AP CHEMISTRY CHAPTER 14 OUTLINE

ACIDS AND BASES

14.1: THE NATURE OF ACIDS AND BASES

Acids

Bases (alkalis)

Arrhenius Concept

Bronsted-Lowry Model

Hydronium ion

Conjugate base

Conjugate acid

Conjugate acid-base pair

Example

HA(aq) + H2O(l) ↔ H3O+(aq) + A-(aq)

Acid Dissociation Constant (Ka)

Note: B-L definition can also be applied to reactions in the gas phase

NH3(g) + HCl(g) ↔ NH4Cl(s)

14.2: ACID STRENGTH

Strong Acid

Weak Acid

Diprotic Acid

Ways to describe Acid Strength

|  |  |  |
| --- | --- | --- |
| PROPERTY | STRONG ACID | WEAK ACID |
| Ka Value |  |  |
| Equilibrium position |  |  |
| Equilibrium [H+] vs [HA]o |  |  |
| Strength of Conjugate base vs water |  |  |

Oxyacids

Organic Acids

Using Table 14.2

Water as an Acid and a Base

Amphoteric

Autoionization of water

H2O(l) + H2O(l) ↔ H3O+(aq) + OH-(aq)

Kw and its meaning

14.3: THE pH SCALE

Significant figures and logarithms

Why is it that pH + pOH = 14

How do I solve acid-base problems successfully?

* Think Chemistry
* Be systematic
* Be flexible
* Be patient
* Be confident

14.4: CALCULATING THE pH OF STRONG ACID SOLUTIONS

Determine the major components of a solution

Which components are significant?

Example: the pH of a 1.0 M HCl solution

14.5: CALCULATING THE pH OF WEAK ACID SOLUTIONS

Example: Develop a strategy to calculate the pH of a 1.00 M HF. Ka = 7.2 x 10-4

Solving Weak Acid Equilibrium Problems

* List the major species in the solution
* Choose the species that can produce H+, and write balanced equations for the reactions producing H+
* Using the values of the equilibrium constants for the reactions you have written, decide which equilibrium will dominate in producing H+
* Write the equilibrium expression for the dominant equilibrium
* Use an ICE table
* Solve the “x” the easy way and use the 5% rule to determine validity
* Calculate [H+] and pH

The pH of a Mixture of Weak Acids

Percent Dissociation

Example: In a 1.00 M solution of HF, [H+] = 2.7 x 10-2M. What is the percent dissociation of HF?

For a given weak acid: The percent dissociation increases as the acid becomes more dilute

14.6: BASES

Strong Bases

Bases without OH-

Kb

Weak bases

14.7: POLYPROTIC ACIDS

Example: phosphoric acid

14.8: ACID-BASE PROPERTIES OF SALTS

Salt

Salts That Produce Neutral Solutions

Salts That Produce Basic Solutions

Base Strength in Aqueous Solution

Salts That Produce Acidic Solutions

Highly Charged Metal Ions

Summary of Types of Salts

14.9: THE EFFECT OF STRUCTURE ON ACID-BASE PROPERTIES

14.10: ACID-BASE PROPERTIES OF OXIDES

14.12: STRATEGY FOR SOLVING ACID-BASE PROBLEMS: A SUMMARY