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

.....

.....

..... [2]

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

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

[3]

(ii) One molecule of the gas has a mass of 4.7×10^{-26} 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]

[Total: 10]