

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

An electric kettle contains 1.41 kg of water at 25 °C.

The kettle is switched on.

After a while, the water reaches boiling point at 100 °C.

The specific heat capacity of water is 4200 J / kg °C.

- (i) Calculate the amount of thermal energy supplied to the water by the kettle.
Give your answer to the appropriate number of significant figures.

Use an equation selected from the list of equations at the end of the paper.

(3)

energy supplied = J

- (ii) The kettle is kept switched on and the water continues to boil.

After a while, the mass of the water in the kettle has decreased to 1.21 kg.

The thermal energy supplied to the water during this time was 450 000 J.

Calculate the specific latent heat of vaporisation of water.

Use an equation selected from the list of equations at the end of the paper.

(3)

specific latent heat of vaporisation = J/kg

(Total for question = 6 marks)

Q2.

Another student decides to melt some ice.

The student melts 380 g of ice at 0 °C.

The specific latent heat of fusion of ice is 3.34×10^5 J/kg.

Calculate the thermal energy needed to melt the ice.

Select an equation from the list of equations at the end of this paper.

(2)

thermal energy needed = J

(Total for question = 2 marks)

Q3.

The espresso machine shown in Figure 27 is an electrical appliance.



(Source: © tanawaty/123RF)

Figure 27

The espresso machine has an electrical heater connected to a 440 V mains supply.

The power of the electrical heater is 3.5 kW.

(i) The rating of a fuse is the current above which it melts.

Which of these is the most suitable fuse for the espresso machine circuit?

(1)

- ☐ **A** 1 A
- ☐ **B** 5 A
- ☐ **C** 10 A
- ☐ **D** 13 A

(ii) Before the espresso machine can be used, its heater must raise the temperature of some cold water.

The specific heat capacity of water is 4200 J/kg K.

Show that it takes the heater about 90 s to raise the temperature of 1 kg of water from 18°C to 95°C.

Use an equation from the formula sheet.

(3)

(Total for question = 4 marks)

Q4.

Describe an investigation to determine the value for the specific heat capacity of water.

Your answer should include details of

- the apparatus needed
- the experimental procedure
- how the value may be calculated from the measurements taken.

You may draw a diagram to help your answer.

(6)

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(Total for question = 6 marks)