Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic: Thermal Physics

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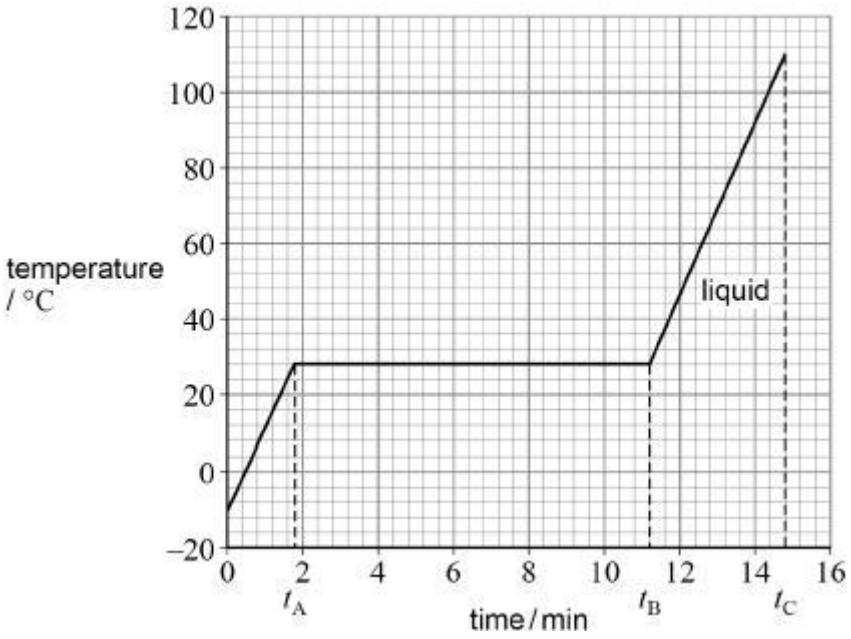
Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

A perfectly insulated flask contains a sample of metal **M** at a temperature of –10 °C.

The figure shows how the temperature of the sample changes when energy is transferred to it at a constant rate of 35 W.



(a) State the melting temperature of **M**.

temperature = _____ °C

(1)

(b) Explain how the energy transferred to the sample changes the arrangement of the atoms during the time interval t_A to t_B.

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_____

(1)

(c) State what happens to the potential energy of the atoms and to the kinetic energy of the atoms

during the time interval t_A to t_B.

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(2)

(d) Describe how the motion of the atoms changes during the time interval t_B to t_C.

_____

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_____

(1)

(e) The sample has a mass of 0.25 kg.

Determine the specific heat capacity of **M** when in the liquid state. State an appropriate SI unit for your answer.

specific heat capacity = _____ unit = _____

(3)

(f) The table shows the specific latent heats of fusion l for elements that are liquid at similar temperatures to **M**.

Element	Caesium	Gallium	Mercury	Rubidium
l **/ kJ kg^{-1}**	16	80	11	26

M is known to be one of the elements in the table above.

Identify **M**.

M = _____

(2)

(Total 10 marks)

Q2.

(a) State what is meant by the internal energy of a gas.

_____

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(2)

(b) Absolute zero of temperature can be interpreted in terms of the ideal gas laws or the kinetic energy of particles in an ideal gas.

Describe these two interpretations of absolute zero of temperature.

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(2)

(c) A mixture of argon atoms and helium atoms is in a cylinder enclosed with a piston. The mixture is at a temperature of 310 K.

Calculate the root mean square speed (c_{rms}) of the argon atoms in the mixture.

molar mass of argon = 4.0×10^{-2} kg mol^{-1}

c_{rms} = _____ m s^{-1}

(2)

(d) Compare the mean kinetic energy of the argon atoms and the helium atoms in the mixture.

_____

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(2)

(e) Explain, in terms of the kinetic theory model, why a pressure is exerted by the gas on the piston.

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(3)

(f) The mixture of gases in the cylinder stays the same.

Explain, using the kinetic theory model, **two** changes that can be made independently to reduce the pressure exerted by the gas.

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(3)

(Total 14 marks)