

CHEMISTRY

The Structure and Properties of Atoms

- 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 and 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.

The Structure and Properties of Molecules

- Analyze data to predict the type of bonding most likely to occur between two elements using the patterns or 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).

Stability and Change in Chemical Systems

- 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 reactions.
- 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.

Energy in Chemical Systems

- 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.
- 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.