

Basics of Phytochemistry

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Definition and Scope

- Phytochemistry is the study of chemicals derived from plants (phytochemicals) and encompasses their biosynthesis, structure, function, and application.
- These compounds include alkaloids, flavonoids, terpenoids, phenolics, saponins, and glycosides, among others.

Importance of Phytochemicals

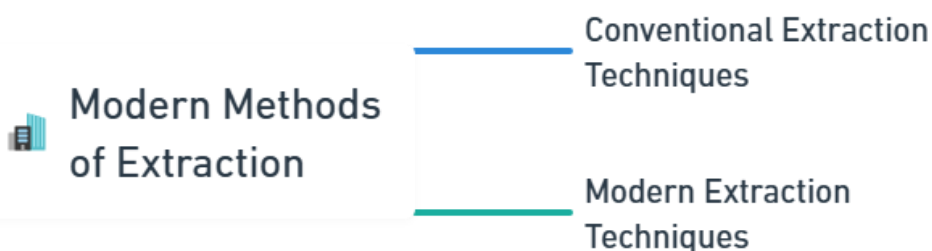
- Medicinal Uses:** Many phytochemicals have therapeutic properties. For example, aspirin was originally derived from salicylic acid found in willow bark.
- Nutritional Value:** Compounds like vitamins and antioxidants contribute to human health.
- Agricultural Applications:** Phytochemicals can be used as natural pesticides or growth promoters.
- Industrial Uses:** They serve as natural dyes, fragrances, and in the synthesis of various materials.

Biosynthesis of Phytochemicals

- Plants synthesize phytochemicals through primary and secondary metabolic pathways.
- Primary metabolites are essential for growth and development, while secondary metabolites often play roles in defense, signaling, and interaction with the environment.

Modern Methods of Extraction

- Extraction is the first crucial step in phytochemical analysis, aiming to isolate bioactive compounds from plant material.
- Modern extraction methods focus on improving efficiency, reducing solvent usage, and preserving compound integrity.



Conventional Extraction Techniques

- Conventional methods have been used for a long time and rely primarily on heat and solvent use to extract bioactive compounds.

- These methods are widely accepted due to their simplicity, but they often require longer extraction times and large amounts of solvents.



1. Maceration

- Maceration is a simple extraction technique where the plant material is soaked in a solvent for a specified period to dissolve bioactive compounds.

Construction & Apparatus:

- A container (glass or stainless steel vessel) with a wide mouth.
- Solvent (such as ethanol, methanol, or water).
- Filtration apparatus (such as filter paper or a mesh strainer).

Procedure/Working:

1. The plant material is finely powdered or cut into small pieces to increase the surface area.
2. The material is soaked in an appropriate solvent (like ethanol or water).
3. The mixture is kept at room temperature for 1–3 days, stirred occasionally.
4. The liquid extract is filtered to separate the solvent from the plant residue.
5. The solvent is evaporated to obtain the concentrated extract.

Advantages:

- Simple, cost-effective, and does not require special equipment.

Disadvantages:

- Slow, requires large amounts of solvent, and has low efficiency.

2. Percolation

- Percolation is a continuous process where fresh solvent passes through a column packed with plant material to ensure efficient extraction.

Construction & Apparatus:

- Percolator (a cylindrical vessel with a perforated bottom).
- Solvent (ethanol, methanol, or water).
- Collection flask to gather the extract.

Procedure/Working:



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