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

.....

..... [1]

(b) A storage cylinder for an ideal gas has a volume of $3.0 \times 10^{-4}\,m^3$. The gas is at a temperature of 23 °C and a pressure of $5.0 \times 10^{7}\,Pa$.

(i) Show that the amount of gas in the cylinder is 6.1 mol.

[2]

(ii) The gas leaks slowly from the cylinder so that, after a time of 35 days, the pressure has reduced by 0.40%. The temperature remains constant.
Calculate the average rate, in atoms per second, at which gas atoms escape from the cylinder.

rate = ... s^{-1} [4]