Chemistry 101

TEST 1 STUDY GUIDE

Topic	*Text Reference*
CHAPTER 3	
• Characterize the two types of bonds: ionic and covalent	3.2
• Know how ionic and covalent bonds are formed	3.2
• Differentiate between empirical, molecular and structural formulas	3.3
• Classify pure substances based on their atomic-level view	3.4
• Name and write formulas for binary ionic compounds	3.5
• Name and write formulas for ionic compounds formed from elements with multiple ionic charges	3.5
• Name and write formulas for polyatomic ionic compounds	3.5
• Name and write formulas for hydrated crystals	3.5
• Name and write formulas for binary molecular compounds	3.6
• Name and formula for binary and polyatomic acids	3.6
• Calculate formula mass and molar mass of a compound	3.8
• Convert among mass, moles and number of particles	3.8
• Determine the percent composition of elements in a compound	3.9
• Calculate mass of element in a compound using mass percent or chemical formula	3.9
• Determine empirical formula from percent composition	3.10
• Determine molecular formula from % composition and molar mass	3.10
• Determine empirical formula from combustion analysis data	3.10
• Write balanced chemical reactions from word equations	3.11
CHAPTER 4	
• Calculate molar quantities of reactants and products in a balanced chemical equation	4.2
• Calculate mass of a substance from mass of another in a chemical reaction	4.2
• Determine the limiting reactant from given mass of reactants in a chemical reaction	4.3
• Calculate the theoretical and percent yield in a chemical reaction	4.3
• Know the general characteristics of solutions	4.4
• Determine the concentration of solutions as molarity	4.4
• Use molarity as conversion factor to solve for amount or volume of solution	4.4
• Convert between molarity and mass percent of solutions	Notes
• Solve dilution problems	4.4
• Solve stoichiometry problems involving solutions	4.4
• Explain why some solutes dissolve others do not based on solute & solvent attractions	4.5
• Know the difference between strong, weak and non-electrolytes.	4.5
• Use solubility rules in Table 4.1 to predict formation of precipitates.	4.5
• Predict whether a precipitation reaction occurs or not and write molecular equation	4.6
• Write complete and net ionic equations from molecular equations	4.7
• Know the Arrhenius definition of acids and bases	4.8
• Identify strong and weak acids and bases listed in Table 4.2	4.8
• Write molecular and net ionic equations for neutralization reactions	4.8
• Solve acid-base titration problems using solution stoichiometry	4.8
• Write molecular and net ionic equations for reactions with unstable products	4.8
• Know the general characteristics of oxidation-reduction (redox) reactions	4.9
• Assign oxidation numbers for elements in a compound	4.9
• Identify redox reactions from non-redox reactions	4.9
• Determine oxidizing and reducing agents in a redox reaction	4.9
• Balance redox reactions using half-reaction method	Notes

Topic	*Text Reference*
CHAPTER 5	
• Know the concept of gas pressure and its units of measurement	5.2
• Determine pressure of gas a barometer and open and closed end manometers	5.2
• Use Boyle's , Charles's, and Avogadro's Laws to solve problems involving gases	5.3
• Use Ideal Gas Law to determine the volume, pressure, temperature or amount of gas based on given data	5.4
• Determine gas density and molar mass of a gas using the Ideal Gas Law	5.5
• Use Dalton's law of partial pressure and mole fraction to calculate partial pressure of gases in a mixture	5.6
• Determine pressure of a gas collected over water	5.6
• Use ideal gas law and molar volume of gases to solve stoichiometry problems with gases	5.7
• Know the postulates of the Kinetic Molecular Theory and how they are related to the simple gas laws and concept of pressure	5.8
• Know the relationship of the molecular speed of a gas to its size and temperature.	5.8
• Distinguish between diffusion and effusion, and use Graham's Law to calculate the rates of different gases.	5.9
• Identify conditions under which real gases deviate from ideal behavior	5.10
• Identify the factors that cause the deviations from ideal behavior	5.10
• Identify the correction factors in Van der Waal's equation for non-ideal behavior of gases	5.10

SUMMARY OF EQUATIONS

The equations listed below will be provided for your use on the test.

$$d = \frac{PM}{RT} \qquad P_n = X_n \, P_{total} \qquad P_{tot} = P_1 + P_2 + P_3 \ldots$$

$$u_{rms} = \sqrt{\frac{3RT}{M}} \qquad \frac{\text{rate A}}{\text{rate B}} = \sqrt{\frac{M_B}{M_A}}$$

R = 0.0821 Latm/molK or 8.314 J/molK