

5.5 Standard Enthalpies of Formation

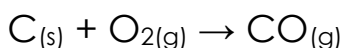
- The examples in the textbook are essential for your understanding of the concept.
 - Enthalpies of reaction can be calculated using Calorimetry or Hess's law.
 - The third method uses tabulated enthalpy changes (standard enthalpy of formation) for a special set of reactions called formation reactions.
 - 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.: $\text{C}_{(\text{s})} + \text{O}_{2(\text{g})} \rightarrow \text{CO}_{2(\text{g})} \quad \Delta H^{\circ}_{\text{f}} = -393.5 \text{ kJ/mol}$

Writing Formation Equations

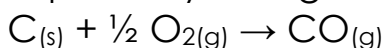
Step 1: Write one mole of product in the state that has been specified



Step 2: Write the reactant elements in their standard states



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



Using Standard Enthalpies of Formation

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

Multi-step Energy Calculations Using $\Delta H^{\circ}_{\text{f}}$

- Remember $\Delta H = q$ and $\Delta H = n\Delta H_{\text{x}}$ and everything from the earlier chapters

Homework

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