

Chemistry

Periodicity

Students will be able to:

- Describe how physical and chemical properties can be used to classify and describe matter.
- Explain that the atom is a discrete particle and the model of the atom can be utilized to explain the interaction of elements and compounds that are observed in the real world.
- Understand how the periodic table provides information about the elements based upon their atomic structure.
- Use the periodic table to identify various groups and periods of elements.
- Relate the position of the element in the periodic table to its electron structure, and visa versa, and to other energy relationships.

Chemical Bonding

Students will be able to:

- Describe the different types of bonding that can occur through the interaction of the valence electrons.
- Draw Lewis dot structures for simple molecules and ions.
- Predict the 3-D structure of simple molecular compounds.
- Name and write formulas for simple molecular and ionic compounds.

Chemical Reactions and Stoichiometry

Students will be able to:

- Understand the conservation of mass.
- Balance simple chemical reaction equations.
- Recognize and identify types of reactions: composition, decomposition, replacement, and double replacement.
- Explain that since atoms (mass) cannot be created or destroyed, the mass of your products must equal the mass of your reactants in a chemical reaction.
- Demonstrate an understanding of the “mole concept” and use to solve simple stoichiometry problems by using the relationship among molar mass, moles, and mass.

Gases and Kinetic Molecular Theory

Students will be able to:

- Explain the relationship among the variables (pressure, temperature, volume and number of particles) in a gas sample using the kinetic molecular theory and use to solve simple problems.
- Understand and use the basic gas laws (Boyle’s law, Charles’ law, the combined gas laws, and Avogadro’s hypothesis) that relate the gas variables, temperature, pressure, volume, and the number of particles to solve problems.
- Explain the ideal gas law and define standard conditions.
- Demonstrate the use of the ideal gas laws to perform calculations.

Solutions

Students will be able to:

- Determine what physical factors that are involved in creating solutions; describe the process involved and the factors involved.
- Explain the difference among types of solutions: unsaturated, saturated, and super-saturated.
- Calculate the concentration of solutions in terms of molarity and use to calculate concentrations due to dilution.

Acids and Bases

Students will be able to:

- Understand the difference between an acid and base.
- Explain the relationship of the concentration of hydronium and/or hydroxide ions to the pH scale.
- Calculate pH from the hydronium or hydroxide concentrations.
- Explain acid-base neutralization reactions.
- Describe and perform an acid-base titration and perform calculations to determine the pH of the unknown solution.

Equilibrium and Kinetics

Students will be able to:

- Understand that systems that are in equilibrium are really always changing.
- Explain that if a stress is imposed to a system at equilibrium, the system will try to relieve it (LeChatelier's principle).
- Predict qualitatively what changes will occur to a system at equilibrium when a stress is applied and qualitatively what changes in the amounts of products and reactants will result when the new equilibrium is achieved.
- Describe factors that affect the rate of a reaction.

Thermochemistry

Students will be able to:

- Understand the law of conservation of energy.
- Identify energy involved in chemical reactions and phase changes and physical processes.
- Calculate the amount of energy involved in a process utilizing the appropriate mathematical relationships.