

# Chemistry

## Essential Curriculum

### **Unit 1: Atomic and Nuclear Chemistry**

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. ([HS-PS1-1](#))

Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. ([HS-PS1-3](#))

Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. ([HS-PS1-8](#))

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. ([HS-PS1-7](#))

### **Unit 2: Electrons and the Periodic Table**

Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. ([HS-PS4-3](#))

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. ([HS-PS1-1](#))

### **Unit 3: Chemical Bonding**

Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. ([HS-PS2-6](#)).

### **Unit 4: Chemical Reactions**

Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. ([HS-PS1-2](#))

Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in the total bond energy. ([HS-PS1-4](#))

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. ([HS-PS1-5](#))

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. ([HS-ESS3-4](#))

### **Unit 5: The Mole and Stoichiometry**

Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. ([HS-PS1-2](#))

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. ([HS-PS1-5](#))

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. ([HS-PS1-7](#))

### **Unit 6: Intermolecular Forces and Solutions**

Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. ([HS-PS1-3](#))

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. ([HS-PS1-5](#))

### **Unit 7: Gas Laws/Kinetic Molecular Theory**

Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. ([HS-PS1-3](#))

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. ([HS-PS1-7](#))

## **Unit 8: Thermochemistry**

Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). ([HS-PS3-4](#))

## **Unit 9 Acids and Bases/ Equilibrium**

Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. ([HS-PS1-2](#))

Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. ([HS-PS1-6](#))

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. ([HS-ESS3-4](#))