

Exercice n°1

A rechercher dans le tableau périodique du livre :

$$M(C) = 12 \text{ g} \cdot \text{mol}^{-1}$$

$$M(H) = 1 \text{ g} \cdot \text{mol}^{-1}$$

$$M(O) = 16 \text{ g} \cdot \text{mol}^{-1}$$

$$M(Cu) = 63,5 \text{ g} \cdot \text{mol}^{-1}$$

$$M(Cl) = 35,5 \text{ g} \cdot \text{mol}^{-1}$$

$$M(Ag) = 107,9 \text{ g} \cdot \text{mol}^{-1}$$

$$M(S) = 32,1 \text{ g} \cdot \text{mol}^{-1}$$

$$M(Fe) = 55,8 \text{ g} \cdot \text{mol}^{-1}$$

$$M(AE) = 27 \text{ g} \cdot \text{mol}^{-1}$$

$$M(N) = 14 \text{ g} \cdot \text{mol}^{-1}$$

$$\begin{aligned} \text{a) } M(\text{CH}_3\text{COOH}) &= 2 \times M(C) + 4 \times M(H) + 2 \times M(O) \\ &= 2 \times 12 + 4 \times 1 + 2 \times 16 \\ &= \underline{60 \text{ g} \cdot \text{mol}^{-1}} \end{aligned}$$

$$\text{b) } M(\text{CO}_2) = 1 \times M(C) + 2 \times M(O) = 1 \times 12 + 2 \times 16 = \underline{44 \text{ g} \cdot \text{mol}^{-1}}$$

$$\text{c) } M(\text{CH}_3\text{Cl}) = 1 \times 12 + 3 \times 1 + 1 \times 35,5 = \underline{50,5 \text{ g} \cdot \text{mol}^{-1}}$$

$$\begin{aligned} \text{d) } M(\text{CuCl}_2 + 2\text{H}_2\text{O}) &= 1 \times M(\text{Cu}) + 2 \times M(\text{Cl}) + 2 \times (2 \times M(H) + 1 \times M(O)) \\ &= 1 \times 63,5 + 2 \times 35,5 + 2 \times (2 \times 1 + 1 \times 16) \\ &= \underline{170,5 \text{ g} \cdot \text{mol}^{-1}} \end{aligned}$$

$$\text{e) } M(\text{AgCl}) = \underline{143,4 \text{ g} \cdot \text{mol}^{-1}} \quad \text{f) } M(\text{H}_2\text{SO}_4) = \underline{98,1 \text{ g} \cdot \text{mol}^{-1}}$$

$$\begin{aligned} \text{g) } M(\text{CuSO}_4 \cdot 5\text{H}_2\text{O}) &= 1 \times M(\text{Cu}) + 1 \times M(S) + 4 \times M(O) + 5 \times (2 \times M(H) + 1 \times M(O)) \\ &= 1 \times 63,5 + 1 \times 32,1 + 4 \times 16 + 5 \times (2 \times 1 + 1 \times 16) \\ &= \underline{249,6 \text{ g} \cdot \text{mol}^{-1}} \end{aligned}$$

$$\text{h) } M(\text{C}_{12}\text{H}_{22}\text{O}_{11}) = 12 \times 12 + 22 \times 1 + 11 \times 16 = \underline{342 \text{ g} \cdot \text{mol}^{-1}}$$

$$\text{i) } M(\text{C}_3\text{H}_7\text{N}) = \underline{73 \text{ g} \cdot \text{mol}^{-1}}$$

$$\begin{aligned} \text{j) } M(\text{FeSO}_4 \cdot 7\text{H}_2\text{O}) &= 1 \times M(\text{Fe}) + 1 \times M(S) + 4 \times M(O) + 7 \times (2 \times M(H) + 1 \times M(O)) \\ &= 1 \times 55,8 + 1 \times 32,1 + 4 \times 16 + 7 \times (2 \times 1 + 1 \times 16) \\ &= \underline{277,9 \text{ g} \cdot \text{mol}^{-1}} \end{aligned}$$

$$\begin{aligned} \text{k) } M(\text{AE}(\text{OH})_3) &= 1 \times M(\text{AE}) + 3 \times (1 \times M(O) + 1 \times M(H)) \\ &= 1 \times 27 + 3 \times (1 \times 16 + 1 \times 1) \\ &= \underline{78 \text{ g} \cdot \text{mol}^{-1}} \end{aligned}$$

$$\begin{aligned} \text{l) } M(\text{Fe}(\text{SO}_4)_2(\text{NH}_4)_2 \cdot 6\text{H}_2\text{O}) &= 1 \times M(\text{Fe}) + 2 \times (M(S) + 4 \times M(O)) + 2 \times (1 \times M(N) + 4 \times M(H)) + 6 \times (2 \times M(H) + 1 \times M(O)) \\ &= 1 \times 55,8 + 2 \times (32,1 + 4 \times 16) + 2 \times (14 + 4 \times 1) + 6 \times (2 + 16) \\ &= \underline{392 \text{ g} \cdot \text{mol}^{-1}} \end{aligned}$$

Exercice n°2

données: $C_{20}H_6Na_2O_5Br_4$

$$V = 2,0 \text{ mL}$$

$$m = 40 \text{ mg} = 40 \cdot 10^{-3} \text{ g.}$$

1) masse molaire: $M(C_{20}H_6Na_2O_5Br_4) = 20 \times 12 + 6 \times 1 + 2 \times 23 + 5 \times 16 + 4 \times 79,9$
 $= \underline{691,6 \text{ g} \cdot \text{mol}^{-1}}$

2) Quantité d'éosine dans 2,0 mL:

relation: $n = \frac{m}{M}$

calcul: $n = \frac{40 \cdot 10^{-3}}{691,6} = \underline{5,8 \cdot 10^{-5} \text{ mol}}$

Exercice 3

Données: $C_6H_8O_6$

$$m = 500 \text{ mg} = 500 \cdot 10^{-3} \text{ g}$$

$$\begin{aligned} \cdot \text{masse molaire: } M(C_6H_8O_6) &= 6 \times M(C) + 8 \times M(H) + 6 \times M(O) \\ &= 6 \times 12 + 8 \times 1 + 6 \times 16 \\ &= 176 \text{ g} \cdot \text{mol}^{-1} \end{aligned}$$

$$\cdot \text{qte' de mati\`ere: } n = \frac{m}{M} = \frac{500 \cdot 10^{-3}}{176} = 2,8 \cdot 10^{-3} \text{ mol}$$

$$\cdot \text{nbre de mol\`ecule: } N = n \times N_A = 2,8 \cdot 10^{-3} \times 6,02 \cdot 10^{23} = 1,7 \cdot 10^{21} \text{ mol\`ecules}$$

Exercice 4:

Données: $V = 5,0 \cdot 10^3 \text{ m}^3$ H_2O

$$\rho = 910 \text{ kg} \cdot \text{m}^{-3}$$

$$\cdot \text{quantit\`e' de mati\`ere?} \quad n = \frac{m}{M} \quad \text{et} \quad \rho = \frac{m}{V} \quad \text{soit} \quad m = \rho \times V$$

$$\text{calculs: } m = 910 \times 5,0 \cdot 10^3 = 4,55 \cdot 10^6 \text{ kg} = 4,55 \cdot 10^9 \text{ g}$$

$$M(H_2O) = 2 \times M(H) + M(O) = 2 \times 1 + 16 = 18 \text{ g} \cdot \text{mol}^{-1}$$

$$n = \frac{m}{M} = \frac{4,55 \cdot 10^9}{18} = 2,5 \cdot 10^8 \text{ mol}$$

$$\begin{aligned} \cdot \text{nombre de mol\`ecules: } N &= n \times N_A = 2,5 \cdot 10^8 \times 6,02 \cdot 10^{23} \\ &= 1,5 \cdot 10^{32} \text{ mol\`ecules} \end{aligned}$$