12 Radon-222 ($^{222}_{86}Ra$) is a radioactive gas that decays randomly with a decay constant of 7.55×10^{-3} hour^{-1}.

(a) State what is meant by:

(i) *random* decay

.....

..... [1]

(ii) *decay constant*.

.....

.....

..... [2]

(b) The activity of radon gas in a sample of 4.80×10^{-3} m^3 of air taken from a building is 0.600 Bq.

There are 2.52×10^{25} air molecules in a volume of 1.00 m^3 of air.

Calculate, for 1.00 m^3 of the air, the ratio

$$\frac{\text{number of air molecules}}{\text{number of radon atoms}}.$$

ratio = ... [5]

[Total: 8]