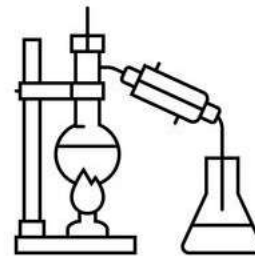


Name _____ Date _____



DISTILLATION QUIZ –Answer Key

1. What is distillation?

Distillation is a separation technique used to separate components within a liquid mixture based on differences in their boiling points.

2. During distillation, the pure liquid that's collected after vaporizing and condensing the mixture being separated is called **Distillate**.

3. Simple distillation can either be used to separate a dissolved **solute** from its solvent or a mixture of two **miscible** liquids with different **boiling points**.

4. State two benefits of using a Liebig condenser instead of a normal delivery tube in a distillation process.

- **More Efficient:** provides efficient cooling of the vapor, which allows it to condense back into liquid form quickly.
- **High Surface Area for Condensation:** The design provides a large surface area for the vapor to come into contact with the cooling water.
- **More Resistant to Thermal Shock:** Made of sturdy borosilicate glass, it is durable and resistant to thermal shock.

5. What's the difference between simple distillation and fractional distillation?

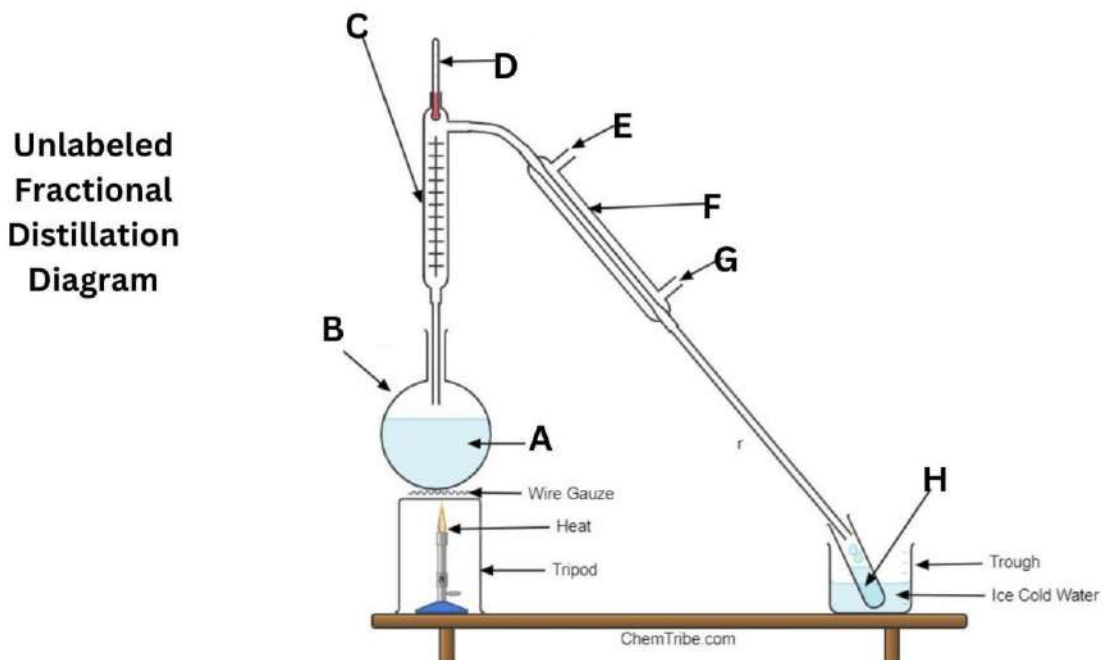
- **Simple distillation is used to separate components with large differences in boiling points (more than 40°C).**
- **Fractional distillation is more efficient than simple distillation and is used to separate components with smaller differences in boiling points (less than 40°C), or when higher purity is required.**

6. State two uses of distillation in real life.

- **Water purification**
- **Petroleum refining**
- **Production of oxygen and nitrogen from atmospheric air**
- **Recycling of oil**
- **Pharmaceutical manufacturing**
- **Food processing**
- **Alcohol production**

See explanations here: <https://chemtribe.com/applications-of-distillation/>

7. The figure below shows a fractional distillation step-up. Use it to answer the questions below:



- a. Identify the apparatus labeled:

B: **Distillation Flask**

C: **Fractionating column**

D: **Thermometer**

F: **Liebig Condenser**

- b. What is the roles of the apparatus labelled:

C: **Enhances separation efficiency by facilitating multiple vaporization-condensation cycles.**

D: **Monitors and regulates the temperature during distillation**

F: **Condenses the vaporized components back into liquid form.**

c. Why are glass beads added to the apparatus labeled C?

To provide a large surface area over which vapor condenses before passing into the condenser.

d. Why are boiling stones sometimes added to the mixture labeled A?

To ensure smooth boiling without bumping or splashing.

e. Why is it always recommended to have water inlet at point G instead of E?

To cool the vapor efficiently based on the counter-flow principle. Find more comprehensive explanation here: <https://chemtribe.com/distillation/>

f. What happens when the flow of water between points G and E is reversed?

Condensation would be less efficient.

g. During the separation of an ethanol and water mixture, a chemist proposed that the efficiency of separation could be improved by increasing the length of apparatus C. Is it true? Explain

True. The vapors of the components would take longer to reach the top of the column, which maximizes the condensation of the less volatile component. The net effect is improved separation efficiency.

h. State two limitations of fractional distillation as a separation method in chemistry.

- **Less effective when separating components with boiling points that are very close together.**
- **May not COMPLETELY separate the components of a mixture, causing some overlap or contamination between components.**
- **Mixtures that undergo chemical reactions during heating may not be effectively separated**

Find more comprehensive explanation here: <https://chemtribe.com/distillation/>