

**Question One-** Complete the following tables

Concentration of standard (mol <sup>-1</sup> )	Average titre (mL)	Amount of standard (mol)	Ratio Std : Unkn	Amount of unknown (mol)	Volume of unknown (mL)	Concentration of unknown (mol <sup>-1</sup> )
0.102	13.7	0.001397	1 : 2	0.0027948	20	0.140
0.113	20.3	0.002294	1 : 1	0.0022939	20	0.115
0.0987	16.5	0.001629	2 : 1	0.00081428	10	0.0814
0.128	14.3	0.00183	1 : 1	0.0018304	15	0.122

**Question Two**

The main chemical in LPG is propane (C<sub>3</sub>H<sub>8</sub>), it is a fossil fuel. The burning of propane can be described by the equation below:



Calculate the maximum mass of carbon dioxide forms when 50 g of propane is burnt under excess oxygen.

$$\text{Molar mass}(\text{C}_3\text{H}_8) = 12 \times 3 + 8 = 44 \text{ gmol}^{-1}$$

$$\text{Amount of C}_3\text{H}_8 = 50 \text{ g} \div 44 \text{ gmol}^{-1} = 1.13636... \text{ mol}$$

$$\text{Ratio C}_3\text{H}_8 : \text{CO}_2 = 1 : 3$$

$$\text{Amount of CO}_2 = 3.409... \text{ mol}$$

$$\text{Mass of CO}_2 = 3.409 \text{ mol} \times 44 \text{ gmol}^{-1} = \underline{150 \text{ g}}$$

Calculate the minimum mass of oxygen gas is required to burnt 23 g of propane

$$\text{Amount of C}_3\text{H}_8 = 23 \text{ g} \div 44 \text{ gmol}^{-1} = 0.5227... \text{ mol}$$

$$\text{Ratio C}_3\text{H}_8 : \text{O}_2 = 1 : 5$$

$$\text{Amount of O}_2 = 2.6136... \text{ mol}$$

$$\text{Mass of O}_2 = 2.6136... \text{ mol} \times 32 \text{ gmol}^{-1} = \underline{83.6 \text{ g}}$$

Calculate the mass of propane required to produce 530 g of water

$$\text{Molar mass (H}_2\text{O)} = 18 \text{ gmol}^{-1}$$

$$\text{Amount of H}_2\text{O} = 530 \text{ g} \div 18 \text{ gmol}^{-1} = 29.44... \text{ mol}$$

$$\text{Ratio H}_2\text{O} : \text{C}_3\text{H}_8 = 4 : 1$$

$$\text{Amount of C}_3\text{H}_8 = 29.44... \text{ mol} \div 4 = 7.36... \text{ mol}$$

$$\text{Mass of C}_3\text{H}_8 = 7.36... \text{ mol} \times 44 \text{ gmol}^{-1} = \underline{324 \text{ g}}$$