

## Review for Second Exam:

### Chapter 15

Definition of equilibrium; equilibrium as a dynamic process  
Equilibrium constant;  $K_C$  and  $K_p$ ; significance of the equilibrium constant  
Properties of equilibrium constant

- Lack of units for  $K_C$  and  $K_p$
- Relationship between  $K_C$  and  $K_p$
- Relationship between  $K$  and the way a reaction is written
- Things that do not appear in  $K$  (solids, pure liquids, solvents)

Finding numerical values for  $K$   
Using  $K$  to find equilibrium concentrations

- ICE method (initial, change, equilibrium)
- Quadratic equation; quadratic formula
- Conditions where  $x$  in ICE method can be assumed small

Trends in  $K$ ; equilibrium when  $K \gg 1$  or  $K \ll 1$   
Reaction quotient ( $Q$ ); definition, relationship between  $Q$  and  $K$   
Use of reaction quotient to predict how systems will approach equilibrium  
Le Chatelier's principle and its applications  
Definition of the thermodynamic reaction quotient ( $Q$ ) and equilibrium constant ( $K$ )  
Free energy change for non-standard conditions  
Use of thermodynamic data to find the value for  $K$  (equilibrium constant)  
Temperature dependence of  $K$

### Chapter 16 (16.1, 16.3, 16.4, 16.5)

Arrhenius definition of acids and bases  
Bronsted definition of acids and bases; acid/conjugate base and base/conjugate acid pairs  
Finding the conjugate acid and conjugate base for a substance  
 $K_a$  (acid ionization constant) and  $K_b$  (base ionization constant)  
Amphoteric substances; definition and examples  
The seven strong acids; strong and weak acids  
The eight strong soluble bases; insoluble bases; weak bases  
Comparing relative strengths of weak acids or weak bases  
Autoionization of water;  $K_w$ ;  $[H_3O^+]$  and  $[OH^-]$  for neutral solutions at  $T = 25\text{ }^\circ\text{C}$   
Acid, basic, and neutral solutions  
pH; definition and calculation; relationship between pH and  $[H_3O^+]$   
pOH and pK; relationship between pH, pOH, and  $pK_w$   
pH and pOH for strong acids and strong bases