Oxford Cambridge and RSA

A Level Physics A

H556/01 Modelling physics

Question Set 26

1 A substance can exist as a crystalline solid, a liquid or a gas.
A solid sample of the substance is placed in a sealed container and heated at a constant rate until it changes into a gas.

Fig. 21 shows the variation with time t of the temperature θ for the substance.

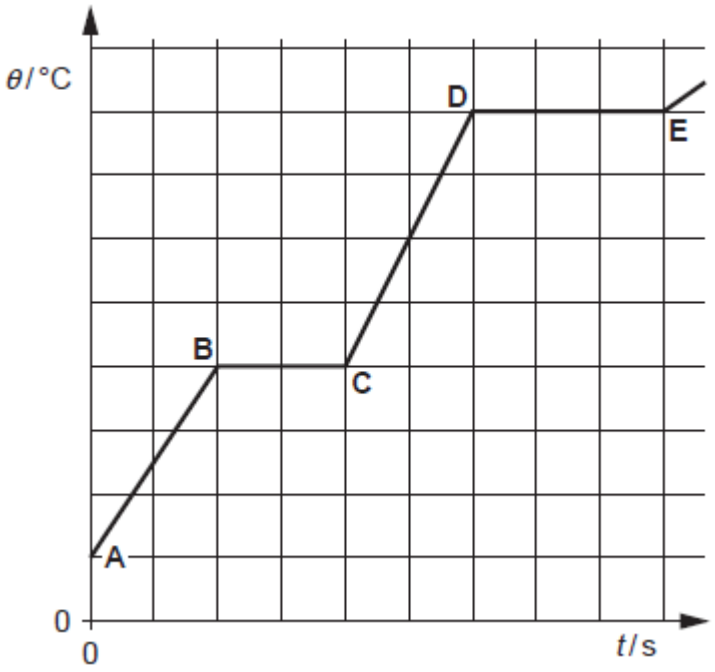

Fig. 21

(a) Use the kinetic theory of matter to describe the solid phase (section **AB**) and the liquid phase (section **CD**) in terms of the motion and arrangement of the molecules of the substance.

Section **AB**: .....

.....

Section **CD**: .....

..... **[4]**

(b) Use Fig. 21 to explain how the specific heat capacity of the liquid compares with the specific heat capacity of the solid. **[2]**

(c) State what is meant by the **internal energy** of the substance. **[1]**

(d) Beyond the point **E** in Fig. 21, the substance behaves as an ideal gas.

(i) The mass of a gas molecule is 4.8×10^{-26} kg.
Calculate the root mean square speed of the gas molecules at a temperature of 250 °C.

root mean square speed = ... $m\,s^{-1}$ **[3]**

(ii) Calculate the internal energy of 1.3 moles of the gas at 250 °C.

internal energy = ... J **[3]**

Total Marks for Question Set 26: 13