

Review Sheet for Exam on Thermodynamics

This review sheet provides a summary of topics covered in this section of the course, a list of equations that you should know, and a list of constants and other materials that are provided to you. As Chem 170 is a prerequisite for this course, you should be familiar with basic stoichiometric calculations.

Topics Covered

- types of chemical reactions
- reaction energy diagrams
- thermodynamics vs. kinetics
- calorimetry
- enthalpy (including enthalpies of atom combination and formation)
- Hess's law
- entropy
- Gibbs's free energy
- predicting signs of ΔH° , ΔS° , and ΔG° and predicting effect of temperature on ΔG°
- thermodynamics of redox reactions
- relationship between thermodynamics (ΔG°), equilibrium (K) and potential (E°)

Equations You Should Know

- $-q_{rxn} = q_{soln} = mS\Delta T$
- $\Delta H = \frac{q_{rxn}}{n_{LR}} \times \frac{\nu_{LR}}{\text{mol}_{rxn}}$
- $\Delta H^\circ = \left[\sum_i n_i \Delta H_{f,i}^\circ \right]_{products} - \left[\sum_j n_j \Delta H_{f,j}^\circ \right]_{reactants}$
- $\Delta S^\circ = \left[\sum_i n_i \Delta S_{f,i}^\circ \right]_{products} - \left[\sum_j n_j \Delta S_{f,j}^\circ \right]_{reactants}$
- $\Delta G^\circ = \left[\sum_i n_i \Delta G_{f,i}^\circ \right]_{products} - \left[\sum_j n_j \Delta G_{f,j}^\circ \right]_{reactants}$
- $\Delta S^\circ = \frac{\Delta H_{unavail}^\circ}{T}$
- $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ = -RT\ln K = -nFE^\circ$
- $\Delta G = \Delta G^\circ + RT\ln Q$
- $E_{rxn}^\circ = E_{red}^\circ + E_{ox}^\circ$

Constants and Other Materials Provided To You

- periodic table
- specific heat of water = 4.184 J/g • °C
- R = 8.314 J/K • mol_{rxn}
- F = 96,485 C/mol e⁻ = 96,485 J/V • mol e⁻