Unit 8: States of Matter (Ch10)

Objectives:

* State the kinetic-molecular theory of matter and describe how it explains certain properties of matter
* List the 5 assumptions of the kinetic molecular theory of gases. Define the terms ideal gas and real gas.
* Describe each of the following characteristic properties of gases: expansion, density, fluidity, compressibility, diffusion, and effusion.
* Describe the conditions under which a real gas deviates from “ideal” behavior.
* Describe the motion of particles in liquids and the properties of liquids according to the kinetic-molecular theory.
* Discuss the process by which liquids can change into a gas. Define vaporization.
* Discuss the process by which liquids can change into a solid. Define freezing.
* Describe the motion of particles in solids and the properties of solids according to the kinetic-molecular theory.
* Distinguish between the 2 types of solids.
* Describe the different types of crystal symmetry. Define crystal structure and unit cell.
* Explain the relationship between equilibrium and changes of state.
* Interpret phase diagrams
* Explain what is meant by equilibrium vapor pressure
* Describe the processes of boiling, freezing, melting, and sublimation.
* Describe the structure of a water molecule
* Discuss the physical properties of water and explain how they are determined by the structure of water.
* Calculate the amount of energy absorbed or released when a quantity of water changes state.

Unit 19: Gas Laws (Ch 11)

Objectives

* Define pressure, give units of pressure, and describe how pressure is measured.
* State the standard conditions of temperature and pressure convert units of pressure.
* Use Dalton’s law of partial pressures to calculate partial pressures and total pressures.
* Use kinetic-molecular theory to explain the relationship among gas volume, temperature, and pressure.
* Use Boyle’s law to calculate volume-pressure changes at a constant temperature.
* Use Charles’s law to calculate volume-temperature changes at constant pressure.
* Use Gay-Lussac’s law to calculate pressure-temperature changes at constant volume.
* Use the combined gas law to calculate volume-temperature-pressure changes.
* State the law of combining volumes.
* State Avogdro’s law and explain its significance.
* Define standard volume of gas and use it to calculate masses and volumes.
* State the ideal gas law.
* Using the ideal gas law calculate pressure, volume, temperature, or amount of gas when the other three quantities are known.
* Describe the process of diffusion.
* State Grahm’s law of effusion.
* State the relationship between the average molecular velocities of two gases and their molar masses.

Unit 10: Solutions (Chapter 12-13)

Objectives:

* Distinguish between heterogeneous and homogeneous mixtures
* List three different solute-solvent combinations
* Compare the properties of suspensions, colloids, and solutions
* Distinguish between electrolytes and non-electrolytes
* List and explain 3 factors that affect the rate at which a solid solute dissolves in a liquid solvent
* Explain solution equilibrium, and distinguish among saturated, unsaturated and supersaturated solutions
* Explain the meaning “like dissolves like” in terms of polar substances and nonpolar substances
* Compare the effects of temperature and pressure on solubility
* Given the mass of solute and volume of solvent, calculate the concentration of a solution
* Given the concentration of a solution, determine the amount of solute in a given amount of solution
* Given the concentration of solution, determine the amount of solution that contains a given amount of solute
* Define colligative properties of solutions and list examples.

Unit 11: Acids & Bases (Ch14-15)

Objectives:

* List five general properties of aqueous acids and bases.
* Name Common binary acids and oxyacids, given their chemical formulas.
* Define acid and base according to the Arrhenius, Bronstead-Lowry, and Lewis theories. Be able to compare and relate them.
* Explain the differences between strong and weak acids and bases.
* Know the names and formulas of all the strong acids and bases.
* Describe a conjugate acid, a conjugate base, and an amphoteric compound.
* Explain the process of neutralization.
* Define acid rain, give examples of compounds that can cause acid rain, and describe the effects of acid rain.
* Describe the self-ionization of water.
* Define pH, and give the pH of a neutral solution at 25c.
* Explain and use the pH scale.
* Given [H+] or [OH-] find the pH.
* Given pH, find [H+] or [OH-].
* Describe how an acid-base indicator functions.
* Explain how to carry out an acid base titration.
* Calculate the molarity of a solution from titration data.

Unit 12: Thermochemistry (CH 16-17)

Objectives:

Ch. 16

* Define temperature and state the units in which it is measured.
* Define heat and state its units
* Perform specific-heat calculations.
* Define exothermic and endothermic.
* Explain enthalpy change, enthalpy of reaction, enthalpy of formation, and enthalpy of combustion.
* Solve problems involving enthalpies of reaction, enthalpy of formation, and enthalpy of combustion.
* Explain the relationship between enthalpy change and the tendency of a reaction to occur.
* Define entropy, free energy, and free energy change.
* Explain the relationship between entropy change and the tendency of a reaction to occur
* Explain how the value of free energy is calculated and interpreted.
* Describe the use of free energy change to determine the tendency of a reaction to occur.
* Understand and be able to use Hess’s Law to determine enthalpy of formation.

Ch. 17

* Explain the concept of reaction mechanism.
* Use the collision theory to interpret chemical reactions.
* Define activated complex.
* Relate activation energy to enthalpy of reaction.
* Discuss the factors that influence reaction rate.
* Define catalyst, and discuss two different types.
* Define activation energy.
* Discuss Collision theory.
* Be able to interpret a graph showing reaction pathways to determine whether a reaction is exothermic or endothermic.

Unit 13 Organic Chemistry (CH. 22)

Objectives

* Explain how the bonding of Carbon leads to the diversity of organic compounds
* Compare the use of molecular and structural formulas to represent organic compounds
* Compare structural and geometric isomers of organic compounds
* Distinguish between the structures of alkanes alkenes, and alkynes
* Write structural formulas and names for alkanes, alkenes, and alkynes
* Relate properties of different types of hydrocarbons to their structures
* Define functional group and explain why functional groups are important
* Identify alcohols, alkyl halides, ethers, aldehydes, keytones, carboxylic acids, esters, and amines based on the functional group present in each.
* Be able to tell the difference between a substitution reaction, condensation reaction, and a polymerization

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