5

(a)

State two basic assumptions of the kinetic theory of gases.

……

……

……

……

[2]

(b)

By considering the random motion of the gas molecules in a cubic container of length *L*, show that the pressure *p* exerted by an ideal gas is given by the equation

$$p = \frac{1}{3}\rho\left\langle c^2 \right\rangle$$

where ρ is the density of the ideal gas and $\left\langle c^2 \right\rangle$ is the mean-square speed of the gas atoms or molecules.

[4]

(c)

(i)

Explain what is meant by *specific latent heat of fusion*.

……

……

……...

[1]

(ii)

A thermally insulated vessel containing liquid water and water vapour is connected to a vacuum pump that removes water vapour continuously. When the temperature reaches freezing point of water, the vessel contains 120 g of liquid water. The specific latent heat of fusion of water is 3.40×10^5 J kg^{-1} and the specific latent heat of vaporisation of water is 2.52×10^6 J kg^{-1}.

Calculate the mass of ice formed when no liquid remains.

mass of ice = …..…… g

[3]