

- 2 A fixed mass of an ideal gas is at a temperature of 21°C . The pressure of the gas is $2.3 \times 10^5 \text{ Pa}$ and its volume is $3.5 \times 10^{-3} \text{ m}^3$.

(a) (i) Calculate the number N of molecules in the gas.

$N = \dots\dots\dots$ [2]

(ii) The mass of one molecule of the gas is 40 u .

Determine the root-mean-square (r.m.s.) speed of the gas molecules.

r.m.s. speed = $\dots\dots\dots \text{ m s}^{-1}$ [2]

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- (b) The temperature of the gas is increased by 84°C .

Calculate the value of the ratio

$$\frac{\text{new r.m.s. speed of molecules}}{\text{original r.m.s. speed of molecules}}.$$

ratio = [2]