

CHAPTER HIGHLIGHTS

Thermochemistry

Vocabulary

thermochemistry
calorimeter
temperature
joule
heat
specific heat
enthalpy change
enthalpy of reaction
thermochemical equation
molar enthalpy of formation
enthalpy of combustion
Hess's law

- Thermochemistry is the study of the changes in energy that accompany chemical reactions and physical changes.
- A thermochemical equation is an equation that includes the quantity of energy released or absorbed as heat during the reaction as written.
- An enthalpy change is the amount of energy absorbed as heat by a system in a process carried out at constant pressure.
- The enthalpy of reaction is the enthalpy change that occurs during a chemical reaction.
- The enthalpy change is negative for exothermic reactions and positive for endothermic reactions.
- Compounds with highly negative enthalpies of formation tend to be stable; compounds with highly positive or only slightly negative enthalpies of formation tend to be unstable.
- The standard molar enthalpy of formation is the enthalpy change that occurs when one mole of a compound is formed from its elements in their standard states at 25°C and 1 atm.
- The enthalpy change that occurs in a combustion reaction is called the enthalpy of combustion.
- Enthalpies of reaction can be calculated by using enthalpies of formation of reactants and products.

Driving Force of Reactions

Vocabulary

entropy
free energy
free-energy change

- The tendency throughout nature is for a reaction to proceed in the direction that leads to a lower energy state.
- Entropy is a measure of the randomness of a system.
- Free-energy change combines the effects of entropy and enthalpy changes and temperature of a system, and it is a measure of the overall tendency toward natural change.
- A reaction is spontaneous if it is accompanied by a decrease in free energy. It is not spontaneous if there is an increase in free energy.