Outline for Today
Wednesday, Oct. 10

- Chapter 5: Thermochemistry
  - Constant Pressure Calorimetry
  - Constant Volume Calorimetry
- Professor Troisi will lead you all in a Mid-Semester Course Analysis to get anonymous feedback about CH141

Example: Constant Pressure Calorimetry; Determining ΔT

- **0.20 mol** of HCl (g) is dissolved into **500. g of water**. Assuming all of the heat is transferred to the water (none is lost to the surroundings), what is the temperature change (**C_s=4.184 J/(g K)**)?

$$HCl(g) \rightarrow HCl(aq) \qquad \Delta H_{rxn} = -17.88 \text{ kJ/mol}$$

Example: Constant Pressure Calorimetry; Determining ΔH_{rxn}

- When **10.0 g** of **H_2O_2** (l) decomposes into **water** and **oxygen** gas in a constant pressure calorimeter with a C_{cal} of **400.0 J/K**, the temperature increases by **72 K**. What is the balanced chemical reaction and the Enthalpy of the reaction?

Example: Constant Pressure Calorimetry; Determining Mass of Reactant

- **10. g** of **ammonium nitrate** **(ΔH_{soln}=25.69 kJ/mol)** is dissolved in water in a calorimeter with unknown C_{cal} and the temperature changes from **300. K** to a final temperature of **297.33 K**.

- In a separate experiment with *the same calorimeter*, an unknown mass of ammonium nitrate is dissolved into the water and the temperature decreases by **18.7 K**. **What is the mass of ammonium nitrate dissolved?**

Example: Constant Pressure Calorimetry; Determining Mass of Reactant

- **10. g** of **ammonium nitrate** **(ΔH_{soln}=25.69 kJ/mol)** is dissolved in water in a calorimeter with unknown C_{cal} and the temperature changes from **300. K** to a final temperature of **297.33 K**.

- **What is C_{cal} of the calorimeter?**

- In a separate experiment with *the same calorimeter*, an unknown mass of ammonium nitrate is dissolved into the water and the temperature decreases by **18.7 K**. **What is the mass of ammonium nitrate dissolved?**

Example: Constant Pressure Calorimetry

- What would the expected **temperature change** be in a *bomb calorimeter* (**C_{cal}=5.431 kJ/K**) if **2.0 g** of methane is combusted?

- $CH_4\,(g) + 2O_2\,(g) \rightarrow CO_2\,(g) + 2H_2O\,(l)$ **ΔE_{rxn}=-883 kJ/mol**