

Unit 4 Review

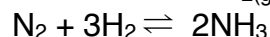
- What is meant by the term dynamic equilibrium?
- What are the three types of equilibria we covered in class?
- What does K_{eq} describe? Using K_{eq} , how would you know when products are favored? Reactants?
- What happens to a systems in equilibriums when: The concentration of reactants is increased, the concentration of products is increased, the concentration of reactant is decreased, temperature is increased, temperature is decreased, a catalyst is added, pressure is increased, volume is increased.
- Know what the hundred rule is and when to apply it.
- What is reaction quotient? How can it help you determine the direction of the reaction?
- What does K_{sp} stand for? How can it be used to determine if a precipitate will form?
- List properties of both acids and bases.
- What is Arrhenius' definition of an acid? Bronsted-Lowry?
- What does the term amphoteric mean?
- Do strong acids ionize completely in water? What about weak acids?
- What salts may be acidic in water? Basic?
- What is a buffer and how do they work?
- What does K_a stand for and how does it relate to the strength of an acid. K_b ?
- What is titration? What are the products of titration always going to be?
- Describe how to identify the equivalence point.

Skills

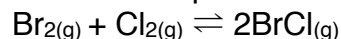
- Be able to write a K_{eq} expressions
- Calculate K_{eq} using a variety of methods (initial concentration, partial pressures, ICE table)
- Use the quadratic formula to solve for equilibrium concentration.
- Use K_{sp} to solve for the equilibrium concentration of various ions.
- Use solubility to solve for K_{sp}
- Calculate pH using pOH or concentration of hydrogen
- Calculate percent ionization
- Calculate K_a and K_b using pH and initial concentration

Practice Problems:

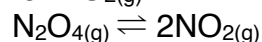
In a 5 L flask, 0.1 mols of $\text{N}_2(\text{g})$ and 0.3 moles of $\text{NH}_3(\text{g})$ was recorded. If $K_{\text{eq}}=3.1 \times 10^{-2}$, what is the concentration of $\text{H}_2(\text{g})$ at equilibrium?



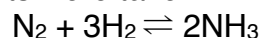
$\text{Br}_2(\text{g})$ and $\text{Cl}_2(\text{g})$ establish an equilibrium to form BrCl . The K_{eq} for this reaction is 28.8. If 8.0 mol of $\text{Br}_2(\text{g})$ and 8.0 mol of $\text{Cl}_2(\text{g})$ are initially placed into a 2 L flask, what is the concentration of BrCl at equilibrium?



9.8 mol of $\text{N}_2\text{O}_4(\text{g})$ was initially placed into an 8 L flask and was allowed to come to equilibrium. If the K_{eq} for the equation is 8.9×10^{-11} , what is the equilibrium concentration of $\text{NO}_2(\text{g})$?



At a single point in time, it was determined that a reaction contained 0.3 M N_2 , 0.5 M H_2 , and 1.0 M NH_3 . If K_{eq} for the reaction is 50, is the reaction at equilibrium when the measurements were taken?



The solubility of silver sulfide, Ag_2S is 3.0×10^{-3} M. What is the K_{sp} of silver sulfide dissolving in water?

The K_{sp} of NaCl is 1.38. What is the equilibrium concentration of chloride ions in a saturated solution?

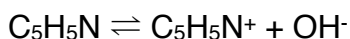
What is the pH of a solution containing 3.0 M H_3O^+ ions?

What is the pOH of a solution containing 3.0×10^{-4} M H_3O^+ ions?

Propanoic acid is a weak acid. If 1.0 M solution has a pH of 3.8, calculate the percent ionization of propanoic acid.



Pyridine, $\text{C}_5\text{H}_5\text{N}$, is a weak base. If 0.38 M solution has a pH of 10.98, what is the percent ionization of pyridine?



50 mL of 1.0 M LiOH is titrated with 1.3 M HF . Calculate the pH after the addition of 35 mL of HF .

