

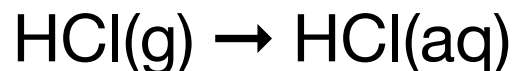
Outline for Today

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 (**$C_s=4.184 \text{ J/(g K)}$**)?



$$\Delta H_{\text{rxn}} = -17.88 \text{ kJ/mol}$$

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 ($\Delta H_{\text{soln}}=25.69 \text{ kJ/mol}$) 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 ($\Delta H_{\text{soln}}=25.69 \text{ kJ/mol}$) 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* ($C_{\text{cal}}=5.431 \text{ kJ/K}$) if **2.0 g** of methane is combusted?
- $\text{CH}_4 (\text{g}) + 2\text{O}_2 (\text{g}) \rightarrow \text{CO}_2 (\text{g}) + 2\text{H}_2\text{O} (\text{l})$ $\Delta E_{\text{rxn}}=-883 \text{ kJ/mol}$