Honour Chemistry Unit 2 Outline: Matter as Solutions and Gases

Chapter 4: Reactions in Aqueous Solutions

Classes	Topics	Suggested Reading	✓	Assignments	✓
1	Water Molecule Structure (Polarity, Hydrogen Bonding), Aqueous Solutions, Solution Formation Process, Dissociations, Hydration, Strong and Weak Electrolytes, Nonelectrolytes, Reversible Reactions, Solute, Solvent, Solubility, General Rules for Solubility, Precipitation, Strong and Weak Acids and Bases, Metathesis Reactions, Molecular Equations, Complete Ionic Equations, Net-Ionic Equations	4.1 General Properties of Aqueous Solutions (pg. 95 – 96) 4.2 Precipitation Reactions (pg. 97 – 101)		pg. 124−125 #1, 2, 3, 5, 6, 8 to 13 pg. 125 #16 to 24	
2 - 3	General Properties of Acids and Bases, Brønsted-Lowry Acids and Bases, Hydronium ion, Acid-Base Neutralizations, Acid Decompositions to Gases, Molarity or Molar Concentration $\left(C = \frac{n}{V}\right)$, Dilution ($C_1V_1 = C_2V_2$) and Dilution Technique, Pipet, Volumetric Flask	4.3 Acid-Base Reactions (pg. 101 – 106) 4.5 Concentration of Solution (pg. 114 – 118)		pg. 126 #26 to 34 pg. 127 #52 to 60, pg. 129 #98, 107; pg. 127 #61, 63 to 68	
4	**Lab #3: Solution Preparation (October 21, Friday)**	Lab #3 Procedure		***Lab #3 Report (*Due with Lab #4) (November 9, Wednesday)***	
5 & 6	Predicting Amounts of Precipitate Produced or Minimum Limiting Reagent Needed, Neutralization, Volumetric Analysis, Indicator, Equivalence (Stoichiometric) Point, Endpoint, Titration Technique, Titrant, Analyzed, Using Burets	4.6 Solution Stoichiometry (pg. 118 – 123)		pg. 127 #70 to 74; pg. 128−129 #77 to 80; pg. 128−129 #91 to 96	
7	**Lab #4: Gravimetric and Solution Stoichiometry (October 26, Wednesday)**	Lab #4 Procedure		***Lab #4 Report (November 9, Wednesday)***	
	Chapter 4 Quiz (November 2, Wednesday)	***Chapter 4 Homework Due (Nov 2, Wed)***			

Chapter 5: Gases

Classes	Topics	Suggested Reading	✓	Assignments	✓
1	Properties of Gases, Pressure (kPa, atm, mmHg and torr), Barometer, Manometer, Standard Atmospheric Pressure	5.1 Substances That Exist as Gases (pg. 133) 5.2 Pressure of a Gas (pg. 134 − 136)		pg. 163 #2 pg. 163 #13, 14	
2	Variables of Gas (V, P, T, n), Boyle's Law (P & V), Temperature (K), Charles's Law (T & V), Gay-Lussac's Law (P & T), Avogadro's Law	5.3 The Gas Law (pg. 137 – 142)		pg. 164-165 #15 to 26	
3	Ideal Gas, Ideal Gas Law ($PV = nRT$), Ideal Gas Constant [$R = 8.314$ (L • kPa)/(K • mol) = 0.0821 (L • atm)/(K • mol)], STP and SATP, Combined Gas Law $\left(\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}\right)$, Density and Molar Mass Calculations from Ideal Gas Law, Gas Stoichiometry	5.4 The Ideal Gas Equation (pg. 142 – 148)		pg. 165-166 #29, 30 to 54; pg. 167 #89	
4 & 5	Dalton's Law of Partial Pressure, Mole Fraction (χ), Collection of Gas over Water, Vapour Pressure, Kinetic Molecular Theory of Gases, Summary of the Application of Gas Laws, Graham's Law of Effusion, Diffusion, Departure from Ideal Gas Law, Real Gases	5.5 Partial Pressures (pg. 148–152) 5.6 The Kinetic Molecular Theory of Gas (pg. 153 − 156, 158, 159) 5.7 Deviation from Ideal Behavior (pg. 159−160)		pg. 166 #55, 56, 58, 60 to 64; pg. 167 #82 to 84, 87a, 88 pg. 166 #65 & Effusion Wksh pg. 167 #76	
6	**Activity #2: What's the Matter with Your Gases? and Lab #5: Ideal Gas Law *(November 9, Wednesday)***	Lab #5 Procedure		***Act #2 & Lab #5 Report Due (November 18, Friday)***	
		Chapter 5 Homework Due (Nov 14, Monday)			

Chapter 12: Properties of Liquid & Phase Changes

Classes	Topics	Suggested Reading	✓	Assignments	✓
1 & 2	Kinetic Molecular Theory of Liquids and Solids, Intermolecular Forces and Polarity, Properties of Liquid (Surface Tension, Surfactant, Adhesion, Cohesion, Viscosity, Specific Heat Capacity), Structures and Properties of Water (High Surface Tension, High Viscosity, Density of Ice, High Specific Heat Capacity, High Boiling and Melting Points), Phase Changes, Equilibrium Vapour Pressure versus Temperature, Evaporation and Vaporization, Condensation, Boiling Point, Melting Point, Liquid-Solid Equilibrium, Solid-Vapour Equilibrium and Sublimation, Phase Diagrams	12.1 Kinetic Molecular Theory of Liquids and Solids (pg. 391) 12.3 Properties of Liquids (pg. 398 − 399) 12.6 Phase Changes (pg. 408 − 410, 412 − 415) 12.7 Phase Diagram (pg. 415 -416)		pg. 419 #21, 22, 24, 27 to 30 pg. 420−421 #55, 60, 67, 68, 73, 75 to 77 pg. 420 #65; pg. 421−422 #86, 87, 92, 94, 97	
3	**Unit 2 Test (covers Chapters 4 & 5 & 12) (December 2, Friday)**	Unit 2 Practice Test – Part 1		***Chapter 12 Homework Due (December 2, Friday)***	

Chapter 13: Physical Properties of Solutions

Classes	Topics	Suggested Reading	✓	Assignments	✓
1	Saturated, Unsaturated, and Supersaturated Solutions, Crystallization, Miscible and Immiscible, % by Mass, % by Volume Molarity (M), Molality (*m*), Comparison and Conversion of Concentration Units	13.1 Types of Solutions (pg. 426) 13.3 Concentration Units (pg. 429 – 432)		pg. 448 #1, 2, 6 pg. 448 #13 to 22; pg. 452 #90	
2	Solid and Gas Solubilities and Temperature, Solutions with various Solubilities (Miscible, Partially Miscible, Non-miscible), Henry's Law of Solubility of Gas	13.4 Effect of Temperature on Solubility (pg. 432−433) 13.5 Effect of Pressure on the Solubility of Gases (pg. 433 − 435)		pg. 449 #23 to 26 pg. 449 #27 to 36	
3	Colligative Properties (Freezing Point Depression and Boiling Point Elevation); Molal Boiling Point Elevation Constant (K_b) and Molal Freezing Point Depression Constant (K_f); Van't Hoff Factor (i); Calculating Boiling Point Elevation and Freezing Point Depression ($\Delta T_b = iK_b \times m$ and $\Delta T_f = iK_f \times m$); Molar Mass Determination from Colligative Properties; Osmotic Pressure ($\Pi = CRT$) & ($\Pi = iCRT$), Isotonic and Hypertonic Solutions	13.6 Colligative Properties (pg. 435, 438 − 446)		pg. 449−452 #38, 41, 43, 44, 46, 47, 48, 55, 56, 58 to 60, 62 to 67, 70, 71, 73 to 75, 77, 78, 80, 96	
	Chapter 12 & 13 Quiz (Take-Home) (Sections 12.1, 12.3, 12.6 & 12.7 & Sections 13.1, 13.3, 13.4 & 13.5) (Assign on December 7, Wednesday)			***Ch 12 & 13 Quiz Due (December 9, Friday)***	
	Final Exam (covers Unit 1 and Unit 2) (Chapter 1 to 5, Sections 12.1, 12.3, 12.6 &12.7 and Chapter 13) (December 15, Thursday)	Practice Final Exam		***Chapter 13 Homework Due (December 12, Monday)***	