DEPARTMENT OF PHYSICS.

S.6 CALORIMETRY TEST 2020. (Paper 1)

1. (a) (i) Define the term specific latent heat of vaporisation. (1 mark)

(ii) Explain briefly why temperature is constant when a solid is changing into a liquid. (2 marks)

(b) Describe with the aid of a labeled diagram, an electrical method for determination of specific latent heat of vaporization of a liquid. (7 marks)

(c) (i) Define the term specific heat capacity of a substance. (1mark)

(ii) An electrical heater rated 500W is immersed in a liquid of mass 2.0kg contained in a large thermos flask of heat capacity 840 JK^{-1} at 28°C. Electrical power is supplied to the heater for 10 minutes. If the specific heat capacity of the liquid is 2.5 $\times 10^3$ $Jkg^{-1}K^{-1}$, its specific latent heat of vaporization is 8.54 $\times 10^3$ Jkg^{-1} and its boiling point is 78°C, estimate the amount of liquid which boils off stating any assumptions made. (5 marks)

State any assumptions made in your calculation. (1 mark)

(d) The specific heat latent heat of fusion of a substance is significantly different from its specific latent heat of vaporisation at the same pressure. Explain how the difference arises. (03 marks)

2. (a) (i) Define the term specific heat capacity of a substance. (1mark)

(ii) State how heat losses are minimized in calorimetry. (2marks)

(b) (i) State three advantages of the continuous flow method over the method of mixtures ion the determination of specific heat capacity of a liquid. (3marks)

(ii) In a continuous flow experiment of a liquid of specific heat capacity $4150\ J\,kg^{-1}K^{-1}$, the following results were obtained:

Ammeter reading (A)	Voltmeter reading (V)	Mass of liquid collected per min (g)
2.00	25.2	75.0
2.52	30.0	115.9

If the inflow temperature was 15°C find,

(i) the outflow temperature (4 marks)

(ii) the rate of heat loss. (2 marks)

(c) Explain in terms of specific heat capacity why water is used in a car radiator other than any other liquid. (02 marks)

(d) (i) State Newton's law of cooling. (01 mark)

(ii) An electric heater rated 520 W is used to raise the temperature of 2.5 kg of a liquid from room temperature of 20ºC to 100ºC in 25 minutes and the rate of heat loss at 100ºC is 16 W. Estimate the specific heat capacity of the liquid. (4 marks)

END.