

Chemistry Bookmark

Matter and Change

- Describe states of matter with phase diagrams and in terms of motion and arrangement of molecules.
- Distinguish between chemical and physical changes in terms of properties of substances.

Atomic Structure

- Identify the number of sub-atomic particles in an ion or isotope and write the symbol as ${}^A_Z X$.
- Describe the location of electrons in terms of energy levels and orbitals.
- Use strong force and mass defect to explain nuclear stability and determine age using the ratio of different isotopes of an element.
- Use periodic table to write electron configurations and predict trends of atomic properties.

Moles

- Calculate percent weight of each element of the molecular formula of a compound.
- Identify limiting reagents in a reaction.

Compounds

- Predict types of bonds formed between two atoms as primarily ionic or covalent.
- Name and write formulae of simple ionic and molecular compounds; draw Lewis structures.
- Calculate empirical and molecular formula of a compound.

Reactions and Energy

- Balance chemical reactions and calculate the mass of reactants used, the mass of products made, or the ΔH .
- Explain how the rate of a chemical reaction is dependent on temperature and activation energy.
- Describe and predict equilibrium shifts in reactions caused by changing conditions.
- Balance half reactions and describe them as oxidation or reduction.

States of Matter

- Explain energy changes associated with changes in the state of matter.
- Explain changes in gas pressure, temperature, and volume in terms of the kinetic molecular theory.

Solutions

- Calculate concentration of solutes and explain how solutes affect properties of the solution.
- Classify solutions as acidic or basic, calculate pH, and predict products of an acid-base neutralization.
- Predict if a reaction is spontaneous.

Carbon

- Draw structural formulas for up to 10 carbon chains of simple hydrocarbons and draw their isomers.

Physics Bookmark

Motion

- Analyze and predict position, time, velocity, and acceleration using graphs, motion diagrams and different frames of reference.
- Describe, classify and solve problems that involve circular, projectile, or periodic motion.

Forces

- Analyze the effects of inertia and resistance forces such as air resistance and friction and their effects on acceleration.
- Solve problems involving force, mass, acceleration, and Newton's law of gravitation.

Momentum & Impulse

- Apply the law of conservation of momentum to analyze the motions of systems of objects.
- Solve problems involving momentum and impulse including simple collisions.

Mechanical Energy

- Solve problems involving work, PE, KE and the law of conservation of energy.
- Apply the law of conservation of energy to analyze the motions of systems of objects.

Electricity & Electromagnetism

- Explain how objects are charged in terms of conduction and induction and charge distribution.
- Use electrostatic attraction and repulsion to explain common experiences with charged objects, electrostatic forces and electric current.
- Analyze series and parallel electric circuits in terms of electric current, resistance, voltage, and power.
- Use magnetic repulsion and attraction to explain common experiences with magnets and magnetic objects.
- Relate magnetic fields and forces with electric current such as in the workings of motors and generators.

Waves

- Understand and solve problems involving frequency, wavelength, and wave speed including examples of light and sound.
- Describe and predict how waves and wave motion change due to interference with other waves and their surroundings.

Thermal

- Analyze the effects of heat, temperature, and efficiency in thermal systems.

Nuclear

- Understand nuclear fission and fusion and the interchangeable nature of mass and energy.