

**Question 26** (4 marks)

A gas is produced when 10.0 g of zinc is placed in 0.50 L of 0.20 mol L<sup>-1</sup> nitric acid. 4

Calculate the volume of gas produced at 25°C and 100 kPa. Include a balanced chemical equation in your answer.

$V = \text{Molar mass} \times \text{mass}$  ~~etc~~

~~mol~~ zinc =  $\frac{10}{65.41}$  Equation:  $2\text{Zn}_{(s)} + 2\text{HNO}_3 \rightarrow 2\text{ZnNO}_3 + \text{H}_2$   
(aq) (aq)

$= 0.152881822..$   $\therefore 1 \text{ mol of Hydrogen}$

$= 0.153$  (2 sig fig)

$\text{HNO}_3 = 0.20 \text{ mol/L}^{-1}$   $V_{\text{gas}} = 0.10 \times 24.79$

$V = 0.50 \text{ L}$   $V_{\text{gas}} = 2.479$

$\frac{1.008 + 14.01 + 16 \times 3}{2} \times 500 \text{ ml}$   $V_{\text{gas}} = 0.06115 \times 24.79$

$63.018$   $= 1.52 \text{ L}$

mass = 7.93 grams  $V_{\text{gas}} = \frac{7.93}{2} \times 24.79$   
(HNO<sub>3</sub>)  $= 98.29 \text{ Litres.}$