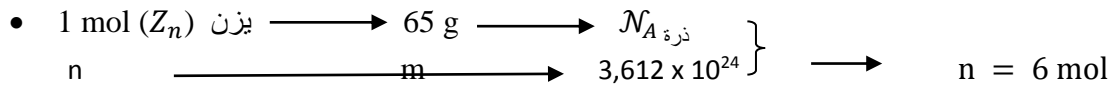


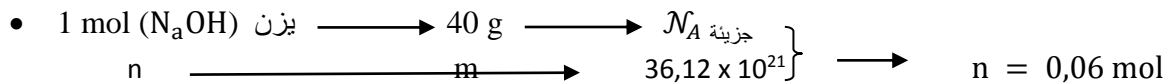
الحلول المقترحة

التمرين الأول :

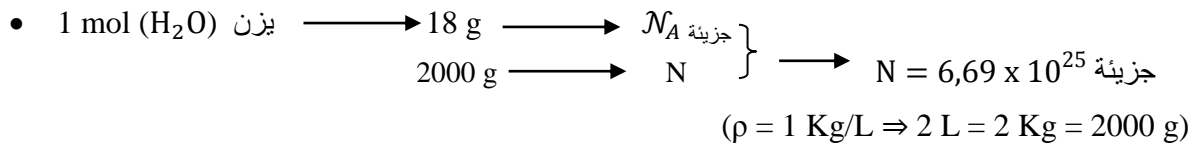
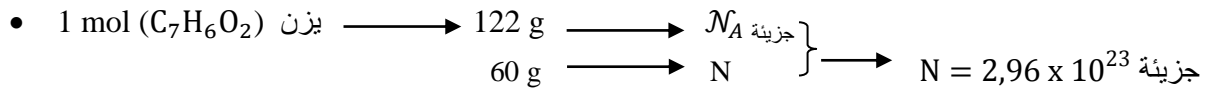


$$m = \frac{3,612 \times 10^{24} \times 65}{6,023 \times 10^{23}} = 390 \text{ g}$$

ou : $n = \frac{m}{M} \Rightarrow m = n \cdot M = 6 \times 65 \Rightarrow m = 390 \text{ g}$



$$m = n \cdot M = 0,06 \times 40 \Rightarrow m = 2,4 \text{ g}$$

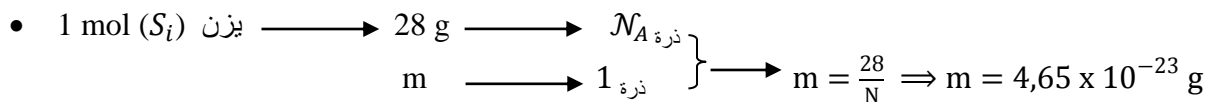


• $1 \text{ uma} = \frac{1}{12} m'_{12\text{C}} = \frac{1}{12} \times 1,99 \times 10^{-23}$

$$1 \text{ uma} = 1,66 \times 10^{-24} \text{ g}$$

• $1 \text{ uma} = \frac{1}{12} m'_{12\text{C}} = \frac{1}{12} \times \frac{M_{\text{C}12}}{\mathcal{N}_A} = \frac{1}{12} \times \frac{12}{\mathcal{N}_A}$

$$1 \text{ uma} = \frac{1}{\mathcal{N}_A} \Rightarrow \mathcal{N}_A = \frac{1}{\text{uma}} = \frac{1}{1,66 \times 10^{-24}} = 6,023 \times 10^{23} \text{ entité/mol}$$



$$\begin{array}{l} 1 \text{ uma} \longrightarrow 1,66 \times 10^{-24} \text{ g} \\ m \longrightarrow 4,65 \times 10^{-23} \text{ g} \end{array} \longrightarrow m = \frac{4,65 \times 10^{-23}}{1,66 \times 10^{-24}} \Rightarrow m = 28 \text{ uma}$$

$$m' = \frac{M}{\mathcal{N}_A} = M \cdot \left(\frac{1}{\mathcal{N}_A} \right) = M \cdot \text{uma} \Rightarrow m'(\text{S}_i) = 28 \text{ uma}$$

• 1 mol (A_g) يزن \longrightarrow 107,9 g \longrightarrow ذرة N_A } \longrightarrow ذرة $N = 5,58 \times 10^{22}$
 10 g \longrightarrow N }

$L = 2 r_a \cdot N = 2 \times (1,44 \times 10^{-10}) \times 5,58 \times 10^{22} = 15,84 \times 10^{12} \text{ m} \gg L' \text{ (شمس - ارض)}$

التمرين الثاني :

• Cr_xO_y , 31,6 % (O)
 $M(Cr_xO_y) \longrightarrow 52 X$ } $\longrightarrow X = \frac{M \times 68,4}{100 \times 52} \dots \dots \dots (1)$
 100% $\longrightarrow 68,4 \%$ }

$M(Cr_xO_y) \longrightarrow 16 Y$ } $\longrightarrow Y = \frac{M \times 31,6}{100 \times 16} \dots \dots \dots (2)$
 100 g $\longrightarrow 31,6 \text{ g}$ }

$\frac{Y}{X} = \frac{M \times 31,6}{100 \times 16} \times \frac{100 \times 52}{M \times 68,4} = 1,5$ بأخذ النسبة $\frac{(2)}{(1)}$ نجد

$\frac{Y}{X} = \frac{3}{2} \Rightarrow Y = \frac{3}{2} \cdot X$ وهي دالة خطية

رسمها :

X	2
Y	3

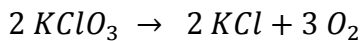
اذن المركب هو Cr_2O_3

• $Fe_xS_yO_z \cdot n \cdot H_2O$

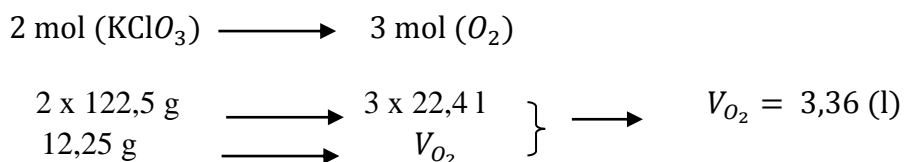
100% \longrightarrow 20,1 % (Fe) } $\longrightarrow X = 1$
 278 \longrightarrow 56 X (Fe) }
 100% \longrightarrow 11,6 % (S) } $\longrightarrow Y = 1$
 278 \longrightarrow 32 Y (S) }
 100% \longrightarrow 23 % (O) } $\longrightarrow Z = 4$
 278 \longrightarrow 16 Z (O) }
 100% \longrightarrow 45,3 % (H_2O) } $\longrightarrow n = 7$
 278 \longrightarrow 18 n (H_2O) }

المركب هو $FeSO_4$ حيث $M_{FeSO_4} = 152 \text{ g/mol}$
 لكن الكتلة المولية للمركب هي : 277 g/mol
 $(278 = 152 + 18 n \Rightarrow n = 7)$
 المركب المطلوب هو $FeSO_4 \cdot 7 H_2O$

التمرين الثالث :



$2 \text{ mol } (KClO_3) \longrightarrow 3 \text{ mol } (O_2)$ }
 $n \text{ mol} \longrightarrow 1,5 \text{ mol } (O_2)$ } $\longrightarrow n = 1 \text{ mol } (KClO_3)$

التمرين الرابع :

$$M_w (\text{CaCl}_2) = 40 + (35,5 \times 2) = 111 \text{ g/mol}$$

$$m_{\text{soluté}} = 53,8 \text{ g}$$

$$m_{\text{solvant}} = 100 \text{ g} = 0,1 \text{ Kg}$$

$$\rho_{\text{sol}} = 1,342 \text{ g/cm}^3 = 1,342 \text{ g/mL} = \frac{1,342 \text{ g}}{10^{-3} \text{ l}} = 1342 \text{ g/L}$$

$$m_{\text{sol}} = m_{\text{soluté}} + m_{\text{solvant}} = 53,8 + 100 \Rightarrow m_{\text{sol}} = 153,8 \text{ g}$$

$$\rho_{\text{sol}} = \frac{m_{\text{sol}}}{V_{\text{sol}}} \Rightarrow V_{\text{sol}} = \frac{m_{\text{sol}}}{\rho_{\text{sol}}} = \frac{153,8}{1342} \Rightarrow V_{\text{sol}} = 0,11 \text{ L}$$

$$M = \frac{n_{\text{soluté}}}{V_{\text{sol (L)}}} = \frac{m}{M_w V} = \frac{53,8}{111 \times 0,11} \Rightarrow M = 4,4 \text{ mol/L} \quad , \quad n = \frac{53,8}{111} = 0,48 \text{ mol}$$

$$m = \frac{n_{\text{soluté}}}{m_{\text{solvant (Kg)}}} = \frac{0,48}{0,1} \Rightarrow m = 4,8 \text{ mol/Kg}$$

$$X_{\text{soluté}} = \frac{n_{\text{soluté}}}{n_t} \quad , \quad n_{\text{solvant}} = \frac{100}{18} = 5,56 \text{ mol} \Rightarrow X_{\text{soluté}} = \frac{0,48}{0,48 + 5,56} = 0,08$$

$$X_{\text{solvant}} = 1 - X_{\text{soluté}} = 1 - 0,08 \Rightarrow X_{\text{solvant}} = 0,92$$

$$W(\%) = \frac{m_{\text{soluté}}}{m_{\text{solvant}}} \times 100 = \frac{53,8}{153,8} \times 100 \Rightarrow W(\%) \simeq 35\%$$

التمرين الخامس :

- $\text{CH}_3\text{-CH}_2\text{-OH} \Rightarrow M_w = (12 \times 2) + 6 + 16 = 46 \text{ g/mol}$, $M_w(\text{H}_2\text{O}) = 18 \text{ g/mol}$

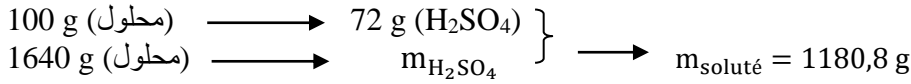
$$X_{1 (\text{EtOH})} = \frac{n_1}{n_1 + n_2} = \frac{70/46}{70/46 + 30/18} = 0,48$$

$$X_{2 (\text{H}_2\text{O})} = 1 - X_1 = 0,52$$

- $M_w(\text{H}_2\text{SO}_4) = 98 \text{ g/mol}$

$$\rho_{\text{sol}} = 1,64 \text{ g/cm}^3 = 1640 \text{ g/L} \Rightarrow \text{يزن من المحلول 1 L} \longrightarrow 1640 \text{ g}$$

$$\rho_{\text{sol}} = \frac{m_{\text{sol}}}{V_{\text{sol}}} \Rightarrow m_{\text{sol}} = \rho_{\text{sol}} \cdot V_{\text{sol}} = 1640 \text{ g/L} \times 1 \text{ L} = 1640 \text{ g}$$



$$M = \frac{n}{V} = \frac{m}{M_w V} = \frac{1180}{98 \times 1 \text{ (L)}} \Rightarrow M \simeq 12 \text{ mol/L}$$

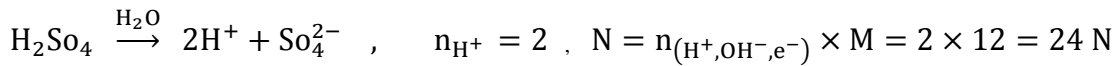
$$d = \frac{\rho}{\rho_{\text{eau}}} = \frac{\rho}{1 \text{ Kg/L}} = \frac{\rho}{1000 \text{ g/L}} \Rightarrow d = \frac{\rho}{1000} \Rightarrow \rho = d \times 1000 \text{ (g/L)}$$

$$M = \frac{\frac{W}{100} \times d \times 1000}{M_w} \Rightarrow \frac{W \% \times d \times 10}{M_w}, d = \frac{\rho}{1000} = \frac{1640}{1000} = 1,64$$

$$M = \frac{72 \times 1,64 \times 10}{98} \simeq 12 \text{ mol/l}$$

$$m = \frac{n_{\text{soluté}}}{m_{\text{solvant}}(\text{Kg})} = \frac{72/98}{(100 - 72) \times 10^{-3} \text{ kg}} \quad \text{ou} \quad \frac{1180,8/98}{(1640 - 1180,8) \times 10^{-3}}$$

$$m = 26,24 \text{ mol/kg}$$



Ou :

$$N = \frac{Eq}{V_{\text{sol}} \text{ (L)}} = \frac{n_{\text{soluté}} \times n_{(\text{H}^+, \text{OH}^-, \text{e}^-)}}{V_{\text{sol}} \text{ (L)}} = \frac{m_{\text{soluté}} \times n_{(\text{H}^+, \text{OH}^-, \text{e}^-)}}{M_w \times V_{\text{sol}} \text{ (L)}}$$

$$N = \frac{1180,8 \times 2}{98 \times 1 \text{ (L)}} = 24,1 \text{ N}$$

$$X_{\text{H}_2\text{SO}_4} = \frac{n_{\text{H}_2\text{SO}_4}}{n_t} = \frac{72/98}{72/98 + 28/18} = 0,32, \quad n_{\text{H}_2\text{O}} = 1 - 0,32 = 0,68$$

$$M = \frac{20 \times 1,18 \times 10}{98} = 2,4 \text{ M}$$

$$n_1 = n_2 \Rightarrow N_1 V_1 = N_2 V_2$$

حسب قانون لافوازييه لحفظ المادة :

$$\Rightarrow 2 C_1 V_1 = 2 C_2 V_2 \Rightarrow V_2 = \frac{C_1 V_1}{C_2} = \frac{12 \times 100}{2,4} = 500 \text{ ml (sol diluée)}$$

$$V_{\text{solvant H}_2\text{O}} = V_{\text{sol}} - V_{\text{H}_2\text{SO}_4} = 500 - 100 = 400 \text{ ml}$$

و هو حجم الماء المضاف