

11 (a) For an ideal gas $pV = NkT$ and $pV = \frac{1}{3}Nm \langle c^2 \rangle$.

Use these relationships to show that the mean kinetic energy of a gas molecule is proportional to the absolute temperature.

(2)

(b) The molecules in a sample of gas have a mass of 5.0×10^{-26} kg.

Calculate the root-mean-square speed of gas molecules in the gas at 25 °C.

(3)

Root-mean-square speed =

(Total for Question 11 = 5 marks)