5.5 Standard Enthalpies of Formation

- The examples in the textbook are essential for your understanding of the concept.
- Enthalpies of reaction can be calculated using Calorimetry or Hess's law.
- The third method uses tabulated enthalpy changes (standard enthalpy of formation) for a special set of reactions called formation reactions.
- Standard Enthalpy of Formation: the quantity of energy associated with the formation of one mole of a substance from its elements in their standard states (SATP).

- E.g.: $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta H°_f = -393.5$ kJ/mol

Writing Formation Equations

Step 1: Write one mole of product in the state that has been specified

$CO_{(g)}$

Step 2: Write the reactant elements in their standard states

$C_{(s)} + O_{2(g)} \rightarrow CO_{(g)}$

Step 3: Choose equation coefficients for the reactants to give a balanced equation yielding one mole of product.

$C_{(s)} + \frac{1}{2} O_{2(g)} \rightarrow CO_{(g)}$

Using Standard Enthalpies of Formation

- The standard enthalpy of formation ($\Delta H°_f$) of an element (e.g. O_2) already in its standard state is zero.
- Use the formula $\Delta H = \sum n\Delta H°_{f(products)} - \sum n\Delta H°_{f(reactants)}$

Multi-step Energy Calculations Using $\Delta H°_f$

- Remember $\Delta H = q$ and $\Delta H = n\Delta H_x$ and everything from the earlier chapters

Homework

- Practice 1,2,3,4,5,7,8
- Questions 1,2,3,4