Thermochemistry Unit Outline

Vocabulary
- thermochemistry
- chemical potential energy
- heat
- law of conservation of energy
- endothermic process
- exothermic process
- heat capacity
- specific heat
- calorimetry
- calorimeter
- enthalpy
- thermochemical equation
- heat of reaction
- heat of combustion
- molar heat of fusion
- molar heat of solidification
- molar heat of vaporization
- molar heat of condensation
- molar heat of solution
- Hess’s Law
- standard heat of formation

Key Points
- Energy changes occur as either heat transfer or work, or a combination of both.
- During any chemical or physical process, the energy of the universe remains unchanged.
- The heat capacity of an object depends on both its mass and its chemical composition.
- The value of $\Delta H$ of a reaction can be determined by measuring the heat flow of the reaction at a constant pressure.
- In a chemical equation, the enthalpy change for the reaction can be written as either a reactant or a product.
- The quantity of heat absorbed by a melting solid is exactly the same as the quantity of heat released when the liquid solidifies. $\Delta H_{\text{fus}} = -\Delta H_{\text{solid}}$.
- The quantity of heat absorbed by a vaporizing liquid is exactly the same as the quantity of heat released when the vapor condenses. $\Delta H_{\text{vap}} = -\Delta H_{\text{cond}}$.
- During the formation of a solution, heat is either released or absorbed.
- Hess’s Law allows you to determine the heat of a reaction indirectly by using the known heats of reaction of two or more thermochemical equations.
- For a reaction that occurs at standard conditions, you can calculate the heat of reaction by using the standard heats of formation.

Key Equations

$$q = mc\Delta T$$

$$q_{\text{sys}} = \Delta H = -q_{\text{surr}} = -mc\Delta T$$

$$c = \frac{q}{m\Delta T}$$

$$\Delta H^\circ = \Delta H_f^\circ (\text{products}) - \Delta H_f^\circ (\text{reactants})$$