4 **(a)** Describe the motion of molecules in a gas, according to the kinetic theory of gases.

.....

.....

.....[2]

(b) Describe what is observed when viewing Brownian motion that provides evidence for your answer in **(a)**.

.....

.....

.....[2]

(c) At a pressure of 1.05×10^5 Pa and a temperature of 27 °C, 1.00 mol of helium gas has a volume of 0.0240 m^3.
The mass of 1.00 mol of helium gas, assumed to be an ideal gas, is 4.00 g.

(i) Calculate the root-mean-square (r.m.s.) speed of an atom of helium gas for a temperature of 27 °C.

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

(ii) Using your answer in **(i)**, calculate the r.m.s. speed of the atoms at 177 °C.

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

[Total: 10]