



Answer all the questions below as fully as you can then check your answers

1. What is the purpose of fractional distillation?

- a) To separate a solid from a liquid
- b) To separate a mixture of liquids with different boiling points
- c) To separate a dissolved solid from a solution
- d) To speed up evaporation

2. What is the role of the Liebig condenser in distillation?

- a) To heat the liquid mixture
- b) To cool the vapour and condense it back into a liquid
- c) To collect the different liquids
- d) To prevent bumping

3. What is the purpose of anti-bumping granules?

- a) To increase the boiling point of the liquids
- b) To ensure smooth boiling and prevent bumping
- c) To speed up the condensation process
- d) To act as a catalyst

4. Describe what happens to the acetone vapour as it travels up the fractionating column.

a. Why is a fractionating column used in the separation of liquids with close boiling points?

b. Explain the difference between simple distillation and fractional distillation.

c. What would happen if you forgot to add anti-bumping granules to the round-bottomed flask?

d. In fractional distillation, which liquid will be collected first – the one with the lowest or highest boiling point?

5. You have a mixture of water, ethanol, and propanol (boiling point 97°C). Describe the steps you would take to separate these liquids using fractional distillation.

6. You need to obtain pure water from a saltwater solution. Would you use simple distillation or fractional distillation? Explain your choice.

7. A student is asked to separate a mixture of two liquids, A (boiling point 60°C) and B (boiling point 95°C). Describe the apparatus she would use and explain how the separation works.

8. Explain why it is important to control the temperature during fractional distillation.

True or False Questions:

a. Simple distillation is used to separate a mixture of liquids.

b. The thermometer in a distillation setup should be placed in the liquid being heated.

Answers

1. What is the purpose of fractional distillation?

- a) To separate a solid from a liquid
- b) To separate a mixture of liquids with different boiling points
- c) To separate a dissolved solid from a solution
- d) To speed up evaporation

Answer: b) To separate a mixture of liquids with different boiling points

2. What is the role of the Liebig condenser in distillation?

- a) To heat the liquid mixture
- b) To cool the vapour and condense it back into a liquid
- c) To collect the different liquids
- d) To prevent bumping

Answer: c) To cool the evaporated vapour and condense it back into a liquid

3. What is the purpose of anti-bumping granules?

- a) To increase the boiling point of the liquids
- b) To ensure smooth boiling and prevent bumping
- c) To speed up the condensation process
- d) To act as a catalyst

Answer :b) To ensure smooth boiling and prevent bumping

4. Describe what happens to the acetone vapour as it travels up the fractionating column.

Answer: It cools and condenses back into liquid acetone when it reaches a part of the column that is below its boiling point (56°C).

a. Why is a fractionating column used in the separation of liquids with close boiling points?

Answer: The fractionating column provides a large surface area (e.g., with glass beads) that allows for repeated vaporisation and condensation. This process helps to separate liquids with similar boiling points more effectively.

b. Explain the difference between simple distillation and fractional distillation.

Answer: Simple distillation is used to separate a liquid from a solution (e.g., water from saltwater). Fractional distillation is used to separate a mixture of liquids with different boiling points. Fractional distillation uses a fractionating column, whereas simple distillation does not.

c. What would happen if you forgot to add anti-bumping granules to the round-bottomed flask?

Answer: The liquid could boil unevenly, causing bumping and potentially splashing the liquid out of the flask.

d. In fractional distillation, which liquid will be collected first – the one with the lowest or highest boiling point?

Answer: The liquid with the lowest boiling point.

5. You have a mixture of water, ethanol, and propanol (boiling point 97°C). Describe the steps you would take to separate these liquids using fractional distillation.

Answer:

- Set up the fractional distillation apparatus.
- Heat the mixture gently.
- The propanol (lowest boiling point) will vaporize first, condense in the condenser, and be collected.
- Increase the temperature slightly to collect the ethanol.
- Finally, increase the temperature again to collect the water.

6. You need to obtain pure water from a saltwater solution. Would you use simple distillation or fractional distillation? Explain your choice.

Answer: Simple distillation. Since you are separating a liquid (water) from a dissolved solid (salt), a fractionating column is not necessary.

7. A student is asked to separate a mixture of two liquids, A (boiling point 60°C) and B (boiling point 95°C). Describe the apparatus she would use and explain how the separation works.

Answer: The student should use fractional distillation apparatus. The mixture is heated. Vapour from liquid A (lower boiling point) will reach the top of the fractionating column first, condense, and be collected. As the temperature increases, vapour from liquid B will then reach the top, condense and be collected. The fractionating column allows for a better separation of liquids with close boiling points. The Liebig condenser cools the vapours so they condense back into liquids.

8. Explain why it is important to control the temperature during fractional distillation.

Answer: Controlling the temperature allows for the selective vaporisation and condensation of each liquid component. By maintaining the temperature close to the boiling point of each liquid, you can ensure that only that liquid vaporises and is collected, leading to a better separation.

True or False Questions:

9. Simple distillation is used to separate a mixture of liquids.

Answer: False. It is used to separate a liquid from a solution.

b. The thermometer in a distillation setup should be placed in the liquid being heated.

Answer: False. It should be placed at the junction between the fractionating column (or round-bottomed flask in simple distillation) and the condenser to measure the temperature of the vapour.