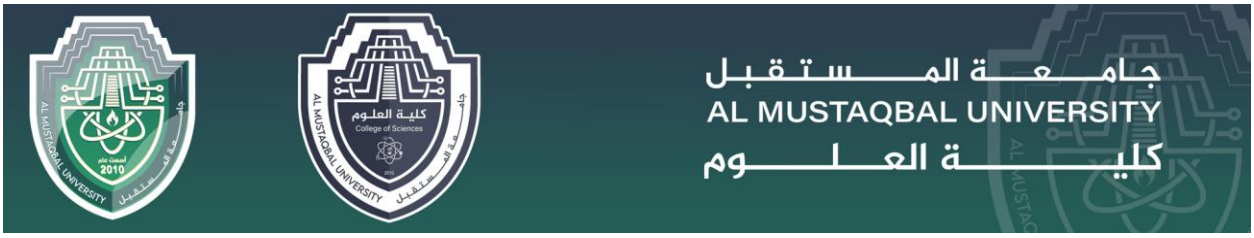

Organic Chemistry Laboratory Experiment

2nd stage

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Lecture 3: Extraction

Department of Bio Chemistry

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Theory

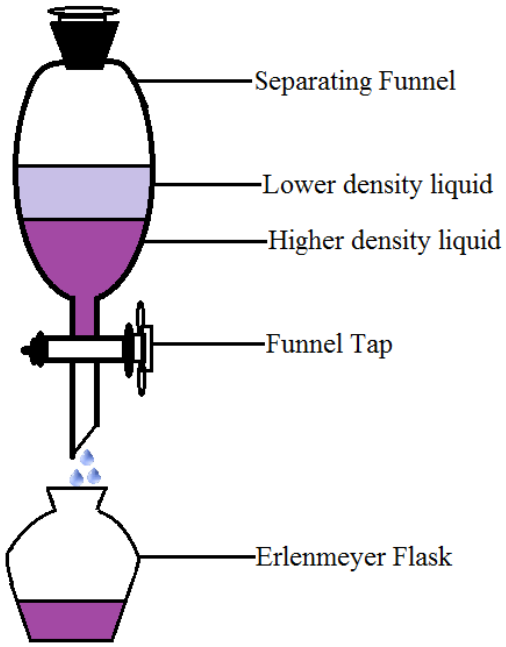
Extraction in organic chemistry is a separation technique used to isolate a compound by transferring it from one phase (solid or liquid) to another, based on differences in solubility. Common methods include liquid-liquid extraction, which separates based on solubility in two immiscible solvents (like water and an organic solvent), and acid-base extraction, which uses acid-base reactions to transfer ionic compounds between phases. Another type is solid-liquid extraction, where a liquid solvent extracts a solute from a solid.

Common types of extraction

1.Liquid-liquid extraction:

A solute is transferred from one liquid solvent to another immiscible solvent.

Liquid-liquid Extraction



2. **Acid-base extraction**:

A specific type of liquid-liquid extraction that uses acid-base chemistry to move compounds between phases.

3. Solid-liquid extraction:

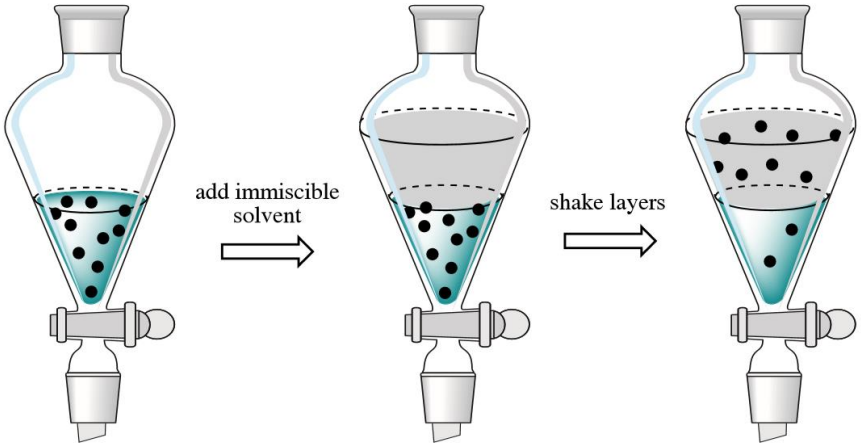
A liquid solvent is used to dissolve and extract a solute from a solid mixture.

Apparatus and materials

- Coffee powder (or tea leaves)
- Beaker (100 mL)
- Filter paper and funnel
- Separatory funnel (or a test tube for simple extraction)
- Solvent (e.g., dichloromethane or ethyl acetate)
- Hot water bath or heater
- Stirring rod
- Evaporating dish or watch glass

Procedure

1. Put 5 grams of coffee powder in a beaker.
2. Add 50 mL of hot water to the beaker and stir for 5 minutes.
3. Filter the solution using filter paper and a funnel.
4. Pour the filtered liquid into a separatory funnel.
5. Add the same amount (about 50 mL) of organic solvent to the separatory funnel.
6. Shake the funnel gently for 2-3 minutes, then wait for the two layers to separate.
7. Drain the bottom layer (organic layer with caffeine) into a clean container.
8. Repeat the extraction two more times to get more caffeine.
9. Put all the organic layers together in an evaporating dish.
10. Heat gently in a water bath to evaporate the solvent and leave behind solid caffeine.



Discussion

1. Why is an organic solvent used to extract caffeine from the aqueous solution?
2. Why do we use hot water to first dissolve the caffeine?
3. What properties of caffeine allow it to be extracted this way?
4. What safety precautions should be taken when handling organic solvents?