

## CHEMISTRY

### The Structure and Properties of Atoms

#### *Priority Standards*

- **Obtain, evaluate, and communicate information** regarding the structure of the atom on the basis of experimental evidence.
- **Use mathematics and computational thinking** to relate the rates of change in quantities of radioactive isotopes through radioactive decay (alpha, beta, and positron) to ages of materials or persistence in the environment.
- **Construct an explanation** about how fusion can form new elements with greater or lesser nuclear stability.
- **Use** the periodic table as a **model** to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
- **Use models** to describe the changes in the composition of the nucleus of the atom during nuclear processes, and compare the energy released during nuclear processes to the energy released during chemical processes.

#### *Supporting Standards*

- **Analyze and interpret data** to identify patterns in the stability of isotopes and predict likely modes of radioactive decay.
- **Construct an explanation** of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

### The Structure and Properties of Molecules

#### *Priority Standards*

- **Analyze data** to predict the type of bonding most likely to occur between two elements using the patterns of reactivity on the periodic table.
- **Plan and carry out an investigation** to compare the properties of substances at the bulk scale and relate them to molecular structures.
- Evaluate **design solutions** where synthetic chemistry was used to solve a problem (cause and effect).

#### *Supporting Standards*

- **Engage in argument supported by evidence** that the functions of natural and designed macromolecules are related to their chemical structures.



## Stability and Change in Chemical Systems

### *Priority Standards*

- **Use mathematics and computational thinking** to analyze the distribution and proportion of particles in solution.
- **Analyze data** to identify patterns that assist in making predictions of the outcomes of simple chemical equations.
- **Plan and carry out an investigation** to observe the change in properties of substances in a chemical reaction to relate the macroscopically observed properties to the molecular level changes in bonds and the symbolic notation used in chemistry
- **Use mathematics and computational thinking** to support the observation that matter is conserved during chemical reactions and matter cycles.
- **Construct an explanation** using experimental evidence for how reaction conditions affect the rate of change of a reaction.
- **Construct an argument from evidence** about whether a simple chemical reaction absorbs or releases energy.
- **Design** a device that converts energy from one form into another to solve a problem.

### *Supporting Standards*

- **Develop solutions** related to the management, conservation, and utilization of mineral resources (matter).
- **Design a solution** that would refine a chemical system by specifying a change in conditions that would produce increased or decreased amounts of a product at equilibrium.
- **Obtain, evaluate, and communicate information** regarding the effects of designed chemicals in a complex real-world system.
- **Develop an argument from evidence** to evaluate a proposed solution to societal energy demands based on prioritized criteria and trade-offs that account for a range of constraints that could include cost, safety, reliability, as well as possible social, cultural, and environmental impacts.

