

Question Number	Answer	Mark
14(a)	<p>Use of $pV = NkT$ (1)</p> <p>Temperature conversion (1)</p> <p>$N = 6.02 \times 10^{23}$ (1)</p> <p><u>Example of calculation</u></p> $N = \frac{pV}{kT} = \frac{1.01 \times 10^5 \text{ Pa} \times 0.0241 \text{ m}^3}{1.38 \times 10^{-23} \text{ J K}^{-1} \times (20.0 + 273) \text{ K}} = 6.02 \times 10^{23}$	3
14(b)	<p>Use of $\frac{1}{2}m\langle c^2 \rangle = \frac{3}{2}kT$ (1)</p> <p>Use of 60.5 % (1)</p> <p>Ratio = 2.7 (Do not award MP3 if a value for either mass has been assumed) (1)</p> <p><u>Example of calculation</u></p> $\frac{1}{2}m_1\langle c_1^2 \rangle = \frac{1}{2}m_2\langle c_2^2 \rangle$ $\therefore \frac{m_1}{m_2} = \frac{\langle c_2^2 \rangle}{\langle c_1^2 \rangle}$ $\frac{\langle c_c^2 \rangle}{\langle c_m^2 \rangle} = 0.605^2 = 0.366$ $\frac{m_c}{m_m} = \frac{\langle c_m^2 \rangle}{\langle c_c^2 \rangle} = \frac{1}{0.366} = 2.73$	3
Total for question 14		6