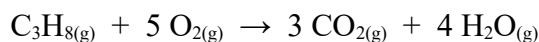


Problema 445: Calcula cando se desprenderá máis cantidade de calor queimando 1kg de gas propano C_3H_8 ou queimando 1kg de gas butano C_4H_{10} .

Calculamos a entalpía das reaccións usando as táboas de termoquímica e calculamos a calor desprendida por quilogramo:

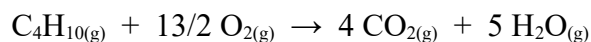


$$\Delta H^{\circ}_R = \sum n_p \cdot \Delta H^{\circ}_{f \text{ prod}} - \sum n_r \cdot \Delta H^{\circ}_{f \text{ react}}$$

$$\Delta H^{\circ}_R = 3 \text{ mol} \cdot \Delta H^{\circ}_f [CO_{2(g)}] + 4 \text{ mol} \cdot \Delta H^{\circ}_f [H_2O_{(g)}] - 1 \text{ mol} \cdot \Delta H^{\circ}_f [C_3H_{8(s)}]$$

$$\Delta H^{\circ}_R = 3 \text{ mol} \cdot \left(-393,7 \frac{\text{kJ}}{\text{mol}}\right) + 4 \text{ mol} \cdot \left(-241,8 \frac{\text{kJ}}{\text{mol}}\right) - 1 \text{ mol} \cdot \left(-103,8 \frac{\text{kJ}}{\text{mol}}\right) = -2044,5 \text{ kJ}$$

$$-2044,5 \frac{\text{kJ}}{\text{mol}} \cdot \frac{1 \text{ mol } C_3H_8}{44 \text{ g}} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} = -46.466 \frac{\text{kJ}}{\text{kg}}$$



$$\Delta H^{\circ}_R = \sum n_p \cdot \Delta H^{\circ}_{f \text{ prod}} - \sum n_r \cdot \Delta H^{\circ}_{f \text{ react}}$$

$$\Delta H^{\circ}_R = 4 \text{ mol} \cdot \Delta H^{\circ}_f [CO_{2(g)}] + 5 \text{ mol} \cdot \Delta H^{\circ}_f [H_2O_{(g)}] - 1 \text{ mol} \cdot \Delta H^{\circ}_f [C_4H_{10(s)}]$$

$$\Delta H^{\circ}_R = 4 \text{ mol} \cdot \left(-393,7 \frac{\text{kJ}}{\text{mol}}\right) + 5 \text{ mol} \cdot \left(-241,8 \frac{\text{kJ}}{\text{mol}}\right) - 1 \text{ mol} \cdot \left(-126,1 \frac{\text{kJ}}{\text{mol}}\right) = -2.657 \text{ kJ}$$

$$-2.657,7 \frac{\text{kJ}}{\text{mol}} \cdot \frac{1 \text{ mol } C_4H_{10}}{58 \text{ g}} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} = -45.822 \frac{\text{kJ}}{\text{kg}}$$

Aínda que o butano desprende máis calor por mol, desprende menos calor por quilogramo, por tanto desprendemos máis calor queimando 1kg de propano.