QUANTITY OF HEAT

KCSE QUICK REVISION

Compilation of Possible Questions in Physics Likely to be examined in KCSE.

A Special Analysis of Prediction Questions that may be Tested in KCSE from this Topic in Form 3.

PHYSICS

SERIES 1

For Marking Schemes

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QUANTITY OF HEAT

1. **(**a) Define the term specific heat capacity.

(b) A block of metal of mass 300g at 100^0c is dropped into a logged calorimeter of heat capacity

$40Jk^{-1}$, containing 200g of water at 20^0c. The temperature of the resulting mixture is 34^0c.

(Specific heat capacity of water = $4200Jkg^{-1}k^{-1}$)

Determine:

(i) Heat gained by calorimeter.

(ii) Heat gained by water.

(iii) Heat lost by the metal block.

(iv) Specific heat capacity of the metal block.

2. **(**a) State **two** differences between boiling and evaporation.

(b) 200g of a solid was uniformly heated by a 0.2 kw heater for sometime. The graph in the

figure below shows how the temperature of the solid changed with time

(i) Explain what is happening between **OA** and **AB**.

(ii) Calculate the specific heat capacity of the solid.

(iii) Calculate the specific latent heat of fusion **k** of the solid.

3. (a) Define the term **heat capacity**

(b) A block of metal of mass 150g at 100^oC is dropped into a logged calorimeter of heat capacity $40Jk^{-1}$ containing 100g of water at 25^oC. The temperature of the resulting mixture is 34^oC. (Specific heat capacity of water = 4200J/KgK)

Determine;-

(i) Heat gained by calorimeter

(ii) Heat gained by water

(iii) Heat lost by the metal block

(iv) Specific heat capacity of the metal block

4. **(**a) Distinguish between evaporation and boiling

(b) A jet delivering 0.44g of dry steam per second, at 100^oC is directed on to crushed ice at 0.0^oC contained in an unlagged copper can which has a hole in the base. 4.44g of water at 0.0^oC flow out of the hole per second

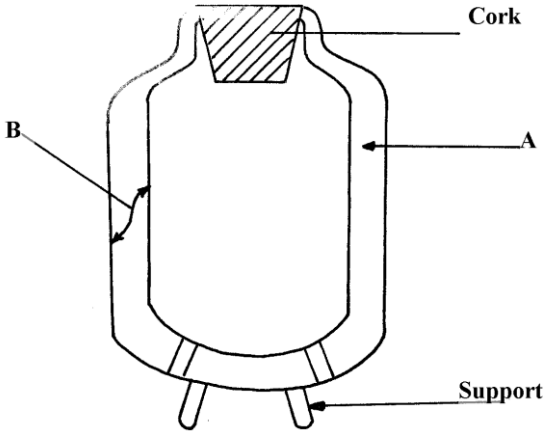
(i) How many joules of heat are given out per second by condensing steam and cooling to

0.0^{o}C of water formed?(Latent heat of vaporization of steam = 2.26 x 10^{6}JKg^{-1}, c for water = 4200JKg^{-1}K^{-1})

(ii) How much heat is taken in per second by the ice which melts?

(iii) Suggest why these amounts above are different

(c) ***Figure 7*** below shows a cross-section of a vacuum flask



(i) Name the parts labelled **A** and **B** on the diagram

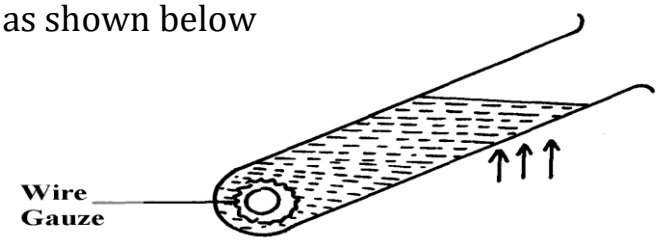
(ii) Explain how the heat losses are minimized when hot liquid is poured into the flask

5. (a) Figure 2 shows two identical thermometers. Thermometer **A** has a blackened bulb while thermometer **B** has a silvery bulb. A candle is placed equidistant between the two thermometers

State with a reason the observations made after some time

5. (b) ***Figure 3*** shows a test tube partially filled with water. An ice wrapped in wire gauze is placed at the bottom of the test-tube. It is then held in the flame of a bunsen burner as shown below

fig. 3



State and explain what will be observed after some time

6. Give any **two** differences between evaporation and boiling

7. Explain why steel feels colder than wood at the same temperature

8. An electric heater 1KW 240V is used to raise the temperature of a 5kg copper block from

15^{o}C to 33^{o}C. If the specific heat capacity of copper is **400JKg^{-1}K^{-1}** and assuming no heat is lost to the surrounding,

Calculate the time taken

9. **(a**) Define specific latent heat of fusion

(b) 0.5kg of naphthalene contained in an aluminium can of mass 0.4kg is melted in a water bath and raised to a temperature of 100^{o}C . Calculate the total heat given out when the can and its contents are allowed to cool to room temperature, 20^{o}C . Neglect losses by evaporation during heating process and give your answer to the nearest kilojoule.

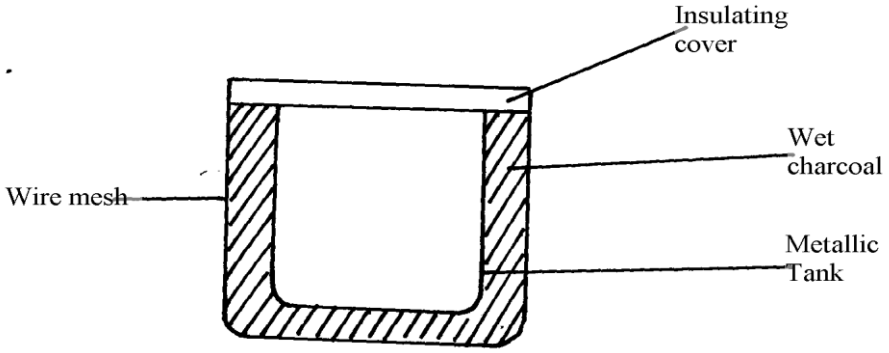
(For naphthalene melting point = 80^{o}C , Specific heat capacity for both liquid and solid =2100J/KgK; specific latent heat of fusion = 170000J/Kg.

For aluminium: specific heat capacity = 900J/Kgk

(c) Briefly explain **two** ways other than direct heating by which quantity of liquid may be made to

evaporate more quickly

(d) The diagram below shows a charcoal refrigerator



(i) Explain why charcoal is used and why it is sprinkled with water

(ii) What is the role of the metallic tank and the wire mesh

10. An electric kettle with a shinny outer surface would be more efficient than one with a dull outer surface. Give a reason for this

11. A heating element rated 2.5 KM is used to raise the temperature of 3.0 kg of water through 50^{o}C. Calculate the time required to Effect this. (*Specific heat capacity of water is 4200J/kgK*).

For Marking Schemes/Answers

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