

Chapter 16 Spontaneity, Entropy, & Free Energy

- Spontaneous Process: a process that occurs without outside intervention.
- 2nd Law of Thermodynamics: $\Delta S_{\text{univ}} = \Delta S_{\text{sys}} + \Delta S_{\text{surr}}$
 - If the $\Delta S_{\text{univ}} > 0$ then it is a spontaneous process
 - $\Delta S_{\text{surr}} = -\frac{\Delta H}{T}$
- 3rd Law of Thermodynamics: the entropy of a perfect crystal at 0 K is zero.
 - Vibrations occur above this temperature
- Gibb's Free Energy
 - $G = H - TS$
 - $\Delta G = \Delta H - T\Delta S$
 - Neg./Pos. ΔG means
- Use of Products – Reactants
- $G = G^\circ + RT \ln(P)$
 - Free energy with Pressure
- $\Delta G = \Delta G^\circ + RT \ln(Q)$
 - ΔG value for a reaction at conditions other than standard conditions
- $\Delta G^\circ = -RT \ln(K_{\text{eq}})$
 - Free energy with K_{eq}
- I am probably forgetting something...

Chapter 17 Electrochemistry

- Balance REDOX reaction
- Galvanic/Voltaic Cell vs. Electrolytic Cell
- Calculating E_{cell} .
 - $E_{\text{cell}} = E_{\text{cathode}} + E_{\text{anode}}$ (using Red & Ox potentials)
 - $E_{\text{cell}} = -[E_{\text{anode}} - E_{\text{cathode}}]$ (using Red potentials)
 - $E_{\text{cell}} = E_{\text{cathode}} - E_{\text{anode}}$ (using Red potentials)
- Cathode and Anode:
 - What happens there?
 - Where are they usually located?
- $\Delta G = -nFE$
- Nernst Equation
 - $E = E^\circ - \frac{RT}{nF}(\ln Q)$
- $I(\text{amps}) = \frac{\text{Charge(Coulombs)}}{\text{Time(sec.)}}$
- Quantitative Work with Cells
- I am probably forgetting something...

Some Good Problems (maybe)

Ch16: 49, 57, 61, 63, 75, 81, 85

Ch17: 71, 101, 103, 109, 113