**.** Fig. 4.1 shows apparatus that could be used to measure the specific latent heat of ice.



1. Describe how you would use the apparatus. You may assume that ice at 0 °C and a stopwatch are available. State all the readings that would be needed at each stage.

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1. In an experiment, 120 g of ice at 0 °C is to be melted. The specific latent heat of ice is 340 J/g. Assume that all the energy from the heater will be used to melt the ice.

Calculate the expected time for which the 60 W heater is switched on.

 Expected Time = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [

1. When the experiment is carried out, the ice melts in slightly less time than the expected time.
2. State one reason why this happens.

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1. Suggest one modification to the experiment that would reduce the difference between the experimental time and the expected time.

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2. (a) (i) In the space below, draw a labelled diagram of the structure of a thermocouple

thermometer. Include the device from which a reading is taken.

(ii) A thermocouple thermometer is used to measure the temperature of the flame of a small

candle.

State **two** reasons why the thermocouple thermometer is suitable for this application.

1. .......................................................................................................................................

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2. .......................................................................................................................................

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(b) State and explain any effect on the sensitivity of a liquid-in-glass thermometer of:

**(i)** reducing the diameter of the capillary tube

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**(ii)** increasing the volume of the liquid-filled bulb.

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**3. (a)** A student is supplied with a small block of iron, a thermometer and an electrical heater of power *P*.

There are two holes drilled in the iron block. The heater fits tightly into one hole and the student places the thermometer into the other hole.

Fig. 5.1 shows the equipment.



The student uses this equipment when determining the specific heat capacity of iron.

State:

• the other equipment the student will need

• the measurements the student needs to take

• the equation used when calculating the value of the specific heat capacity of iron.

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 **(b)** In the student’s home there is a wood-burning stove, which is also made of iron. The mass of

the wood-burning stove is 85 kg.

**(i)** State what is meant by the *thermal capacity* of an object.

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**(ii)** The specific heat capacity of iron is 460 J / (kg °C).

Calculate the thermal capacity of the wood-burning stove.

thermal capacity = ...........................................................

4. A beaker contains water at room temperature. Fig. 4.1 shows the beaker placed on a tripod above

a Bunsen burner.

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The Bunsen burner is lit and the temperature of the water begins to increase.

**(a)** The water is evaporating.

**(i)** Describe **one** difference between evaporation and boiling.

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 **(ii)** State and explain what happens to the rate at which the water evaporates as its

temperature increases.

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**(b)** After a few minutes, the water reaches its boiling point temperature. The water continues to

gain energy from the Bunsen burner.

**(i)** State what happens to the temperature of the water in the beaker.

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**(ii)** The specific latent heat of vaporisation of water is 2.3 × 106 J / kg. After the water reaches

its boiling point, it takes 12 minutes for 0.095 kg of water to boil away.

Calculate the average rate at which energy is being supplied to the water by heating.

rate of energy supplied = ...........................................................