Chapter 4:: Thermochemistry

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Thermochemistry

Motivation

We want to study the relation ship between energy and chemical reactions, along with transformations between forms of energy on a macroscopic scale. Recall that the following happens during reactions::

- Bonds broken $\implies$ requires energy (endothermic, $\Delta H > 0$)
- Bonds formed $\implies$ releases energy (exothermic, $\Delta H < 0$)
- Temperature change
- Gases released or consumed (due to work)

Enthalpy of reactions

- $\forall R(P \equiv const)$, we have that $q_P = \Delta_r H$ (standard enthalpy of reaction).
- $\Delta_r H^\circ$ has units of kJ
- $\Delta_r H^\circ$ is the enthaly change when reactants in standard state are converted to products in **standard state**.
- Enthalpy is an extensive property.

Hess' law

Recall that the standard change in enthalpy for a reaction can be calculated with::

$$\Delta_r H^\circ = \sum_{products} v\Delta_f \bar{H}^\circ_{prod} - \sum_{reactants} v\Delta_f \bar{H}^\circ_{rxt}$$

where v is the stoichiometric coefficients of the products and reactants respectively.