Changes of State (H)

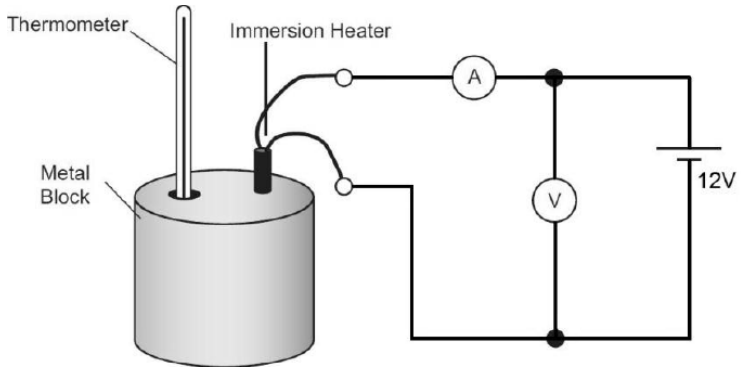
1. A student investigates what happens when she heats a beaker of water.

	The temperature increases	The state changes	The energy stored in the water changes
A	✓	✓	✓
B	✓	***x***	***x***
C	*x*	✓	***x***
D	***x***	***x***	✓

Which row in the table describes what **could** happen when the water is heated?

Your answer ☐ **[1]**

2 (a). A student completes an experiment to find the specific heat capacity of a metal.



i. The student takes voltage and current measurements.

Suggest **three** other measurements they need to take?

--- **[3]**

ii. Describe how these measurements could be used to determine the specific heat capacity of the metal.

--- **[2]**

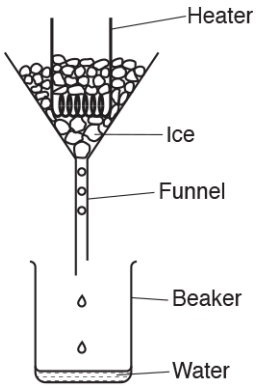
(b). The value obtained from the experiment is much higher than expected.

Suggest **two** reasons how this could have occurred and **two** improvements to the experimental procedure.

[4]

3 (a). Two students design an experiment to find the specific latent heat of water.

They set up their equipment as shown in the diagram.



The students also have access to a power supply, a voltmeter, an ammeter, a stop-clock and a top-pan balance.

* Explain how the students could use this equipment to determine an accurate value for the specific latent heat of water.

[6]

(b). The students find that 250 g of ice takes 95 kJ of energy to change state.

Calculate the specific latent heat.

Answer = ... J/kg **[3]**

4(a). A student puts an ice cube into a beaker. The mass of the ice cube is 40 g.

The ice cube melts.

i. Write down the mass of the water produced.

Mass = ... g **[1]**

ii. Explain your answer to **(i)**.

_____

_____

_____ **[2]**

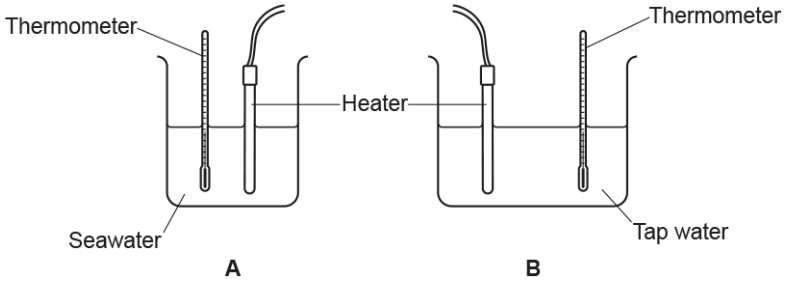
(b). Describe **one** difference between a **physical change** and a **chemical change**.

_____

_____ **[1]**

(c). A student does an experiment to find the difference between the specific heat capacities of seawater and tap water.

The student places a heater and a thermometer into two beakers, **A** and **B**. Look at the diagram.



i. There are 5 steps to the method for this experiment.

Complete the missing steps for this method.

Step 1 – Put seawater into beaker and tap water into beaker .

Step 2 – _____

Step 3 – _____

Step 4 – _____

Step 5 – Calculate the temperature change of beaker and beaker .

[3]

ii. Suggest **one** mistake the student made when choosing their equipment.

_____ **[1]**

iii. Suggest **two** improvements to the method followed.

1 _____

2 _____

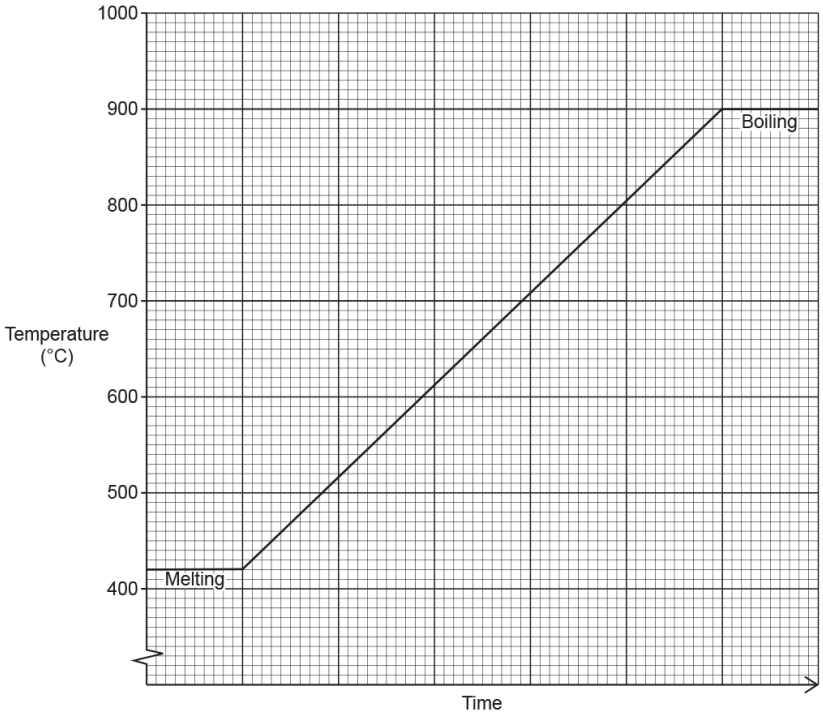
[2]

5 (a). The table shows the specific heat capacities of different materials.

Material	Specific heat capacity (J / kg °C)
Copper	330
Brass	380
Zinc	385
Nickel	440
Concrete	880
Concrete	913

A scientist heats an unknown substance from a solid to a liquid.

The graph shows how the temperature of the substance varies with time.



The scientist has 2.5 kg of the substance and records that it takes 462 kJ of energy to increase it from the lowest to the highest temperature in the liquid state.

Use the graph to calculate the specific heat capacity of the substance.

Suggest what material it could be from the table.

Specific heat capacity = ... J / kg °C

Material = ...

[5]

(b). Suggest **two** reasons why the scientist cannot be certain that the substance has been identified correctly.

1 _____

_____

_____

2 _____

_____

_____

[2]

6.

i. **Table 21.1** gives some information about a kettle.

Energy transferred to the kettle	525 000 J
Mass of water	1.2 kg
Starting temperature of water	25 °C
Final temperature of water	100 °C
Specific heat capacity of water	4200 J / kg °C

Table 21.1

Calculate the efficiency of the kettle described in **Table 21.1**.

Give your answer as a percentage.

Use an equation from the data sheet.

Efficiency = ... % **[5]**

ii. Explain why the efficiency of the kettle is less than 100%.

_____

_____ **[1]**

END OF QUESTION PAPER