## 6.2) Enthalpy and Calorimetry

Study of the heat of a reaction or change in enthalpy , $\Delta H$

Change in enthalpy: $\Delta H = H_{products} - H_{reactants}$

**Calorimetry:** the science of measuring heat

**$q = C_p \times m \times \Delta T$**

q is heat in Joules. Extensive property

$C_p$, heat capacity. Amount of heat energy required to raise 1 gram 1ºC

m, amount of substance in grams

$\Delta T$, change in ºC (or Kelvins). Intensive property

**Ex.** 50.0 ml L of 1.00*M* $Ba(NO_3)_2$ solution at 26.5ºC is added to 50.0 ml of 1.00 *M* $Na_2SO_4$at 25ºC. The white solid $BaSO_4$ forms and the temperature rises to 28.1ºC. Assuming that the calorimeter absorbs no heat, that the solution has a heat capacity of 4.18 J/g·ºC, and that the solution has a density of 1.0 g/ml, calculate the enthalpy change per mole of $BaSO_4$ formed.

$$Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \longrightarrow BaSO_{4(s)}$$

$q = (4.184\ J/g.^oC)\ (50.0 + 50.0g)\ (28.1 - 26.5^oC) = -669\ J$

mol = (0.0500 L x 1.00 *M*) = 0.0500 mol $Ba^{2+}$ = mol $SO_4^{2-}$ = mol $BaSO_4$

$\Delta H = -669\ kJ / 0.0500\ mol = 13.4\ kJ/mol$

**Constant Pressure Bomb calorimeter and Calorimeter Constant**

Done at constant volume so $\Delta E = q$

Calorimeter constant is a value for the calorimeter and all of its parts, expressed as kJ/ºC

**Ex. P.242 Sample Ex. 6.6**

**In Class: P.267 #31, 32, 33, 34, 35, 39**

**Homework: P.268 #36, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56**