Semester 2 Chemistry Final Exam – Review Notes

Chapter 8: Chemical Equations and Reactions

- Key Terms and Definitions
- Physical Change versus Chemical Change ; Physical Properties versus Chemical Properties
- Five Evidences of a Chemical Change
- Identify Five Types of Chemical Reactions
- Chemical Word Equation and Chemical Equation (Predicting Products and their states; Balancing Chemical Equations)
- Use Activity Series to Predict whether there will be a reaction (Single Replacemnet)
- Use Solubility Table to Predict Precipitation

Chapter 9: Stoichiometry

- Key Terms and Definitions
- Mole Ratios
- Gravimetric Stoichiometry Calculations
- % Yield and %Error
- Excess and Limiting Reactants and their Calculations

Chapter 10: Causes of Change

- Key Terms and Definitions
- Heat, Work, Energy and Enthalpy
- Heat Related to Physical Change (Kinetic - Temperature vs. Potential – Phase) and Calculations ($q = mc_P\Delta T$ and $q = nC\Delta T$)
- Specific Heat
- Enthalpy Related to Chemical Potential Change and Calculations ($\Delta H = n\Delta H_{f,\text{ comb, rxn}}$)
- Potential Energy Diagrams of Endothermic and Exothermic Change
- Molar Enthalpy of Reaction, Combustion and Formation
- Theoretical Calculation of Molar Enthalpy of Reaction (Hess's Law and $\Delta H_{rxn} = \Sigma H_{products} - \Sigma H_{reactants}$)
- Experimental Calculation of Molar Enthalpy of Reaction (Calorimetry – Heat Lost = Heat Gained)
- Law of Conservation of Energy

Chapter 11: States of Matter and Intermolecular Forces

- Key Terms and Definitions
- How Kinetic Molecular Theory Describes Three States of Matter
- Phase Changes
- Intermolecular Forces (Ion-Dipole, London Dispersion, Dipole-Dipole, and Hydrogen Bond)
- How Polarity of a Molecule affects Intermolecular Forces
- How Intermolecular Forces affect Physical Properties such as Boiling and Melting Points, Solubility
- Properties of Water (Surface Tension, Capillary Action, Ice Crystal Geometry, Density of Ice)
- Vapour Pressure and Temperature, Volatile Substance, Normal Melting and Boiling Point
- Interpreting Phase Diagram (plus Critical and Triple Point)

Chapter 12: Gases

- Key Terms and Definitions
- Properties of Gases and the Kinetic Molecular Model (Assumptions) of Gases
- Pressure and converting between its units (kPa, atm, mm Hg and torr)
- Gas Laws and calculations (Boyle, Guy-Lussac, Charles, Avogadro, and Combined Gas Law)
- Ideal Gas Law and calculation of mass and molar mass
- Ideal Gas versus Real Gas
- Dalton's Partial Pressure
- Graham's Law of Effusion and calculation
- Gas Stoichiometry

Chapter 13: Solutions

- Key Terms and Definitions
- Solution, Solute and Solvent of various Phases
- Suspensions, Colloid and Solution
- Precipitation and Crystallization, Filtration and Distillation
- Molarity Calculations, ppm Calculations, Preparing a Solution
- Solution Stoichiometry
- Dilution
- Dissociation of Ionic Solute vs. Hydration of Molecular Solute
- "Like Dissolves Like"
- Various Levels of Solubilities (Miscible, Partially Miscible, and Immiscible)

- Various Levels of Concentrations (Unsaturated, Saturated and Supersaturated Solutions)
- Solubility Table
- Calculating Solubility and using a Solubility Graph
- Factors affecting Solubility of Gas Solutes and Solid Solutes
- Conductivities in Solutions (Strong Electrolytes, Weak Electrolytes and Non-electrolytes)
- Colligative Properties (Boiling Point Elevation and Freezing Point Depression)
- Surfactant, Emulsion, Soap and Detergent

Chapter 15: Acids and Bases

- Key Terms and Definitions
- Physical and Chemical Properties of Acids and Bases
- Arrhenius Definitions of Acids and Bases
- Brønsted-Lowry Definitions of Acids and Bases
- Conjugate Acids and Conjugate Bases
- Strong and Weak Acids (Relative Strengths of Acids and Bases)
- Strong and Weak Bases
- Nomenclature of Acids and Bases
- Major Species of Strong and Weak Acids and Bases
- Monoprotic, Diprotic and Polyprotic Acids, Amphoteric Substances
- Acidity, Basicity, pH and pOH Calculations
- Autoionization of Water and Calculations ($K_w = [H_3O^+][OH^-]$)
- pH and pOH calculations of Strong Acids and Strong Bases)
- Acid and Base Indicators
- Acid and Base Neutralization, Stoichiometry of Acid and Base Neutralization
- Titration, Titration Procedure, pH Curve, Stoichiometric (Equivalence) Point and End Point

Things you can do to Review:

1. Look over your Quizzes. Note the type of questions you got wrong. Identify the type of mistakes. Did you not understand the concepts, or it was a silly calculation error? If you do not understand a concept, go to the notes and look over the examples.
2. Go through the multiple choice questions at the end of each chapter. The answers to those are online. Do the practice chapter test I have been handing out at the end of each unit.
3. Do the following **Extra Review Questions** at the very back of the text-book.

   Stoichiometry (pg. 862−863 #1, 3 to 7)
   Causes of Change – Thermochemistry (pg. 863−864 #1 to 4, 7, 12)
   Gases (pg. 865 −870 #1 to 5, 8, 11, 23, 27, 30, 38, 41, 50, 52, 55, 74, 80, 82, 83, 90, 93, 104)
   Solutions (pg. 870−871 #1, 8 to 11, 17; redo **Dilution and Solubility Worksheet in Chapter 13 Notes**)
   Acids and Bases (pg. 872−873 #1 to 6, 8, 10, 12, 13, 16 to 18, 20, 21)

Answer to Extra Review Questions:

Stoichiometry (pg. 862−863)

1. 6.7 g **3. (a)** 2.38 g **(b)** 1.78 g **4. (a)** 2 mol **(b)** 1 mol **(c)** 0.125 mol
5. (a) 0.379 mol **(b)** 0.758 mol **(c)** 126 g **6.** 4.41 g **7. (a)** CO **(b)** 38 mL **(c)** 412 mL

Causes of Change − Thermochemistry (pg. 863−864)

1. −180 kJ **2.** 3600 J **3.** 570 K **4.** 890.2 kJ **7.** 66.4 kJ **12.** 0.14 kJ

Gases (pg. 865−870)

1. 177 kPa **2.** 1330 mmHg **3.** 0.75 atm **4.** 76 kPa **5.** 0.9813 atm **8.** 1.4999 atm
11. 1 L **23.** 40 kPa **27. (a)** 260 K **(b)** −11°C **30.** 6.9 L **38.** 36°C
41. 2.6 atm **50.** 32.0 g/mol **52.** 3.98 atm **55.** 105 L **74. (a)** 15 g **(b)** 2.22 g **(c)** 0.364 g
80. 162 g/mol **82.** 235 m/s **83.** 81 g/mol **90.** 2.24 L **93.** 18.0 g
104. (a) 0.50 mol **(b)** 0.75 mol **(c)** 17 L

Solutions (pg. 870−871)

1. 0.1249 mol/L **8.** 343 g **9.** 1140 g **10.** 0.143 mol **11. (a)** 132.2 g **(b)** 4.003 mol/L **17.** d,a,b,c

Acids and Bases (pg. 872−873)

1. acidic **2.** basic **3.** acidic **4.** basic **5.** 0.35 mol/L
6. (a) 1×10^{-8} mol/L **(b)** 1×10^{-6} mol/L **(c)** 5×10^{-7} M **8.** pH = 5 **10.** pH = 12
12. 1×10^{-4} mol/L **13.** 1×10^{-10} M **16.** 3×10^{-2} M **17.** 3.33×10^{-13} M
18. (a) 2×10^{-4} M **(b)** 5×10^{-11} M **20. (a)** 1×10^{-3} M **(b)** 5×10^{-4} M **21.** 0.0067 M