Chem 30A: Exam Topics to Review for Tro Chpts 15 and 17

Chpt 15. Chemical Equilibrium

1. Reaction rate: the speed of a reaction
   i. Understand that reaction rate is based on 1) frequency of collisions with correct orientation, and 2) activation energy: the energy needed for reactants to surmount the energy barrier to reaction (energy needed to activate the reactants so that they can undergo the chemical transformation). The higher the activation energy, the slower the rate.
   ii. Be able to state the effects of temperature, reactant concentrations, and catalyst on the reaction rate, and reasons behind their effects.
2. Chemical equilibrium:
   i. Understand definition of reversible reaction: a reaction that can go in either direction, from products to reactants or reactants to products
   ii. Understand equilibrium: a state in which the rates of forward and reverse reactions are the same, so the concentrations of reactants and products remain constant
   iii. Know how to write an equilibrium constant expression, given the reaction equation.
   iv. Calculate the equilibrium constant, given concentrations of substances in the reaction.
   v. The equilibrium constant tells extent of reaction: If K>1, there is more product than reactants (product is favored), and reaction has gone nearly to completion. If K < 1, there is more reactants than products (reactant is favored), and the reactions has progressed very little.
3. Le Chatlier's principle: When a system at equilibrium is disturbed, the equilibrium shifts to relieve (counteract) the disturbance.
   i. Equilibrium shift: Concentrations of products and reactants change to new, constant values (a new equilibrium state is reached).
   ii. If equilibrium shifts to right, it means more products are present at the new equilibrium than at the old equilibrium (products are "favored"). If equilibrium shifts to left, it means more reactants are present at the new equilibrium than at the old equilibrium (reactants are "favored").
   iii. Given a disturbance (change in concentration, pressure/volume, temperature, catalyst), predict whether equilibrium shifts to left or to right, or stays the same.

Chpt 17. Radioactivity and Nuclear Chemistry

1. Write balanced nuclear equations.
2. Solve radioactivity half-life problems.
3. Understand ionizing and penetrating effects of α particle, β particle, and γ ray on human.

Memorize

Process	Particle Involved
α emission	$^{4}_{2}He$
β emission	$^{0}_{-1}e$
γ emission	$^{0}_{0}\gamma$
Positron emission	$^{0}_{1}e$