

RESOLUÇÃO DE EXERCÍCIOS PROPOSTOS  
AULA 04 – TURMA ANUAL

01. Item

[D]

Resolução:

$C_{14}H_{18}N_2O_5 = 294 \text{ g/mol}$   
 $294 \text{ g} - 100 \%$   
 $168 \text{ g} - p$   
 $p = 57,14 \%$

02. Item B

Hidrazina

$$N = 87,42\% = 87,42\text{g} = \frac{87,42 \text{ g}}{14\text{g/mol}} = 6,24 \text{ mol} = \frac{6,24 \text{ mol}}{6,24 \text{ mol}} = 1 \text{ mol}$$

$$H = 12,58\% = 12,58\text{g} = \frac{12,58 \text{ g}}{1 \text{ g/mol}} = 12,58 \text{ mol} = \frac{12,58 \text{ mol}}{6,24 \text{ mol}} = 2 \text{ mol}$$

A fórmula mínima da hidrazina é  $CH_2$ .

03.

**Item D**

A substância  $C_5H_6O$  tem massa molar igual a  $84 \text{ g/mol}$ , sendo que deste valor,  $5 \times 12\text{g} = 60\text{g}$  são do elemento carbono.

Assim, temos:

$$\begin{array}{l} 84\text{g} \text{ ----- } 100\% \\ 60\text{g} \text{ ----- } p \end{array}$$

$$P = \frac{60 \times 100\%}{84} = 71,42\%$$

04. Item D

A substância  $\text{Ca}_5(\text{PO}_4)_3\text{OH}$  tem massa molar igual a 502 g/mol, sendo que deste valor,  $3 \times 31\text{g} = 93\text{g}$  são do elemento fósforo.

Assim, temos:

$$\begin{array}{r} 502\text{g} \text{-----} 100\% \\ 93\text{g} \text{-----} \text{ p} \end{array}$$

$$P_{\%} = \frac{93 \times 100\%}{502} = 18,52\%$$

Portanto fica correto o item D.

05. Item A

Óxido 1 ( $\text{Fe}_2\text{O}_3$ )

$$\text{Fe} = 70,0\% = 70,0\text{g} = \frac{70,0\text{ g}}{56\text{g/mol}} = 1,25\text{ mol} = \frac{1,25\text{ mol}}{1,25\text{ mol}} = 1\text{ mol} \times 2 = \mathbf{2\text{ mol}}$$

$$\text{O} = 30,0\% = 30,0\text{g} = \frac{30,0\text{ g}}{16\text{ g/mol}} = 1,875\text{ mol} = \frac{1,875\text{ mol}}{1,25\text{ mol}} = 1,5\text{ mol} \times 2 = \mathbf{3\text{ mol}}$$

Óxido 2 ( $\text{FeO}$ )

$$\text{Fe} = 77,8\% = 77,8\text{g} = \frac{77,8\text{ g}}{56\text{g/mol}} = 1,389\text{ mol} = \frac{1,389\text{ mol}}{1,325\text{ mol}} = 1,04\text{ mol} \cong \mathbf{1\text{ mol}}$$

$$\text{O} = 21,2\% = 21,2\text{g} = \frac{21,2\text{ g}}{16\text{ g/mol}} = 1,325\text{ mol} = \frac{1,325\text{ mol}}{1,325\text{ mol}} = 1\text{ mol} = \mathbf{1\text{ mol}}$$

06. Item B

Óxido

$$\text{Fe}_{\text{ox}} = 72,4\% = 72,4\text{g} = \frac{72,4\text{ g}}{56\text{g/mol}} = 1,292\text{ mol} = \frac{1,292\text{ mol}}{1,292\text{ mol}} = 1\text{ mol} \times 3 \cong \mathbf{3\text{ mol}}$$

$$\text{O}_{\text{ox}} = 27,6\% = 27,6\text{g} = \frac{27,6\text{ g}}{16\text{ g/mol}} = 1,725\text{ mol} = \frac{1,725\text{ mol}}{1,292\text{ mol}} = 1,33\text{ mol} \times 3 = \mathbf{4\text{ mol}}$$

Logo, a fórmula deste óxido é  $\text{Fe}_3\text{O}_4$ .

07. Item C

Óxido 2 ( $\text{N}_2\text{O}$ )

$$\text{N} = 2,8\text{g} = \frac{2,8\text{ g}}{14\text{g/mol}} = 0,2\text{ mol} = \frac{0,2\text{ mol}}{0,1\text{ mol}} = 2\text{ mol}$$

$$\text{O} = 1,6\text{g} = \frac{1,6\text{ g}}{16\text{ g/mol}} = 0,1\text{ mol} = \frac{0,1\text{ mol}}{0,1\text{ mol}} = 1\text{ mol}$$

Óxido 3 ( $\text{N}_2\text{O}_5$ )

$$\text{N} = 3,5\text{g} = \frac{3,5\text{ g}}{14\text{g/mol}} = 0,25\text{ mol} = \frac{0,25\text{ mol}}{0,25\text{ mol}} = 1\text{ mol} \times 2 = \mathbf{2\text{ mol}}$$

$$\text{O} = 10,0\text{g} = \frac{10,0\text{ g}}{16\text{ g/mol}} = 0,625\text{ mol} = \frac{0,625\text{ mol}}{0,25\text{ mol}} = 2,5\text{ mol} \times 2 = \mathbf{5\text{ mol}}$$

08. Item D

**Item E**

A substância  $\text{Fe}_2\text{O}_3$  tem massa molar igual a 160 g/mol, sendo que deste valor,  $2 \times 56\text{g} = 112\text{g}$  são do elemento ferro.

Assim, temos:

$$\begin{array}{r} 160\text{g} \text{-----} 100\% \\ 112\text{g} \text{-----} p \end{array}$$

$$P_{\text{Fe}} = \frac{112 \times 100\%}{160} = 70,0\%$$

Logo a hematita ( $\text{Fe}_2\text{O}_3$ ) tem composição percentual como  $\text{Fe}_{70\%}\text{O}_{30\%}$ .

Já a substância  $\text{Fe}_3\text{O}_4$  tem massa molar igual a 322 g/mol, sendo que deste valor,  $3 \times 56\text{g} = 168\text{g}$  são do elemento ferro.

Assim, temos:

$$\begin{array}{r} 322\text{g} \text{-----} 100\% \\ 168\text{g} \text{-----} p \end{array}$$

$$P_{\text{Fe}} = \frac{168 \times 100\%}{322} = 52,4\%$$

Logo a magnetita ( $\text{Fe}_3\text{O}_4$ ) tem composição percentual como  $\text{Fe}_{52,4\%}\text{O}_{47,6\%}$ .

09. Item A

**Ácido Ascórbico**

$$C = 40,92\% = 40,92\text{g} = \frac{40,92\text{g}}{12\text{g/mol}} = 3,41\text{ mol} = \frac{3,41\text{ mol}}{3,41\text{ mol}} = 1\text{ mol} \times 3 = 3\text{ mol}$$

$$O = 54,50\% = 54,50\text{g} = \frac{54,50\text{g}}{16\text{g/mol}} = 3,41\text{ mol} = \frac{3,41\text{ mol}}{3,41\text{ mol}} = 1\text{ mol} \times 3 = 3\text{ mol}$$

$$H = 4,58\% = 4,58\text{g} = \frac{4,58\text{g}}{1\text{g/mol}} = 4,58\text{ mol} = \frac{4,58\text{ mol}}{3,41\text{ mol}} = 1,34\text{ mol} \times 3 = 4\text{ mol}$$

10. Item E

Sal Hidratado

$$\text{H}_2\text{O} = 43,9\% = 43,9\text{g} = \frac{43,9\text{ g}}{18\text{g/mol}} = 2,44\text{ mol} = \frac{2,44\text{ mol}}{0,35\text{ mol}} = 7\text{ mol}$$

$$\text{ZnSO}_4 = 56,1\% = 56,1\text{g} = \frac{56,1\text{g}}{161,5\text{ g/mol}} = 0,35\text{ mol} = \frac{0,35\text{ mol}}{0,35\text{ mol}} = 1\text{ mol}$$

Logo, a fórmula deste sal é  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ .

11. Item C

$$8 \times 10^9 \text{ kg café} \times \frac{15 \text{ kg óleo}}{100 \text{ kg café}} \times \frac{1 \text{ m}^3 \text{ óleo}}{900 \text{ kg óleo}} \times \frac{1000 \text{ L óleo}}{1 \text{ m}^3 \text{ óleo}} = 1,33 \times 10^9 \text{ L óleo}$$

A análise dimensional leva a 1,33 bilhões de litros de óleo.

12. Item D

A substância  $\text{C}_{18}\text{H}_{26}\text{O}_2$  possui massa molar de 274g/mol, sendo que deste valor 18 x 12g = 216g são do elemento carbono.

$$\begin{array}{l} \text{a) } 274\text{g C}_{18}\text{H}_{26}\text{O}_2 \text{ ----- } 216\text{g C} \\ \quad 25\text{mg C}_{18}\text{H}_{26}\text{O}_2 \text{ ----- } m \end{array} \qquad \qquad \qquad m = 19,7 \text{ mg C}$$

$$\begin{array}{l} \text{d) } 1 \text{ semana ----- } 50 \text{ mg} \\ \quad 4 \text{ semanas ----- } 200 \text{ mg} \end{array} \qquad \qquad \qquad \frac{200 \text{ mg}}{70 \text{ kg corpo}} = 2,86 \text{ mg/kg}$$

Logo, está incorreto o item D.

13. Item A

$$1\text{L leite} \times \frac{1000\text{ mL leite}}{1\text{L leite}} \times \frac{25\%}{200\text{ mL leite}} \times \frac{2,4 \times 10^{-2}\text{ mol}}{100\%} \times \frac{40\text{ g}}{1\text{ mol}} = 1,2\text{ g}$$

A análise dimensional leva a 1,2g ou 1200mg de cálcio.

14. Item D

$$\frac{1\text{ molécula O}_2}{0,2 \times 10^6\text{ moléculas H}_2\text{O}} \times \frac{1\text{ mol O}_2}{6 \times 10^{23}\text{ moléculas O}_2} \times \frac{6 \times 10^{23}\text{ moléculas H}_2\text{O}}{1\text{ mol H}_2\text{O}} \times \frac{55,55\text{ mol H}_2\text{O}}{1\text{ L H}_2\text{O}} \cong 2,8 \times 10^{-4}\text{ mol/L}$$

15. Item E

$$500\text{ mL plasma} \times \frac{6,1 \times 10^{-8}\text{ g C}_3\text{H}_3\text{NO}_3}{1000\text{ mL plasma}} \times \frac{6,0 \times 10^{23}\text{ moléculas}}{183\text{ g}} = 1 \times 10^{14}\text{ moléculas}$$

A análise dimensional leva a  $1 \times 10^{14}$  moléculas. Como cada molécula tem 3 átomos de oxigênio, há  $3 \times 10^{14}$  átomos deste elemento (Item E).

16. Item A

A substância bisfenol  $\text{C}_{15}\text{H}_{16}\text{O}_2$  possui massa molar de 228g/mol. Durante o aquecimento da mamadeira – (23,12 – 0,32) – são transferidos 22,80 ng dessa substância para o interior do líquido.

$$22,8 \times 10^{-9}\text{ g} \times \frac{1\text{ mol}}{228\text{ g}} \times \frac{6,0 \times 10^{23}\text{ moléculas}}{1\text{ mol}} = 6,0 \times 10^{13}\text{ moléculas}$$

A análise dimensional leva a  $6,0 \times 10^{13}$  moléculas. (Item A).

17. Item A

$$1 \text{ grão} \times \frac{62,5 \text{ g milho}}{125 \text{ grãos}} \times \frac{56 \times 10^{-3} \text{ g Fe}}{1000 \text{ g milho}} \times \frac{6,0 \times 10^{23} \text{ átomos}}{56 \text{ g Fe}} = 3 \times 10^{17} \text{ átomos}$$

18. Item D

$$\text{R\$ } 675,00 \times \frac{1,0 \text{ g Au}}{\text{R\$ } 45,00} \times \frac{1 \text{ átomo}}{3,27 \times 10^{-22} \text{ g Au}} \times \frac{1 \text{ mol}}{6,022 \times 10^{23} \text{ átomos}} = 7,62 \times 10^{-2} \text{ átomos}$$

19. Item B

A contribuição individual de cada isótopo pode ser calculada como:

$$\text{Cu} = 62,96\text{u} \times \frac{70,5}{100} = 44,39\text{u}$$

$$\text{Cu} = 64,96\text{u} \times \frac{29,5}{100} = 19,16\text{u}$$

Somados, os valores encontrados levam o elemento cobre à massa de 63,55u.

20. Item C

A massa atômica de um elemento pode ser calculada pela média ponderada das massas dos respectivos isótopos.

$$35,47 = \frac{34,97 \times 75 + B \times 25}{100}$$

Isso levará a um número de massa B igual a 36,97u, portanto responderemos com 37u.