

$$\Delta H = ?$$

Soln: $\Delta H = \sum \Delta H_f^\circ \text{ prod} - \sum \Delta H_f^\circ \text{ react}$

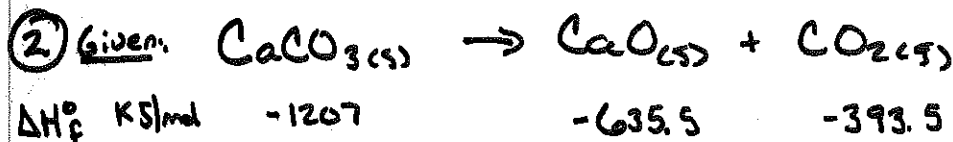
$$\sum \Delta H_f^\circ \text{ p} = (1 \text{ mol})(-393.5 \text{ KJ/mol}) + (2 \text{ mol})(-241.8 \text{ KJ/mol}) = -877.1 \text{ KJ}$$

$$\sum \Delta H_f^\circ \text{ r} = (1 \text{ mol})(-74.8 \text{ KJ/mol}) + 0 = -74.8 \text{ KJ}$$

$$\Delta H = -877.1 \text{ KJ} - (-74.8 \text{ KJ})$$

$$\Delta H^\circ = -802.3 \text{ KJ/mol rxn}$$

Exothermic



Soln: $\Delta H = \sum \Delta H_f^\circ \text{ p} - \sum \Delta H_f^\circ \text{ r}$

$$\sum \Delta H_f^\circ \text{ p} = (1 \text{ mol})(-393.5 \text{ KJ/mol}) + (1 \text{ mol})(-635.5 \text{ KJ/mol}) = -1029.0 \text{ KJ}$$

$$\sum \Delta H_f^\circ \text{ r} = (1 \text{ mol})(-1207 \text{ KJ/mol}) = -1207 \text{ KJ}$$

$$\Delta H = -1029.0 \text{ KJ} - (-1207 \text{ KJ}) = 178 \text{ KJ/mol rxn}$$



$$C_p = 0.385 \text{ J/g}^\circ\text{C}$$

$$m = 0.020 \text{ Kg} = 20. \text{ g}$$

$$T_1 = 25^\circ\text{C}$$

$$T_2 = 125^\circ\text{C}$$

$$Q = ?$$

$$\Delta T = T_2 - T_1$$

$$= 125^\circ\text{C} - 25^\circ$$

$$= 100^\circ\text{C}$$

Soln:

$$Q = m C_p \Delta T$$

$$= (20. \text{ g})(0.385 \text{ J/g}^\circ\text{C})(100.^\circ\text{C})$$

$$Q = 770 \text{ J}$$

④ Given: H_2O

$$C_p = 4.179 \text{ J/g}\cdot\text{C}^\circ$$

$$m = 1200 \text{ g}$$

$$T_1 = 19^\circ\text{C}$$

$$T_2 = ?$$

$$Q = -10 \text{ kJ} = -10,000 \text{ J}$$

lose: -

Soln: $Q = m c_p \Delta T$

$$\Delta T = \frac{Q}{m c_p}$$

$$= \frac{-10,000 \text{ J}}{(1200 \text{ g})(4.179 \text{ J/g}\cdot\text{C}^\circ)}$$

$$= -1.9^\circ\text{C}$$

$$\Delta T = T_2 - T_1$$

$$T_2 = \Delta T + T_1$$

$$= 19^\circ\text{C} + (-1.9^\circ\text{C})$$

$$= 17^\circ\text{C}$$

$$\boxed{T_2 = 17^\circ}$$

⑤ Given:



$$m_{\text{water}} = 100.0 \text{ g}$$

$$T_1 = 25.1^\circ\text{C}$$

$$m_{\text{CaCl}_2(\text{s})} = \text{dissolved} = 10.0 \text{ g}$$

$$T_2 = 42.7^\circ\text{C}$$

$$C_p = 4.18 \text{ J/g}\cdot\text{C}^\circ$$

$$\Delta H_{\text{soln}} = ?$$

Molar !!Soln:

$$\Delta T = T_2 - T_1 = 42.7^\circ\text{C} - 25.1^\circ\text{C}$$

$$\Delta T = 17.6^\circ\text{C}$$

$$Q_{\text{soln}} = m C_p \Delta T$$

$$= (100.0 \text{ g} + 10.0 \text{ g})(4.18 \text{ J/g}\cdot\text{C}^\circ)(17.6^\circ\text{C})$$

$$Q_{\text{soln}} = 8092 \text{ J}$$
$$= 8090 \text{ J}$$

mass of soln = water + solute

But this is for 10.0g CaCl_2
Not 1 mole!

$$\left(\frac{10.0 \text{ g CaCl}_2}{1} \right) \left(\frac{1 \text{ mole CaCl}_2}{110.98 \text{ g CaCl}_2} \right) = 0.0901 \text{ mole CaCl}_2$$

$$\Delta H_{\text{soln}} = -Q_{\text{water}} / \text{moles CaCl}_2$$

$$= -8090 \text{ J} / 0.0901$$

$$= -89800 \text{ J/mole}$$

$$= \boxed{-89.8 \text{ kJ/mole}}$$

