Chem 101B Exam 4 Concepts

Chapter 17 – Thermodynamics

✓ Entropy and statistical number of states

✓ Spontaneous change when $\Delta S_{univ} > 0$ or $\Delta G_{sys} < 0$

✓ Three laws of thermodynamics

✓ Predict the sign of ΔS in any change

✓ Calculate when change is spontaneous for temperature-dependent spontaneity ($\Delta G < 0$)

✓ $K \Leftrightarrow \Delta G°$

✓ ΔG vs $\Delta G°$

✓ Calculate $\Delta S°_{rxn}$ from S reactants and products (similarly calculate $\Delta G°_{rxn}$ and $\Delta H°_{rxn}$ from $\Delta G°_f$ and $\Delta H°_f$)

✓ Calculate ΔG using $\Delta G=\Delta H-T\Delta S$ scenarios of spontaneity

✓ Scenarios $\Delta G=\Delta H-T\Delta S$ for spontaneity (2 scenarios are temperature-dependent; 2 are not)

Chapter 18 – Electrochemical Cells

✓ Write and balance standard cell reaction, predict standard cell potential $\mathscr{E}°$, using standard reduction potentials.

✓ Predicting oxidation and reduction abilities given standard reduction potentials.

✓ Determine number of electrons transferred in redox equation (n)

✓ Balance redox equation in acidic or basic media.

✓ Voltaic vs electrolytic cells

✓ $\mathscr{E}$ vs $\mathscr{E}°$

✓ $K \Leftrightarrow \Delta G° \Leftrightarrow \mathscr{E}°$

✓ Calcualte $\mathscr{E}$ from $\mathscr{E}°$, temperature, and concentrations (i.e. Q)

✓ Electroplating a metal, with a half reaction (dimensional analysis)
  ⇨ Calculate mass plated from current and time
  ⇨ Calculate time to plate given mass and current
  ⇨ Calculate current need to plate a given mass and time