Connections to the Next Generation Science Standards

The Y*ou Be The Chemist* Challenge® *Passport to Science Exploration* study materials expose students in grades 5-8 to the fascinating world of science and chemistry. These study materials are meant to supplement classroom learning for meeting the Next Generation Science Standards (NGSS). Below is an outline of the *Passport to Science Exploration: Chemistry Connections* and the corresponding performance expectations of the NGSS to which each section aligns. To learn more about the Next Generation Science Standards, visit www.nextgenscience.org.

Passport to Science Exploration: Chemistry Connections

I. CHEMICAL FORMULAS

Physical Science (PS)1 Matter and Its Interactions

PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.

Disciplinary Core Ideas

PS1.A Structures and Properties of Matter

PS1.B: Chemical Reactions

Crosscutting Concepts

Patterns

Scale, Proportion, and Quantity

Energy and Matter

Science and Engineering Practices

Developing and Using Models

Analyzing and Interpreting Data

Nature of Science

Scientific Investigations Use a Variety of Methods

Science is a Way of Knowing

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

II. FORCES OF ATTRACTION

PS1 Matter and Its Interactions

PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.

PS2 Motion and Stability: Forces and Interactions

PS2-3: Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Disciplinary Core Ideas

PS1.A Structures and Properties of Matter

PS1.B: Chemical Reactions

PS2.B: Types of Interactions

PS3.C: Relationship Between Energy and Forces

Science and Engineering Practices

Developing and Using Models

Analyzing and Interpreting Data

Crosscutting Concepts

Patterns
Scale, Proportion, and Quantity
Systems and System Models
Structure and Function
Stability and Change

Nature of Science

Scientific Investigations Use a Variety of Methods
Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena
Science is a Way of Knowing

III. CHEMICAL REACTIONS

PS1 Matter and Its Interactions

PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

PS3 Energy

Disciplinary Core Ideas

PS1.A Structures and Properties of Matter
PS1.B: Chemical Reactions
PS3.A: Definitions of Energy
PS3.B: Conservation of Energy and Energy Transfer
PS3.C: Relationship Between Energy and Forces

Crosscutting Concepts

Patterns
Scale, Proportion, and Quantity
Systems and System Models
Energy and Matter
Stability and Change

Science and Engineering Practices

Developing and Using Models
Analyzing and Interpreting Data

Nature of Science

Scientific Investigations Use a Variety of Methods
Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena
Science is a Way of Knowing
Scientific Knowledge Assumes an Order and Consistency in Natural Systems

IV. BALANCING CHEMICAL EQUATIONS

PS1 Matter and Its Interactions

PS1-5: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Engineering, Technology, and Application of Science (ETS)1 Engineering Design

Disciplinary Core Ideas

PS1.A Structures and Properties of Matter
PS1.B: Chemical Reactions
ETS1.B: Developing Possible Solutions
ETS1.C: Optimizing the Design Solution

Crosscutting Concepts

Patterns
Scale, Proportion, and Quantity
Energy and Matter
Stability and Change

Science and Engineering Practices

Developing and Using Models
Analyzing and Interpreting Data

Nature of Science

Science is a Way of Knowing
Scientific Knowledge Assumes an Order and Consistency in Natural Systems

V. ACIDS, BASES, AND pH

PS1 Matter and Its Interactions

PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.

Disciplinary Core Ideas

PS1.A Structures and Properties of Matter

PS1.B: Chemical Reactions

Crosscutting Concepts

Patterns

Scale, Proportion, and Quantity

Structure and Function

Science and Engineering Practices

Using Mathematics and Computational Thinking

Analyzing and Interpreting Data

Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science Addresses Questions About the Natural and Material World

VII. RADIOACTIVITY & NUCLEAR REACTIONS

Disciplinary Core Ideas

PS1.B: Chemical Reactions

Crosscutting Concepts

Patterns

Scale, Proportion, and Quantity

Energy and Matter

Stability and Change

Science and Engineering Practices

Developing and Using Models

Nature of Science

Scientific Investigations Use a Variety of Methods

Scientific Knowledge is Based on Empirical Evidence

Scientific Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

Science is a Way of Knowing

Science is a Human Endeavor