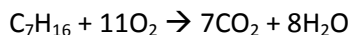


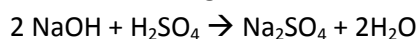
Question One- Complete the following tables



| Mass of C_7H_{16} | Amount of C_7H_{16} | Mass of O_2 | Amount of O_2 | Mass of CO_2 | Amount of CO_2 | Mass of H_2O | Amount of H_2O |
|-----------------------------------|-------------------------------------|----------------------|------------------------|-----------------------|-------------------------|------------------------------|--------------------------------|
| 17.3 g | 0.173 mol | 60.8 g | 1.90 mol | 53.3 g | 1.21 mol | 24.9 g | 1.38 mol |
| 6.88 g | 0.0688 mol | 24.2 g | 0.756 mol | 21.2 g | 0.481 mol | 9.90 g | 0.55 mol |
| 6.01 g | 0.0601 mol | 21.1 g | 0.661 mol | 18.5 g | 0.420 mol | 8.65 g | 0.480 mol |
| 5.69 g | 0.0569 mol | 20.0 g | 0.626 mol | 17.5 g | 0.399 mol | 8.2 g | 0.456 mol |

Question Two

a) 20mL of unknown concentration of NaOH is titrated against 0.103 mol L^{-1} of H_2SO_4



| Trails | #1 | #2 | #3 | #4 |
|------------|---------------------------|------|------|------|
| Titre (mL) | 20.6 (outlier) | 21.3 | 21.3 | 21.2 |

Using the results above, determine the concentration of unknown NaOH (show all working and units)

$$\text{Average titre} = \frac{(21.3 + 21.3 + 21.2)}{3} = 21.26 \dots \text{mL} = 0.02126 \dots \text{L}$$

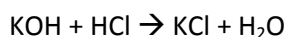
$$\text{Amount of } \text{H}_2\text{SO}_4 = 0.02126 \dots \text{L} \times 0.103 \text{ mol L}^{-1} = 2.190 \dots \times 10^{-3} \text{ mol}$$

$$\text{Ratio } \text{H}_2\text{SO}_4 : \text{NaOH} = 1 : 2$$

$$\text{Amount of NaOH} = 2 \times 2.190 \dots \times 10^{-3} \text{ mol} = 4.380 \dots \times 10^{-3} \text{ mol}$$

$$\text{Concentration of unknown NaOH} = 4.380 \dots \times 10^{-3} \text{ mol} \div 0.020 \text{ L} = \underline{\underline{0.219 \text{ mol L}^{-1}}}$$

b) 15 mL of unknown concentration of HCl is titrated against $0.0998 \text{ mol L}^{-1}$ of KOH



| Trails | #1 | #2 | #3 | #4 |
|------------|------|------|------|------|
| Titre (mL) | 18.5 | 17.4 | 17.5 | 17.3 |

Using the results above, determine the concentration of unknown HCl (show all working and units)

$$\text{Average titre} = \frac{(17.4 + 17.5 + 17.3)}{3} = 17.4 \text{ mL} = 0.0174 \text{ L}$$

$$\text{Amount of KOH} = 0.0174 \text{ L} \times 0.0998 \text{ mol L}^{-1} = 0.001736 \dots \text{ mol}$$

$$\text{Ratio KOH} : \text{HCl} = 1 : 1$$

$$\text{Amount of HCl} = 0.001736 \dots \text{ mol}$$

$$\text{Concentration of unknown HCl} = 0.001736 \dots \text{ mol} \div 0.015 \text{ L} = \underline{\underline{0.116 \text{ mol L}^{-1}}}$$