

3 (a) State what is meant by an ideal gas.

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.....

..... [2]

(b) An ideal gas at a pressure of $1.6 \times 10^5 \text{ Pa}$ has a density of 1.9 kg m^{-3} .

(i) Show that the root-mean-square (r.m.s.) speed of molecules of this gas is approximately 500 ms^{-1} .

[3]

(ii) One molecule of the gas has a mass of $4.7 \times 10^{-26} \text{ kg}$.

Determine the thermodynamic temperature of the gas.

temperature = K [2]

(c) Calculate the internal energy U of 6.0 mol of the gas in (b). Explain your reasoning.

$U =$ J [3]