**REVIEW GUIDE EXAM 4**

**Chapter 13: Liquids**

**“Like dissolves like” rule**

* Polar substances will mix and dissolve in one another, and nonpolar substances will mix and dissolve in one another.
* Polar substances will NOT mix and dissolve in nonpolar substances and vice versa.
* Use the polarity of substances to determine which liquids will mix with one another or which solids will dissolve in water and other polar solvents.

**Intermolecular Forces (IMF’s):** attraction between 2 different molecules in a liquid or solid

* Identify the type(s) of intermolecular force for a molecule as
* **London/dispersion forces**
* **Dipole-dipole forces**
* **Hydrogen bonding**.
* Recognize that polar molecules experience both London/dispersion forces as well as dipole-dipole or hydrogen bonding.
* Know that hydrogen bonds are the strongest type of intermolecular force, dipole-dipole forces are the next strongest, and London forces are generally the weakest.
* Recognize that London forces increase with more electrons—use size to determine relative number of electrons for different molecules.
* Know the terms: evaporation, boiling point, and vapor pressure.
* Recognize how IMF’s influence vapor pressure and boiling point.
* Given different substances, determine which has the highest melting or boiling point based on IMF’s and/or chemical bonds.
* Know ionic and covalent bonds are stronger than all types of intermolecular forces, even hydrogen bonds.
* Know the regions and features of a **Heating/Cooling Curve**

**Chapter 14: Solutions**

**Solution**: uniform mixture of two or more substances as atoms, ions, or molecules (a **solute** dissolved in **solvent)**

* **solute:** component present in smaller amount
* **solvent:** component present in greater amount

Know how temperature affects the solubility of gases and solids in solution.

Know Henry’s Law that Solubility α Pressure (S= k\*P)

$$\frac{S\_{1}}{P\_{1}} = \frac{S\_{2}}{P\_{2}}$$

* Recognize what occurs at the molecular level when a solute dissolves in water.
* Recognize what can be done to increase the rate of dissolving: heating solution, stirring solution, grinding solute into smaller particles
* Know the definitions for unsaturated, saturated, and supersaturated
* Use **“Like dissolves like”** Rule and the **Solubility Rules** to predict what substances are **soluble/insoluble** in or **miscible/** **immiscible** with water or other solvent

$$Mass percent = \frac{mass of solute}{mass of solution} x 100$$

$$ppm = \frac{mass of solute}{mass of solution} x 10^{6}$$

$$mole Fraction of A= \frac{moles of A}{total moles} $$

$$mole Fraction of A= \frac{moles of solute}{Liters of solution} $$

**Dilution Equation: M1 V1 = M2 V2**

**Molarity, Mass Percent Concentration, and Solution Stoichiometry Calculations**

* Solve for amount of solute, solvent, or solution given mass percent concentration, molarity, etc.
* Use molarity and volume to solve for moles

**Chapter 15: Acid and Bases**

* Know **properties of acids and bases**
* Know **Arrhenius** and **Brønsted-Lowry** (B-L) definitions for acids and bases

Given an acid-base reaction,

* Classify each reactant as an Arrhenius and/or a Bronsted-Lowry acid or base
* Indicate the **conjugate acid-base pairs**.
* Note that conjugate acid-base pairs differ only by an H+ ion.

Recognize hydronium ion,

**H3O+ = H+ + H2O**

* Know the **strong acids**: HCl, HBr, HI, HNO3, HClO3, HClO4, H2SO4.
* Know the common **strong bases**: LiOH, NaOH, KOH, Ca(OH)2, Sr(OH)2, Ba(OH)2.

Recognize water rarely ionizes to form ions

→ It does not conduct electricity.

→ ion-product or dissociation constant for

Water at 25°C, **Kw=[H+][OH**−**] =1.0x10**−**14**

**acidic solutions:** [H3O+] > [OH–], pH < 7

**basic solutions:** [OH–] > [H3O+], pH > 7

**neutral solutions:** [OH–] = [H3O+], pH = 7

Use pH to classify a substance as neutral, strongly or weakly acidic, strongly or weakly basic

Calculate pH or pOH using

* [H+]=10–pH and [OH–]=10–pOH
* pH + pOH = 14.00 (exact)
* Kw=[H+][OH−] =1.0x10−14
* Knowing that because pH is a logarithm, the **number of sig figs for the H+** **concentration** determines the **number of** **decimal places for the pH** and vice versa.
* Calculate the pH of a solution after an acid and a base have reacted and by determining the concentration of excess strong acid or strong base that remains

**Chapter 19: Organic Chemistry**

Hydrocarbons

* Alkane
* Alkene
* Alkyne
* Arene
* Difference between saturated, unsaturated, and aromatic hydrocarbon.

Hydrocarbon derivative

* Alcohol
* Ether
* Aldehyde
* Ketone
* Carboxylic Acid
* Ester
* Amine
* Amide

Basic nomenclature of organic compounds

General trends for organic compounds

* intermolecular forces
* polarity
* relative boiling points to other organic compounds
* water solubility.

Polymer

* monomer
* Polymerization reaction

Condensation Reactions

* Esterification
* Amidation

**Chapter 20: Biochemistry**

Carbohydrates

* monosaccharide
	+ difference between an aldose and a ketose
* disaccharide
* polysaccharide

Lipid

* fatty acid
* triacylglycerol
* steroid

Protein

* amino acid
* peptide, dipeptide, polypeptide
* primary structure
* secondary structure
	+ α-helix
	+ Beta-pleated sheet
* Tertiary structure
* Quaternary structure
* What is denaturation? What causes it?
* Enzyme – biological catalyst

Nucleic Acid

* Replication
* Transcription
* Translation