Experiment worksheet

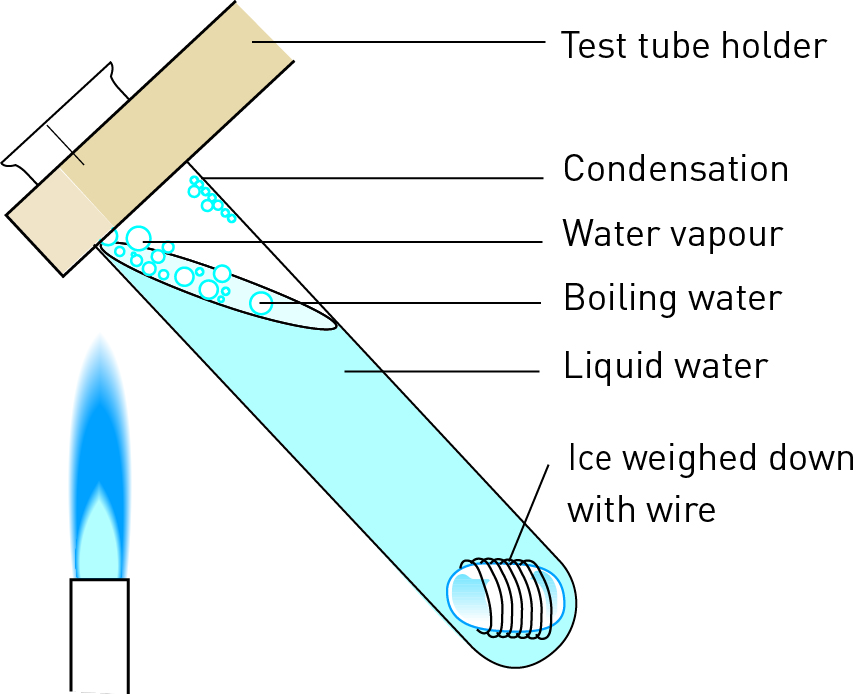
3.1 Water can change state

Pages 48–49 and 184

Challenge 3.1A: Three states of water

What you need:

large test tube, tap water, Bunsen burner, heatproof mat, wooden test tube holders, ice cube, copper wire (approximately 8–10 cm long), pliers

What to do:

1 Collect an ice cube that will fit into a test tube.

2 Wrap copper wire around the ice cube so that it will sink in the water.

3 Pour tap water into the test tube until it is one-third full. Drop the ice cube with the wire around it into the water.

4 Gently heat the water at the top of the test tube. (With the ice cube in it, the test tube should be half to two-thirds full.)

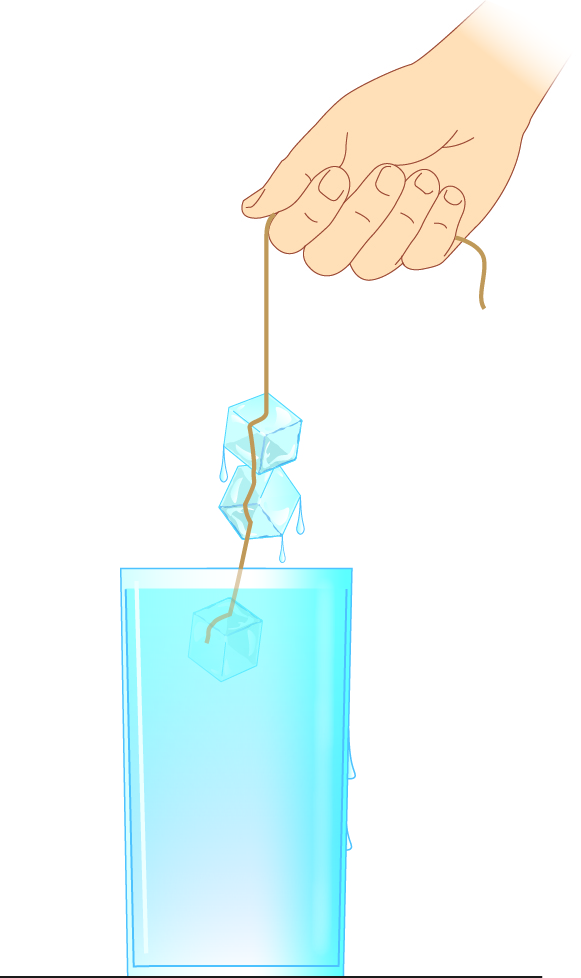
Question:

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

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3.1 Water can change state

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Challenge 3.1B: Ice cube necklace

What you need:

some ice cubes, a glass of water, a piece of cotton string, salt

What to do:

1 Float a few ice cubes in a glass of water.

2 Wet a piece of cotton string with water. Lay the string on top of the ice cubes.

3 Sprinkle salt over the string and wait approximately 10 seconds.

4 Now lift the string and the ice cubes will be stuck to it. You’ve just made a cool ice cube necklace!

Questions:

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

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

a melting

b freezing.

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3.2 Water cycles through the environment

Pages 50–51 and 185

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

Aim

To design and create a model of the water cycle.

Materials

• Large clear plastic bowl

• Plastic wrap

• Small weight

• Smaller container, such as the bottom half of a yoghurt pot

• Water

• Large elastic band or string and tape

Method

1 Place the small container in the middle of the large clear bowl.

2 Pour a little water into the large bowl, being careful not to get any in the small container.

3 Cover the bowl with plastic wrap and fix the plastic wrap to the rim of the bowl with either a rubber band or a tight piece of string.

4 Put a small weight on top of the plastic wrap in the centre so that it hangs over, but does not touch, the smaller container.

5 You have now created a portable water cycle. Place your water cycle in partial shade under a tree. Record the time it takes for water to appear in the small container for each model. Record your observations too.

Inquiry: What if the temperature was hotter in the water cycle?

1 Write a hypothesis for your investigation.

2 What (independent) variable will you need to change to test your hypothesis?

3 What (dependent) variable will you measure and/or observe?

4 Name three variables you will keep the same or control.

Results

Record your measurements in a table in the space provided.

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| --- |
|  |

Discussion

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

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

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

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

Conclusion

What do you know about the water cycle?

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3.4 Human management affects the water cycle

Pages 54–55 and 186

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

Design brief

The Mulwala Canal in the River Murray region of NSW discharges approximately 9000 million litres of water a day. Over 700 000 hectares of land is irrigated from 2880 km of channels in the area.

These open channels allow a lot of water to evaporate before a single drop reaches the plants. Prepare a report that describes a cost-effective way to prevent the loss of water from the irrigation channels.

Criteria restrictions

1 All materials must be available in Australia.

2 All prices must be in Australian dollars.

Questioning and predicting

1 Research the average width of the channels.

2 What materials could you use to replace 1 metre of channel?

3 How much would it cost for this material?

4 Is there a cheaper material that could do the same job?

5 What is the cost of the materials for a 1 km length of channel?

6 How much would it cost for 2880km of channels?

Processing, analysing and evaluating

1 How did the cost of your design compare with that of other students’ designs?

2 Describe one feature of your design that was an improvement on other students’ designs.

3 If you were doing this experiment again, what feature would you change? Explain.

Communicating

Present the various stages of your investigation in a formal experimental report.