a) Calculate the volume, in cm^3, of fluorine gas at 298K and 100kPa required to produce 1.00g of sodium fluoride by reaction with an excess of sodium.
The gas constant R = 8.31 $JK^{-1}mol^{-1}$

① Write the equation to form one mole of NaF:

$$Na + \frac{1}{2}F_2 \longrightarrow NaF$$

② Use the data to find the moles of fluorine gas required:

$$\text{moles of NaF} = \frac{1.00}{42}$$
$$= 0.0238...$$

use the molar ratio

$$\Rightarrow \text{moles of } F_2 = \frac{1}{2} \times 0.0238...$$
$$= 0.0119...$$

③ Rearrange the ideal gas equation for V:

$$PV = nRT$$
$$\Rightarrow V = \frac{nRT}{P}$$

$PV = nRT$

④ Sub in the values to find the volume of F_2:

$$V = \frac{0.0119... \times 8.31 \times 298}{100 \times 10^3}$$
$$= 2.948... \times 10^{-4}\ cm^3$$
$$\Rightarrow 295\ m^3$$

$\div 1 \times 10^{-6}$

$cm^3 \rightleftarrows m^3$

$\times 1 \times 10^{-6}$