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

.....

.....

..... [2]

(ii) State the temperature, in degrees Celsius, of absolute zero.

temperature = ... °C [1]

(b) A sealed vessel contains a mass of 0.0424 kg of an ideal gas at 227 °C.
The pressure of the gas is 1.37×10^5 Pa and the volume of the gas is 0.640 m^3.

Calculate:

(i) the number of molecules of the gas in the vessel

number of molecules = ... [3]

(ii) the mass of one molecule of the gas

mass = ... kg [1]

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

v = ... $m\,s^{-1}$ [3]

(c) The gas in **(b)** is now cooled gradually to absolute zero.

On Fig. 2.1, sketch the variation with thermodynamic temperature T of the r.m.s. speed of the molecules of the gas.

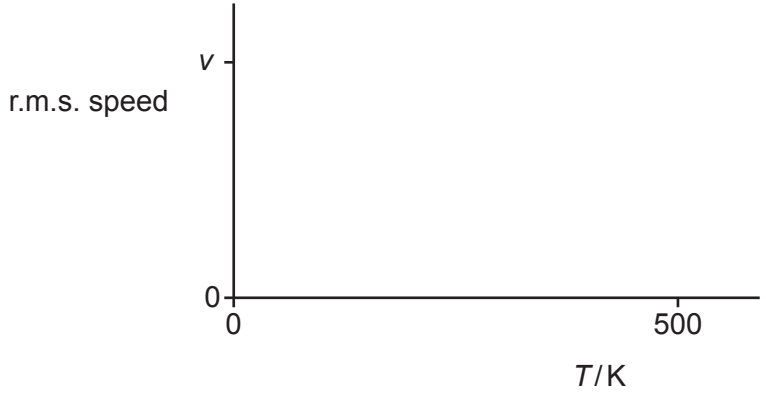

Fig. 2.1

[2]

[Total: 10]