

- 5** An ideal gas at a temperature of  $22\text{ }^{\circ}\text{C}$  is trapped in a metal cylinder of volume  $0.20\text{ m}^3$  at a pressure of  $1.6 \times 10^6\text{ Pa}$ .

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

.....

.....

.....

..... [2]

**(b)** Calculate the amount of gas contained in the cylinder.

amount = ..... mol [2]

**(c)** The gas has a molar mass of  $4.2 \times 10^{-2}\text{ kg mol}^{-1}$ .

Calculate the root-mean-square speed of the gas molecules in the cylinder.

root-mean-square speed = .....  $\text{m s}^{-1}$  [2]

- (d) The cylinder is taken to high altitude where the temperature is  $-50\text{ }^{\circ}\text{C}$  and the pressure is  $3.6 \times 10^4\text{ Pa}$ . A valve on the cylinder is opened to allow gas to escape.

Calculate the mass of gas remaining in the cylinder when it reaches equilibrium with its surroundings.

mass of gas remaining = ..... kg [2]