

Extraction

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Definition

- Extraction is a separation process that involves removing active constituents or desired compounds from raw materials (usually plant or biological sources) using a suitable solvent.
- It is commonly used in pharmaceuticals, chemistry, and herbal drug preparation to isolate bioactive compounds.

Classification

Extraction can be classified based on different criteria:

A. Based on the Principle:

- Solid-Liquid Extraction (e.g., herbal extraction)
- Liquid-Liquid Extraction (e.g., separating compounds between two immiscible liquids)
- Supercritical Fluid Extraction

B. Based on the Process:

- Batch Extraction
- Continuous Extraction

C. Based on Temperature:

- Cold Extraction
- Hot Extraction

Methods of Extraction

Some commonly used methods include:

1. Maceration:

- Soaking plant material in a solvent at room temperature.
- Simple but slow process.

2. Percolation:

- Solvent continuously passes through a column packed with the drug.
- More efficient than maceration.

3. Soxhlet Extraction:

- Uses a reflux system where the solvent is repeatedly evaporated and condensed.

- Ideal for exhaustive extraction.

4. Supercritical Fluid Extraction:

- Uses supercritical CO₂ as a solvent under specific temperature and pressure.
- Efficient and environmentally friendly.

5. Ultrasound-Assisted Extraction (UAE):

- Ultrasonic waves increase penetration of solvent into plant cells.
- Faster and more efficient.

6. Microwave-Assisted Extraction (MAE):

- Uses microwave energy to heat the solvent and sample, speeding up extraction.
- Reduces solvent usage and time.

Applications

1. Pharmaceutical Industry:

- Extraction of alkaloids, glycosides, essential oils, and other bioactive compounds from plants.

2. Food Industry:

- Extraction of flavors, colors, and nutritional components.

3. Cosmetics:

- Obtaining natural fragrances and skin-care activities.

4. Environmental Science:

- Isolation of pollutants from water or soil samples.

5. Chemical Industry:

- Purification and isolation of fine chemicals and intermediates.



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