Chapter 3: Water

Challenge 3.1A: Three states of water

Experiment worksheet answers (pages 48–49 and 184)

Questions

1 Did you manage to have ice and boiling water in the same test tube? Explain how this could happen.

The water in the base of the test tube will heat first. If water is heated fast enough, the water at the base of the test tube will boil (become a gas) while ice remains at the top of the test tube.

Challenge 3.1B: Ice cube necklace

Experiment worksheet answers (pages 48–49 and 184)

Questions

1 Is the ice a solid, a liquid or a gas? Provide evidence to support your reasoning.

The ice is a solid. The water has solidified and holds its shape.

2 The salt lowers the freezing point of the ice for a short time, before it refreezes. Define:

a melting

Melting is when a solid (ice) changes to a liquid as its temperature increases and reaches its melting point.

b freezing.

Freezing is when a liquid (water) turns into a solid (ice) as its temperature lowers below its freezing point.

Experiment 3.2: What if the temperature were increased in the water cycle?

Experiment worksheet answers (pages 50–51 and 185)

Discussion

1 Describe the movement of the water as it continues to collect on the plastic wrap.

Student answers will vary. They should reflect on the condensation of water molecules on the plastic wrap, and the way the droplets move down the wrap to the centre, before dropping into the bowl as clean water.

2 Can any of the water escape from your mini water cycle model? How does this compare with the actual water cycle?

If the plastic wrap is sealed tight, then no water vapour will be able to escape. This is unlike the water cycle where minute amounts of water can escape into space over long geological periods of time. As small amounts of water can be reintroduced to the water cycle through volcanic eruptions, the average amount of water in a water cycle does not change.

3 Give reasons why your model is or is not an accurate representation of the real water cycle.

The water cycle only shows two phases of water (liquid and water vapour), and does not show any solid water (ice).

4 Describe any modifications that you could make to improve the design of your water cycle model.

Student answers will vary.

Conclusion

What do you know about the water cycle?

Student answers will vary. They should reflect on the different phases of water and how water (like all matter) is recycled.

Challenge 3.4: Can you reduce the evaporation of water in irrigation channels?

Experiment worksheet answers (pages 54–55 and 186)

Processing, analysing and evaluating

Student responses for this challenge will vary based on their own planning and evaluation of their experiment design.

Communicating

Present your investigation in a formal experimental report.

Student responses will vary, but posters should include consideration of their aim, equipment, method, evaluation of their method, and conclusion.