

## Chemistry AP Unit 6 Outline: Acids-Bases and Solubility Equilibria

### Chapter 15: Acids and Bases

Classes	Topics	Suggested Reading	✓	Assignments	✓
1	Physical and Chemical Properties of Acids and Bases, Arrhenius Concept, Brønsted-Lowry Model, Hydronium Ion, Conjugate Acid, Conjugate Base, Conjugate Acid-Base Pair, Acid Dissociation Constant ( $K_a$ ), Base Dissociation Constant ( $K_b$ ), Autoionization of Water, pH and pOH Scales, $\text{pH} = -\log [\text{H}_3\text{O}^+]$ , $\text{pOH} = -\log [\text{OH}^-]$ , $K_w = [\text{H}_3\text{O}^+][\text{OH}^-]$ , $\text{pH} + \text{pOH} = 14$ , Strong Acid, Weak Acid, Relative Strength of Acids and Conjugate Bases, Monoprotic Acids versus Diprotic Acids, Amphoteric Substances, Common Strong Acids, Major Species of Strong Acids, pH of Strong Acids, Oxoacids, Organic Acids, Carboxyl Group, Using Approximation to calculate $[\text{H}_3\text{O}^+]$ of Weak Acids, $\text{pH}$ of Weak Acids, $\% \text{ Dissociation} = \frac{[\text{H}_3\text{O}^+]}{[\text{HA}]} \times 100\%$ , $K_a$ and $\% \text{ Dissociation}$ , Strong Bases, Slaked Lime, Lime-soda Process, Weak Bases, pH of Strong and Weak Bases, $K_w = K_a \times K_b$ , Using Approximation to calculate $[\text{OH}^-]$ of Weak Bases, Polyprotic Acids, Diprotic and Triprotic Acids, pH of Polyprotic Acid, Amphoteric Species of Weak Polyprotic Acids	15.1: Brønsted Acids and Bases (pg. 646 to 647) 15.2: The Acid-Base Properties of Water (pg. 647 to 649) 15.3: pH-A Measure of Acidity (pg. 649 to 652) 15.4: Strength of Acids and Bases (pg. 652 to 656) 15.5: Weak Acids and Acid Ionization Constants (pg. 656 to 663)  15.6 & 15.7: Weak Bases and Base Ionization Constants & The Relationship Between the Ionization Constants of Acids and Their Conjugate Bases (pg. 663 to 666) 15.8: Diprotic and Polyprotic Acids (pg. 666 to 670)	✓	pg. 686–687 #1 to 8 pg. 687 #9 to 11  pg. 687 #12 to 26 pg. 687–688 #27, 28, 30 to 38; pg. 690–692 #96, 112, 126, 140  pg. 688 #39 to 50; pg. 690–691 #98 & 124 pg. 688–689 #51 to 58; pg. 691 #122 pg. 689 #59 to 64; pg. 691 #118 and 120	✓
2	Molecular Structural Effect on Acid Properties (Polarity and Hydrohalic Acids, Bond Strength, Electron Density of Oxoacids, Electronegativity, Resonance), Carboxylic Acids, Salt, Salt as Weak Bases, Hydrolysis and Percent Hydrolysis, Salts that produces Acidic Solutions, Acid-Base Properties of Salts	15.9: Molecular Structure and the Strength of Acids (pg. 670 to 674) 15.10: Acid-Base Properties of Salts (pg. 674 to 679)		pg. 689 #67 to 70; pg. 691 #130 pg. 689 #75 to 82; pg. 691 #106 and 128	
3	Acidic and Basic Oxides, Properties of Acids-Base Oxides, Amphoteric Hydroxides, Lewis Model of Acids and Bases, Lewis Acid, Lewis Base	15.11: Acid-Base Properties of Oxides and Hydroxides (pg. 679 to 681) 15.12: Lewis Acids and Bases (pg. 682 to 686)		pg. 690 #83 to 88 pg. 690 #89 to 94; pg. 692 #140	
	<b>Chapter 15 Take-Home Quiz (March 21, Monday)</b>	<b>Chapter 15 Homework Due: March 25, Friday</b>		<b>Take-Home Quiz Due: (March 23, Wed)</b>	

## Chapter 16: Acid-Base Equilibria and Solubility Equilibria

Classes	Topics	Suggested Reading	✓	Assignments	✓
1	Homogeneous and Heterogeneous Equilibria, Common Ion, Common Ion Effect and Calculations, Buffered Solution, Calculations involving Buffered Solution, Buffering Capacity, Preparing a Buffer, Preparation of a Buffer Solution, $pK_a$ , Henderson-Hasselbalch Equation ( $pH = pK_a + \log \frac{[A^-]}{[HA]}$ )	16.1: Homogeneous Versus Heterogeneous Solution Equilibria (pg. 698) 16.2: The Common Ion Effect (pg. 698 to 701) 16.3: Buffer Solutions (pg. 701 to 708)		pg. 740 #1 to 6 pg. 740 #7 to 20; pg. 744 #102 and 107	
2	pH (Titration) Curve, Equivalence Point, pH of Half-way to Equivalence Point = $pK_a$ , millimol (mmol), Titrations between (Strong Acid with Strong Base, Weak Acid with Strong Base, Weak Base with Strong Acid), Acid-Base Indicators and their pH Ranges, Phenolphthalein, Bromothymol Blue, End Point and Colour Change	16.4: Acid-Base Titrations (pg. 708 to 716)  16.5: Acid-Base Indicators (pg. 716 to 718)		pg. 741 #22 to 32; pg. 743–744 #88 and 106  pg. 741 #33 to 38; pg. 744 #100	
3	Solubility Product Constant (Solubility Product) $K_{sp}$ , Molar Solubility (mol/L), Solubility (g/L), Predicting Precipitation Reactions, Separation of Ions by Fractional Precipitation or Selective Precipitation, Common Ions Effect on Solubility	16.6: Solubility Equilibria (pg. 718 to 725)  16.7: Separation of Ions by Fractional Precipitation (pg. 725 to 727) 16.8: The Common Ion Effect and Solubility (pg. 727 to 728)		pg. 741–744 #39 to 54, 92, 94, 99, 109, 112, 113, 116 pg. 742–744 #55, 56, 93, 110  pg. 742–744 #57 to 62; 97, 111	
4	pH and Solubility, Ion Product ( $Q$ ), Determining Precipitation Conditions, Qualitative Analysis (Selective Precipitation and Flame Tests), Complex Ion, Ligand, Formation (Stability Constant), Complex Ions and Solubility, Qualitative Analysis of Cations and Anions	16.9: pH and Solubility (pg. 728 to 731) 16.10: Complex Ion Equilibria and Solubility (pg. 731 to 736) 16.11: Application of the Solubility Product Principle to Qualitative Analysis (pg. 737 to 739)		pg. 742 #63 to 68; pg. 745 #118 pg. 742–743 #69 to 76, 89, 91, 98 pg. 743 #77, 79 to 82	
4	<b>Lab #7: Qualitative Analysis of Cations and Anions (March 31, Thursday)</b>			<b>Lab Report #7 Due: (April 11, Monday)</b>	
5	<b>Unit 6 Test (April 6, Wednesday)</b>	<b>Chapter 16 Homework Due April 4, Monday</b>			