

EXERCÍCIO 1.

$$\text{massa atômica média} = 0.6909 \times 62.93 + 0.3091 \times 64.9278 \\ \approx 63.55 \text{ u.m.a.}$$

EXERCÍCIO 2.

$$\text{massa atômica média} = 0.1978 \times 10.0129 + 0.8022 \times 11.0093 \\ \approx 10.8122 \text{ u.m.a.}$$

EXERCÍCIO 3.

$$n = \frac{m}{M} \Leftrightarrow m = n \times M = 0.356 \text{ mol} \times 65.37 \text{ g/mol}$$

$$m \approx 23.3 \text{ g}$$

EXERCÍCIO 4.

$$n = \frac{m}{M} = \frac{16.3 \text{ g}}{32.06 \text{ g} \cdot \text{mol}^{-1}} \approx 0.51 \text{ mol}$$

$$N = 0.51 \text{ mol} \times 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$N \approx 3.06 \times 10^{23}$$

EXERCÍCIO 5.

$$\text{C}_2\text{H}_5\text{OH} \quad M = 2 \times 12.01 + 5 \times 1 + 16 \approx 46.02 \text{ g/mol}$$

$$\text{C}_8\text{H}_{18} \quad M = 8 \times 12.01 + 18 \times 1 \approx 114.08 \text{ g/mol}$$

EXERCÍCIO 6.

$$\text{CH}_4 \quad M = 12.01 + 4 \times 1 \approx 16 \text{ g/mol}$$

$$n = \frac{m}{M} = \frac{6.07 \text{ g}}{16 \text{ g} \cdot \text{mol}^{-1}} \approx 0.38 \text{ mol}$$

EXERCÍCIO 7.



$$M = 6 \times 12.01 + 12 \times 1 + 6 \times 16 \approx 180.06 \text{ g/mol}$$

$$n = \frac{856 \text{ g}}{180.06 \text{ g} \cdot \text{mol}^{-1}} \approx 4.75 \text{ mol}$$

$$n_{CO_2} = 4.75 \text{ mol de glicose} \times \frac{6 \text{ mol } CO_2}{1 \text{ mol de glicose}} \approx 28.5 \text{ mol}$$

$$m_{CO_2} = 28.5 \text{ mol} \times 44 \text{ g} \cdot \text{mol}^{-1} \\ \approx 1255 \text{ g}$$

EXERCÍCIO 8.



$$M = 12.01 + 4 \times 1 + 16 \approx 32.01 \text{ g/mol}$$

$$n_{CH_3OH} = \frac{209 \text{ g}}{32.01 \text{ g/mol}} \approx 6.53 \text{ mol}$$

$$n_{H_2O} = 6.53 \text{ mol de metanol} \times \frac{4 \text{ mol de } H_2O}{2 \text{ mol de metanol}} \\ \approx 13.06 \text{ mol}$$

$$m_{H_2O} = 13.06 \text{ mol} \times \frac{18 \text{ g}}{\text{mol}} \approx 235 \text{ g}$$

EXERCÍCIO 9.

$$n_{CO_2} = \frac{7.4 \text{ g}}{44 \text{ g} \cdot \text{mol}^{-1}} \approx 0.168 \text{ mol}$$

$$PV = nRT \Leftrightarrow V = \frac{nRT}{P}$$

$$V = \frac{0.168 \text{ mol} \times 0.082 \text{ atm} \cdot \text{L} \cdot \text{K}^{-1} \cdot \text{mol}^{-1} \times 273.15 \text{ K}}{1 \text{ atm}}$$

$$V \approx 3.8 \text{ L}$$

EXERCÍCIO 10.

$$T/K = 62^{\circ}\text{C} + 273.15$$

$$T = 335.15 \text{ K}$$

$$PV = nRT \Leftrightarrow P = \frac{nRT}{V} = \frac{6.9 \text{ mol} \times 0.082 \text{ atm} \cdot \text{L} \cdot \text{K}^{-1} \cdot \text{mol}^{-1} \times 335.15 \text{ K}}{30.4 \text{ L}}$$

$$P \approx 6.2 \text{ atm}$$

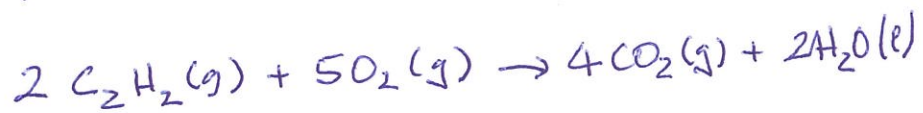
EXERCÍCIO 11.

$$T = 25^{\circ}\text{C} + 273.15 = 298.15 \text{ K}$$

$$\frac{P_i V = nRT_i}{P_f V = nRT_f} \Leftrightarrow \frac{T_f}{T_i} = \frac{P_f}{P_i} \Leftrightarrow T_f = T_i \times \left(\frac{P_f}{P_i}\right)$$

$$T_f = 298.15 \text{ K} \times \frac{2 \text{ atm}}{0.8 \text{ atm}} \approx 745.4 \text{ K} (\approx 472^{\circ}\text{C})$$

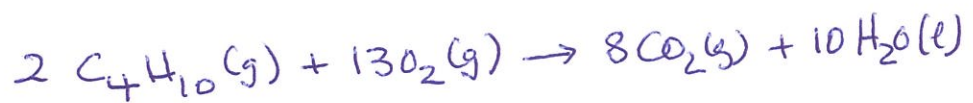
EXERCÍCIO 12.



$V \propto n$, logo

$$V_{\text{O}_2} = 2.64 \text{ L de acetileno} \times \frac{5 \text{ mol}}{2 \text{ mol}} \approx 6.6 \text{ L}$$

EXERCÍCIO 13.



$$V_{\text{O}_2} = 14.2 \text{ L de butano} \times \frac{13}{2} \approx 96.85 \text{ L}$$

EXERCÍCIO 14.



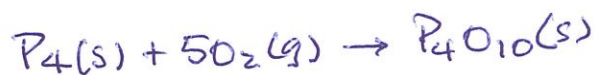
$$M = 1 \times 32.06 + 2 \times 16 = 64.06 \text{ g/mol}$$

$$n = \frac{87.9 \text{ g}}{64.06 \text{ g/mol}} \approx 1.37 \text{ mol}$$

$$\Delta H = -\frac{198.2 \text{ kJ} \times 1.37 \text{ mol}}{2 \text{ mol}} \approx -136 \text{ kJ}$$

logo libertam-se 136 kJ na forma de calor

EXERCÍCIO 15.



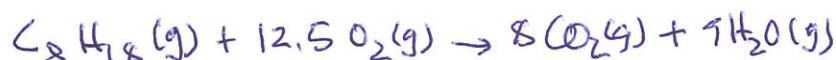
$$M = 4 \times 30.97 + 123.9 \text{ g/mol}$$

$$n = \frac{2.66 \text{ g}}{123.9 \text{ g/mol}} \approx 0.02 \text{ mol}$$

$$\Delta H = -3013 \text{ kJ} \times 0.02 = -64.7 \text{ kJ}$$

logo libertam-se 64.7 kJ na forma de calor

EXERCÍCIO 16. Octano, C_8H_{18}



$$m_{\text{O}_2} = 12.5 \text{ mol} \times \frac{32 \text{ g}}{\text{mol}} \approx 400 \text{ g}$$

massa de O_2 para a combustão de 1 kg de octano

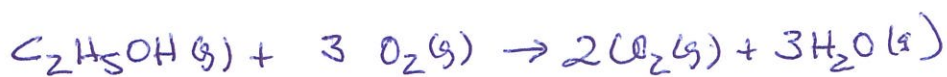
$$m = \frac{400}{114} \approx 3.51 \text{ kg}$$

$$m_{\text{ar}} = \frac{3.51}{0.23} \approx 15.2 \text{ kg}$$

logo o $A/F = 15.2$ (p/ a gasolina é 14.7)

EXERCÍCIO 17.

Etanol, C_2H_5OH



$$m_{O_2} = 3 \text{ mol} \times \frac{32 \text{ g}}{\text{mol}} = 96 \text{ g}$$

Para a combustão de 1 kg de etanol

$$m = \frac{96}{46} \approx 2.09 \text{ kg}$$

$$m_{ar} = \frac{2.09}{0.23} \approx 9.1 \text{ kg}$$

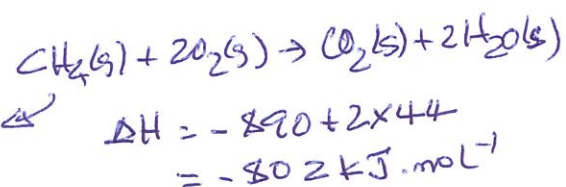
logo A/f ≈ 9.1

EXERCÍCIO 18.

$$\Delta H = \frac{-890 \text{ kJ} \cdot \text{mol}^{-1}}{16 \text{ g} \cdot \text{mol}^{-1}} \approx -55.6 \text{ kJ/g}$$

$$P.C.S = 55.6 \text{ kJ/g}$$

$$P.C.I = 50.1 \text{ kJ/g}$$



EXERCÍCIO 19.

$$\Delta H = -458 \text{ kcal} \cdot \text{mol}^{-1} \times \frac{4.184 \text{ kJ}}{1 \text{ kcal}} \approx -1916.3 \text{ kJ} \cdot \text{mol}^{-1}$$

$$\Delta H = \frac{-1916.3 \text{ kJ} \cdot \text{mol}^{-1}}{46 \text{ g} \cdot \text{mol}^{-1}} \approx 41.6 \text{ kJ/g}$$

$$P.C.S = 41.6 \text{ kJ/g}$$

$$P.C.I = 38.8 \text{ kJ/g}$$