



Evaporation

Topic Summary

- Evaporation explained – Some particles in a liquid have enough energy to escape into the gas state, even below boiling point. Chemists use this to separate a dissolved solid from a solution.
- Evaporation vs. boiling – Evaporation is gradual, only a few particles have enough energy to transition to the gas state, it happens at the surface, it happens at all temperatures where a substance is in the liquid state; boiling is rapid, with all particles gaining enough energy to enter the gas state, bubbles (of the gas state) form throughout the liquid.
- Evaporation is used to obtain the dissolved solid from a solution
- Lab method for GCSE – Place the solution in an evaporating basin, heat it gently in a water bath (85–95 °C for water), stop when crystals start forming, and let the rest evaporate at room temperature.
- Why it matters – Controlled evaporation prevents splashing (loss), thermal decomposition or other reactions (such as oxidation) of the solid. Slower final stages of evaporation allows slow crystal growth for larger (and purer) crystals.
- Beyond GCSE – Modern labs often use hot plates, fume cupboards, or rotary evaporators to work with different solvents safely and efficiently.



Quick Checks to Build Recall

1. Which mixture would evaporation help you to separate?

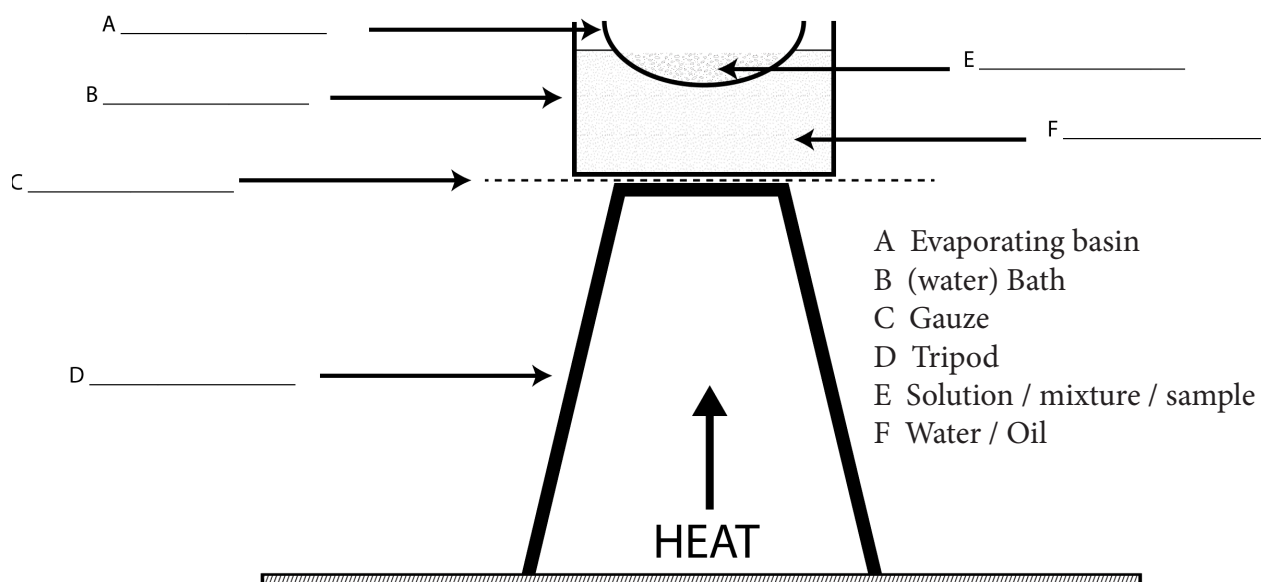
Oil from oil and water

Salt from salty water

Water from salty water

(1 mark)

2. Label this diagram of the equipment needed for evaporation in the laboratory. (3 marks)



3. Which of these terms apply to evaporation but NOT boiling (2 marks)

Happens at any temperature where the substance is a liquid, is gradual.



Evaporation - Page 2



Exam Style Questions

1. Describe how a student could obtain large crystals of copper sulphate from a solution of copper sulphate and water. (4 marks)

Marking Points

- Use evaporating basin and heat source (may also use water bath)
 - Heat to a gentle boil / simmer / 85-95 °C
 - Heat until only a small amount of water remains / small crystals start to form
 - Remove from heat and allow final part of water to evaporate at / near room temperature
 - Wash crystals with (ice cold) (distilled) water
- (1 mark each, maximum 4 marks)

2. A student is asked to evaporate some acetone from a mixture. Acetone is highly flammable and its vapours can be harmful to humans. Give two improvements to the method used to evaporate water to keep the student safe while carrying out this experiment.

DO NOT use a Bunsen burner / USE a hotplate to heat instead.

[use water/oil bath is not sufficient]

Use a fume cupboard / extraction / good ventilation / solvent rated face mask*

(*if no other option is available)



Do this later...

Give your brain a break and come back to these questions later. Cover the rest of the sheet while you have a go. By doing this 24-48 hours after watching the video you will boost your chances of remembering the key points in an exam. If you struggle with these questions, re-watch the video and then try again.

1. Draw a fully labelled diagram of the equipment required to carry out evaporation in the lab.
2. What are the advantages of slowly evaporating the final bit of solvent from the sample?
Better crystals, less losses, less potential decomposition / oxidation / harm to sample
3. Why would a hotplate be better than a Bunsen burner if the solvent was ethanol instead of water?
Lower fire risk due to ethanol being flammable
4. Why might a student choose to evaporate a solvent other than water in a fume cupboard rather than at the bench?
Solvent vapour may be harmful if breathed in.