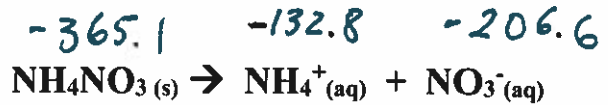
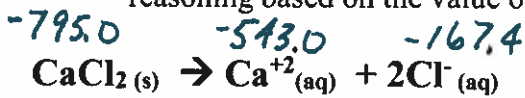


Enthalpy #3

Name: Answers

1. Athletes often use instant cold and hot packs as first-aid devices to treat injuries. These packs work by using the heat of solution concept discussed in class (ΔH_{soln}). Most packs consist of a plastic bag containing a granular dry chemical and a pouch of water. The dissolution reactions that occur in most packs are shown below.

- Find the ΔH_{soln} /mol of each equation.
- State which is the hot pack and which is the cold pack. Provide an explanation for your reasoning based on the value of ΔH_{soln} .



$$\Delta H = \text{products} - \text{reactants}$$

$$= (2(-167.4) + (-543.0)) - (-795.0)$$

$$= (-877.8) - (-795.0)$$

$$\Delta H = -82.8 \text{ kJ/mol}$$

Hot pack \rightarrow EXOTHERMIC

$$\Delta H = \text{products} - \text{reactants}$$

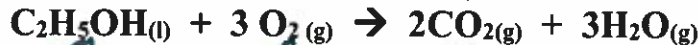
$$= (-132.8 + (-206.6)) - (-365.1)$$

$$= (-339.4) - (-365.1)$$

$$\Delta H = 25.7 \text{ kJ/mol}$$

Cold pack \rightarrow ENDOTHERMIC

2. The burning of gasoline contains ethanol ($\text{C}_2\text{H}_5\text{OH}$) which burns in the presence of O_2 to produce CO_2 and water.



- How much heat is produced per mole of ethanol?



$$\Delta H = \text{products} - \text{reactants}$$

$$= (2(-393.5) + 3(-241.8)) - (-277.6)$$

$$= -1512.4 - (-277.6)$$

$$\Delta H = -1234.8 \text{ kJ/mol}$$

- How much heat is produced when 12.5 g of ethanol are burned?

$$\frac{1 \text{ mol C}_2\text{H}_5\text{OH}}{x} = \frac{46.08}{12.5}$$

$$x = 0.271 \text{ mol}$$

$$\Delta H = \frac{Q}{n}$$

$$-1234.8 \text{ kJ} = \frac{Q}{0.271 \text{ mol}}$$

$$Q = -335 \text{ kJ}$$