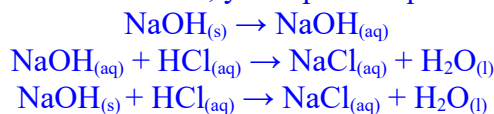


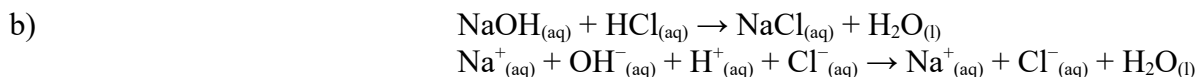
Problema 1121: Calcula ΔH° de las reacciones, y comprueba que se cumple la Ley de Hess.



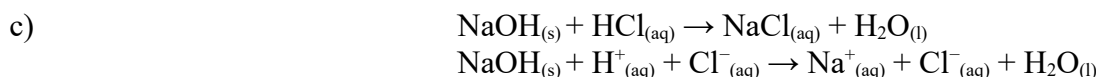
Sumando las dos primeras reacciones obtenemos la tercera, sumando los calores de las dos primeras debemos obtener el calor de la tercera según la ley de Hess.



$$\begin{aligned} \Delta H^\circ_R &= \sum n_p \Delta H^\circ_f \text{ prod.} - \sum n_r \Delta H^\circ_f \text{ react.} = \\ &= 1\text{mol} \cdot \Delta H^\circ_f [\text{Na}^+] + 1\text{mol} \cdot \Delta H^\circ_f [\text{OH}^-] - 1\text{mol} \cdot \Delta H^\circ_f [\text{NaOH}] = \\ &= 1\text{mol}(-240,0\text{kJ/mol}) + 1\text{mol}(-229,9\text{kJ/mol}) - 1\text{mol}(-426,7\text{kJ/mol}) = \underline{\underline{-43,2\text{kJ}}} \end{aligned}$$



$$\begin{aligned} \Delta H^\circ_R &= \sum n_p \Delta H^\circ_f \text{ prod.} - \sum n_r \Delta H^\circ_f \text{ react.} = \\ &= 1\text{mol} \cdot \Delta H^\circ_f [\text{Na}^+] + 1\text{mol} \cdot \Delta H^\circ_f [\text{Cl}^-] + 1\text{mol} \cdot \Delta H^\circ_f [\text{H}_2\text{O}] - \\ &- 1\text{mol} \cdot \Delta H^\circ_f [\text{Na}^+] - 1\text{mol} \cdot \Delta H^\circ_f [\text{OH}^-] - 1\text{mol} \cdot \Delta H^\circ_f [\text{H}^+] - 1\text{mol} \cdot \Delta H^\circ_f [\text{Cl}^-] = \\ &= 1\text{mol} \cdot \Delta H^\circ_f [\text{H}_2\text{O}] - 1\text{mol} \cdot \Delta H^\circ_f [\text{OH}^-] - 1\text{mol} \cdot \Delta H^\circ_f [\text{H}^+] = \\ &= 1\text{mol}(-285,0\text{kJ/mol}) - 1\text{mol}(-229,9\text{kJ/mol}) - 1\text{mol}(0\text{kJ/mol}) = \underline{\underline{-55,1\text{kJ}}} \end{aligned}$$



$$\begin{aligned} \Delta H^\circ_R &= \sum n_p \Delta H^\circ_f \text{ prod.} - \sum n_r \Delta H^\circ_f \text{ react.} = \\ &= 1\text{mol} \cdot \Delta H^\circ_f [\text{Na}^+] + 1\text{mol} \cdot \Delta H^\circ_f [\text{Cl}^-] + 1\text{mol} \cdot \Delta H^\circ_f [\text{H}_2\text{O}] - \\ &- 1\text{mol} \cdot \Delta H^\circ_f [\text{NaOH}] - 1\text{mol} \cdot \Delta H^\circ_f [\text{H}^+] - 1\text{mol} \cdot \Delta H^\circ_f [\text{Cl}^-] = \\ &= 1\text{mol} \cdot \Delta H^\circ_f [\text{Na}^+] + 1\text{mol} \cdot \Delta H^\circ_f [\text{H}_2\text{O}] - 1\text{mol} \cdot \Delta H^\circ_f [\text{NaOH}] - 1 \cdot \Delta H^\circ_f [\text{H}^+] = \\ &= 1\text{mol}(-240,0\text{kJ/mol}) + 1\text{mol}(-285,0\text{kJ/mol}) - 1\text{mol}(-426,7\text{kJ/mol}) - 1\text{mol}(0\text{kJ/mol}) = \underline{\underline{-98,3\text{kJ}}} \end{aligned}$$

$$\Delta H^\circ_A + \Delta H^\circ_B = -43,2\text{kJ} - 55,1\text{kJ} = -98,3\text{kJ} = \Delta H^\circ_C$$