4 **(a)** A sealed vessel contains a fixed amount of gas.

Explain how molecular movement causes the pressure exerted by the gas on the walls of the vessel.

.....

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.....

.....

..... [3]

(b) **(i)** State the assumption of the kinetic theory of gases that relates to the separation of particles in a gas.

.....

..... [1]

(ii) A sealed vessel has a volume of $3.2 \times 10^{-4}\,m^3$ and contains a fixed amount of an ideal gas at a pressure of 180 Pa. The temperature of the gas is 298 K.

Estimate the average distance between the particles of the gas.

average distance = ... m [3]

(iii) The approximate diameter of a gas particle is 1×10^{-10} m.

Use your answer in **(b)(ii)** to explain whether the assumption in **(b)(i)** is valid.

.....

.....

..... [1]

[Total: 8]