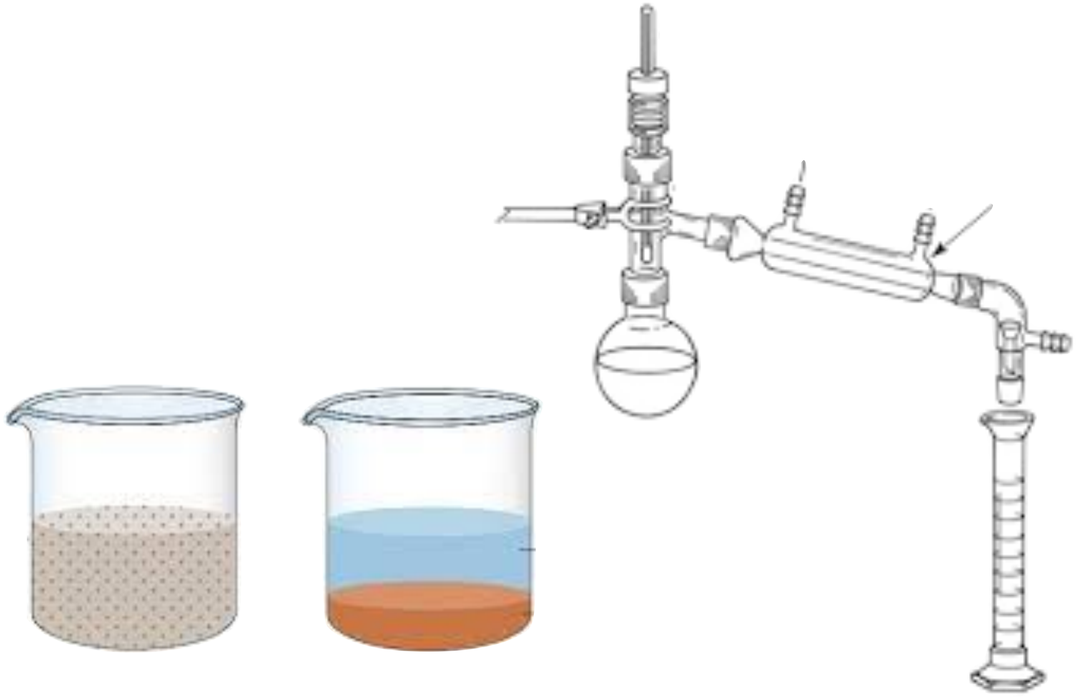
Separation of Organic Compounds

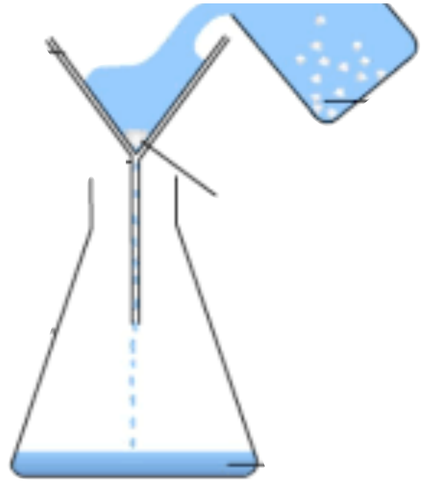
Advance Chemistry Lab 2

Assist. Lect. Zahra A. Ismail

The separation of organic compounds is a fundamental aspect of chemical processes, aiming to isolate and purify individual components from complex mixtures.



Among the methods used to separate organic compounds; Distillation, Ion Exchange, Sedimentation, Chromatography and others.



Distillation is a separation process that involves heating a liquid mixture to create vapour and then cooling that vapour to obtain a purified component. The process relies on differences in the boiling points of the components, allowing them to be separated based on their vaporization and condensation characteristics.

The type of distillation can vary based on the specific requirements of the separation. Some common types include:

1. Simple Distillation: Used for separating components with significantly different boiling points.

2. Fractional Distillation: Employed when separating components with closer boiling points, allowing for multiple distillation steps.

3. Steam Distillation: Applied to volatile compounds that decompose at high temperatures, utilizing steam to carry volatile components.

4. Vacuum Distillation: Conducted under reduced pressure to lower the boiling points of components, useful for heat-sensitive substances.

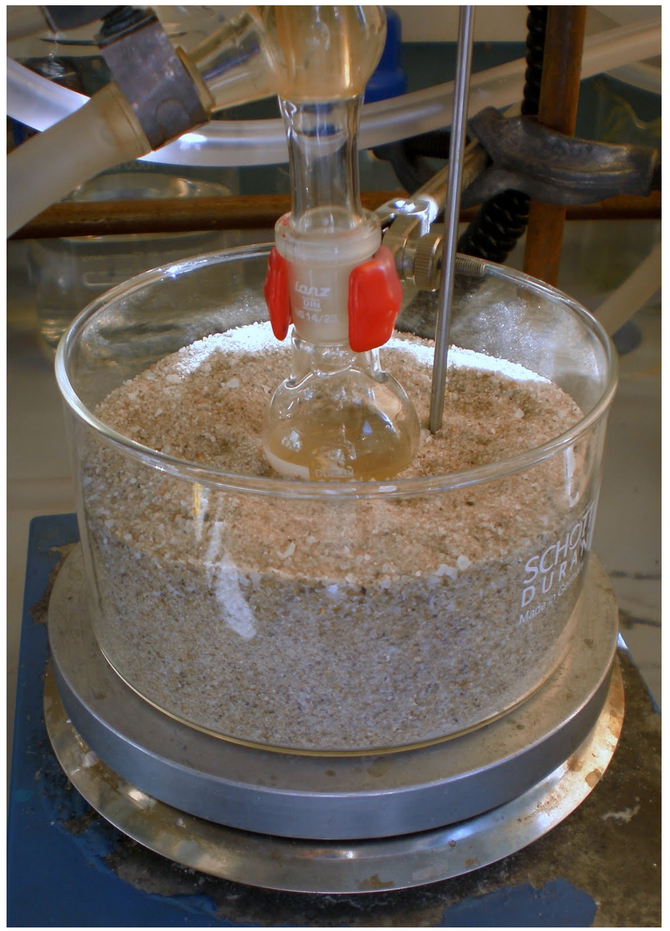
The choice of distillation type depends on the nature of the substances being separated and the desired outcome of the process.

To prevent the temperature of the liquid from rising above the boiling point, place a boiling stone (boiling chips) in the heating pot.

The boiling stone consists mainly of 99.6% molten silica, making it a chemically inert stone. It is characterized by several sharp points aimed at preventing the formation of bubbles.

Water baths are commonly used for temperatures ranging from around room temperature (20-25°C) up to approximately 100°C .

For temperatures above 100°C, alternative methods such as oil baths or sand baths may be more suitable, as water's boiling point limits its use for higher temperature applications.



Tools Used in Simple Distillation Experiment:

Distillation Flask: A conical glass container used to hold the mixture being distilled.

Distillation Column: A column that separates evaporated components based on their different boiling points.

Condenser: A device that cools the evaporated mixture vapor and converts it back into a liquid.

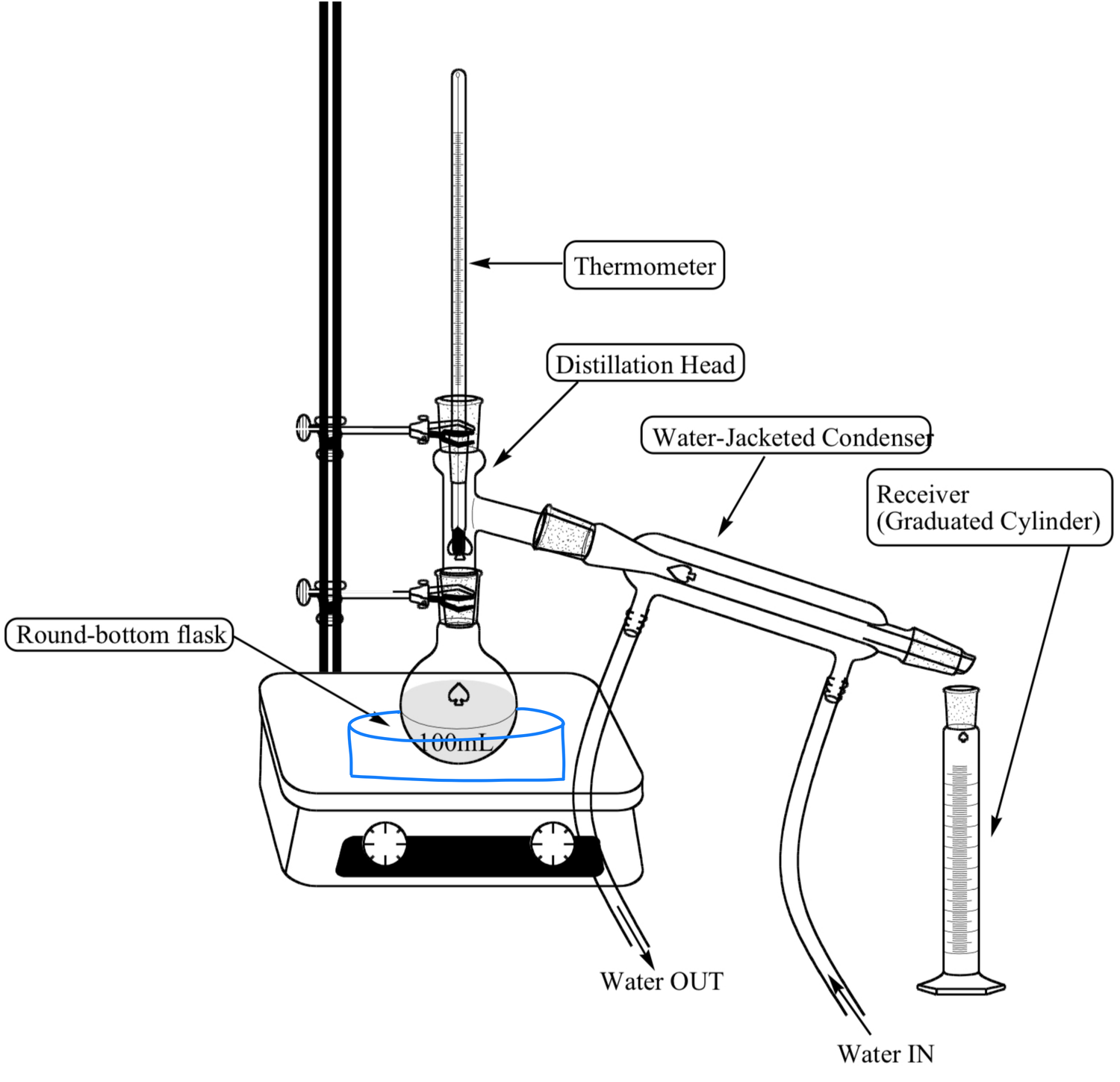
Receiving Flask: A container for collecting the condensed compounds after distillation.

Boiling Stone: A small, heat-resistant particle.

Heat Source (Heater), Thermometer to monitors and controls the temperature during distillation.

Steps in Performing a Simple Distillation Experiment:

- Place an appropriate amount of the mixture in the distillation flask.
- Add a boiling stone to prevent vigorous boiling.
- Gradually heat the solution mixture.
- The solution evaporates, and the vapor rises through the distillation column.
- The vapor passes through the condenser, where it is cooled and converted back to a liquid.
- Collect the condensed component in the receiving flask.
- Record temperatures and observations during the experiment.


Thermometer
Distillation Head
Water-Jacketed Condenser
Receiver
(Graduated Cylinder)
Round-bottom flask
100mL
Water OUT
Water IN