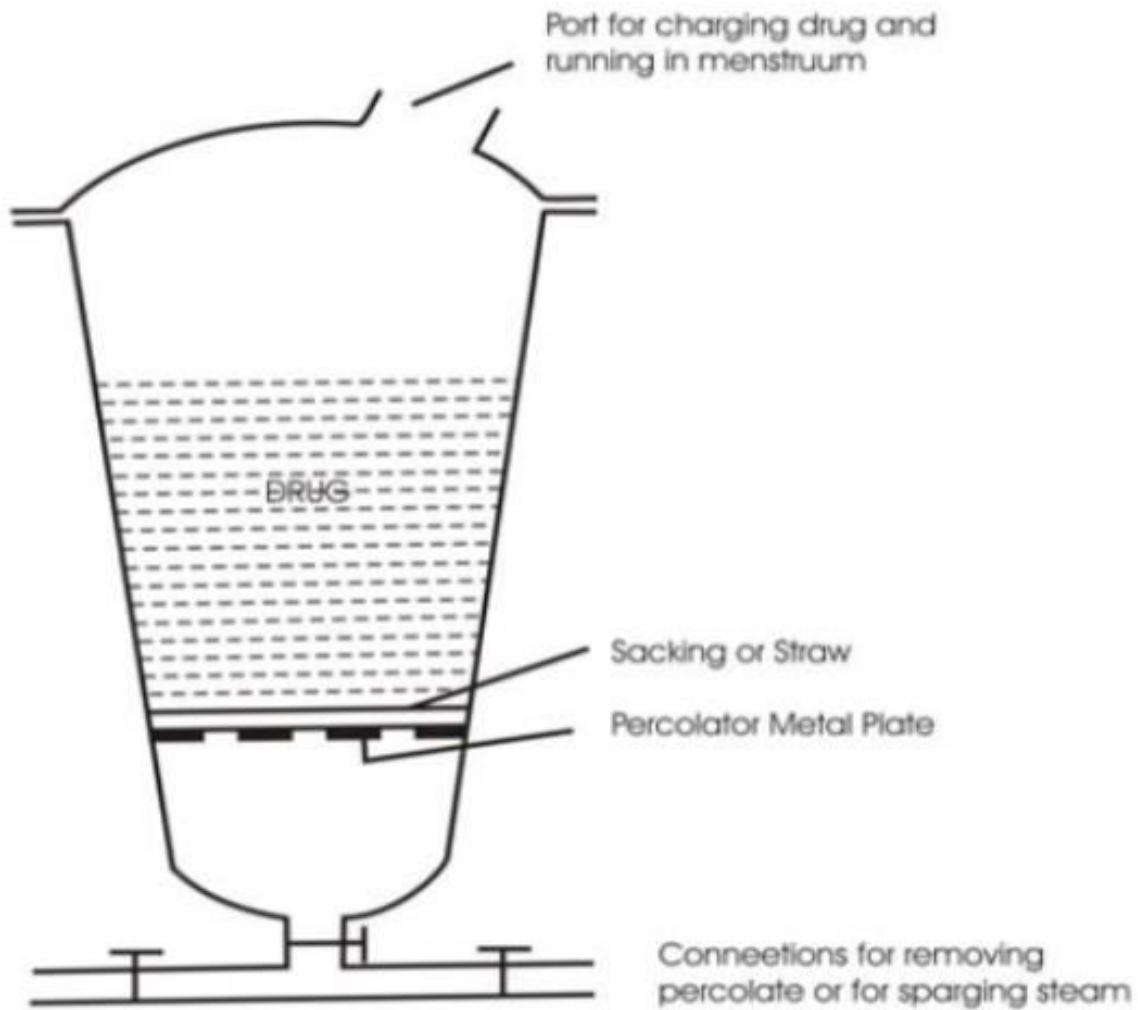
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- ❑ The extractive is separated from the marc by expressing the bag of drug & washing it with additional fresh menstruum, the washings being added to the extractive.

□ If the maceration is performed with the drug loose, the marc may be removed by straining and /or filtration, with the marc being washed free of extractive by the additional passage of menstruum through the strainer or filter into the total extractive.

Maceration





Commercial scale (about 1 ton capacity) percolator

2- Percolation (Latin per, meaning through, and colare, meaning to strain)

A process in which a comminuted drug is extracted of its soluble constituents by the slow passage of a suitable solvent through a column of the drug. The drug is packed in a special extraction apparatus termed a percolator, with the collected extractive called the percolate.

The cylindrical percolator is particularly suited to the complete extraction of drugs with a minimal expenditure of menstruum. By the passage of the menstruum over the drug contained in a high, narrow column (rather than in a lower, wider column), each drug particle is more repeatedly exposed to the passing solvent.

❑ Percolation Advantages

- 1- Extract principles exhaustively with a minimum solvent.
- 2- Easier to bring a product to proper volume by adding solvent than by removing excess solvent

❑ Improving percolation

Fluidextracts

✓ Are liquid preparations of vegetable drugs prepared by percolation. They contain alcohol as a solvent, preservative, or both and are made so that each milliliter contains the therapeutic constituents of 1 gm of the standard drug that it represents.

✓ Disadvantages;

1- Because of their concentrated nature, many fluidextracts are considered too potent to be safely self – administered.

2-many fluidextracts are simply too bitter tasting or otherwise unpalatable to be accepted by the patient.

Extracts

- ❑ Are concentrated preparations of vegetable or animal drugs obtained by removal of the active constituents of the respective drugs with suitable menstrua, evaporation of all or nearly all of the solvent, and adjustment of the residual masses or powders to the prescribed standards.

- Extracts are made in three forms:
 - (a) semiliquid extracts or those of a syrupy consistency prepared without the intent of removing all or even most of the menstruum,
 - (b) pilular or solid extracts of a plastic consistency prepared with nearly all of the menstruum removed, and
 - (c) powdered extracts prepared to be dry by the removal of all of the menstruum insofar as is feasible or practical.

- *Packaging and Storage of Extracts*

Must be packaged in wide mouth containers or plastic tubes and closely tight to prevent loss of moisture which would result in its becoming hard and unstable for use

- **Examples:** Belladonna Extract NF; Cascara Sagrada Extract NF and Pure Glycyrrhiza Extract

Resins

- ❑ Natural resins are solids or semisolid exudates from plants or from insects that feed on plants
- ❑ Prepared by percolation using alcohol as menstrum
- ❑ **Podophyllum Resin USP** percolation of the dried rhizome and roots of *Podophyllum peltatum* used as topical caustic

Thanks a lot