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

.....

.....

.....

[2]

(b) An ideal gas, comprising single atoms, is contained in a cylinder and has a volume of 1.84×10^{-2} m^3 at a pressure of 2.12×10^7 Pa. The mass of the gas in the cylinder is 3.20 kg.

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

root-mean-square speed = ... $m\ s^{-1}$ [3]

(ii) The temperature of the gas in the cylinder is 22 °C.

Determine

1. the amount of gas,

amount = ... mol [2]

2. the mass of one atom of the gas.

mass = ... kg [2]

(iii) Use your answer in **(ii)2.** to determine the nucleon number A of an atom of the gas.

A = ... [2]

[Total: 11]