Unit: Experimenting with Mixtures, Compounds, and Elements

Content Area: **Science**
Course(s): **Integrated Science 6**
Time Period: **3rd Marking Period**
Length: **9 Weeks**
Status: **Not Published**

Unit Overview

All matter consists of mixtures, compounds, and elements, which can be distinguished by their physical and chemical properties.

Transfer

Students will be able to independently use their learning to…

- Identify substances based on their properties in a real world situation.
- Examine mixes and be able to distinguish the components of mixtures.
- Composites are used in a variety of fields, e.g. technology, aviation, warfare, etc.
- Separating or filtering serves as an important role in the world, e.g. desalination, sewage treatment, reverse osmosis, filter feeding, FBI, etc.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that…

- Mixtures have the properties of their components and can be separated by physical means.
- Compounds have properties different from those of their constituent elements and can be separated by chemical means.

- Elements are basic forms of matter, have unique physical and chemical properties, and cannot be separated into other forms.

Essential Questions

Students will keep considering...

- How do the properties of materials determine their use?
- Why is the mass the same after a chemical reaction?
- How do I know if there is a physical or chemical change?
- What makes a substance pure?

Application of Knowledge and Skill

Students will know...

- The periodic table organizes the elements into families of elements with similar products.
- Elements are a class of substances composed of a single kind of atom
- Compounds are substances that are chemically formed and have physical and chemical properties that differ from the reacting substances.
- Substances are classified according to their physical and chemical properties. Acids are a class of compounds that exhibit common chemical properties, including sour taste, characteristic color changes with litmus and other acid/base indicators, and a tendency to react with bases to produce a salt and water.
- Substances are classified according to their physical and chemical properties
- Metals are a class of elements that exhibit physical properties, such as producing salts when combined with nonmetals.
- When substances undergo chemical change, the number and kinds of atoms in the reactants are the same as the number and kinds of atoms in the products. The mass of the reactants is the same as the mass of the products.
- Chemical changes can occur when two substances, elements, or compounds react and produce one or more different substances. The physical and chemical properties of the products are different from those of the reacting substances.

Students will be skilled at...

- Predicting the physical and chemical properties of elements based on their positions on the Periodic Table.
- Identify unknown substances based on data regarding their physical and chemical properties.
- Determine whether a substance is a metal or nonmetal through student-designed investigations.
- Determine the relative acidity and reactivity of common acids, through a variety of student designed investigations.
- Explain, using an understanding of the concept of chemical change, why the mass of reactants and the mass of products remain constant.
- Compare and contrast the physical properties of reactants with products after a chemical reaction, such as those that occur during photosynthesis and cellular respiration.

Content Specific Vocabulary

Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Chemical Reaction	Mixture	Crystal	Absorption	Component	Element
Compound	Pure substance	Solution	Capillary action	Mixture	Compound
Conductor	Heterogeneous	Solute	Chromatography	Freezing point	Catalyst
Dissolve	Homogeneous	Solvent	Adsorption	Melting point	Electrodes
Effervescent	Composite	Crystal	Chromatogram	Boiling point	Chemical reaction
Element		Solute		Alloy	Electrolyte
Filter		Filter		Solder	Decompose
Insoluble		Solution		Katana	Flammability
Magnetic		Filtration		Samurai	Alumina
Mixture		Solvent			Cryolite
Physical change					Catalyst
Product					Electrolysis
Reactant					Chemical reaction
Reactivity					
Soluble					
Lesson 7	Lesson 8	Lesson 9	Lesson 10	Lesson 11	Lesson 12
Compound	Element	Chemical Formula	Metal	Corrosion	Closed system
Element	Property		Nonmetal	Control	Products

Chemical properties Physical properties Electrical conductivity Properties Hardness Reactivity Magnetic properties Scratch test Fusion Supernova	Metal Nonmetal Equation Product Reactant Alchemy Cellulose Latex Synthetic	Compound Element Bibliography Rubric Compound Element Exhibit Oral presentation Currency Salary Mummification Solar still Rituals	Reactivity Corrosion Acid Ion Base Proton Electrolyte	Galvanized steel Iron oxide	Reactants Open system Conservation of Mass

Cognitive Vocabulary

Measure

Components

identified

Visually

Differences

Conduct

Experiment

Observe

Compare

Collect

Data

Brainstorm

Record

Test

Discuss

Classify

Perform

Test

Criteria

Examine

Inquiry

Research

Gather

Present

Review

Describe

Develop

Devise

Carry-out

Speculate

Learning Goal 1

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.

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SCI.MS-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.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

TECH.8.1.8.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.8.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Target 1

Measure the effect of different quantities of salt on the melting point and boiling point of ice. (Lesson 5)

- Measure the effect of different quantities of salt on the melting point and boiling point of ice. (Lesson 5)

Target 2

Compare the melting points of different alloys (Lesson 5)

- Compare the melting points of different alloys (Lesson 5)

Target 3

Determine the effects of concentration and composition on the melting point (Lesson 5)

- Determine the effects of concentration and composition on the melting point (Lesson 5)

Learning Goal 2

Develop models to describe the atomic composition of simple molecules and extended structures.

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SCI.MS-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.
SCI.MS-PS1-3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
SCI.MS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.
SCI.MS-PS1-2	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
SCI.MS-PS1-6	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
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Target 1

Differentiate compounds and elements (Lesson 6)

- Differentiate compounds and elements (Lesson 6)

Target 2

Classify elements based on information gathered (Lesson 7)

- Classify elements based on information gathered (Lesson 7)

Target 3

Differentiate metals and nonmetals/reactants and products (Lesson 8)

- Differentiate metals and nonmetals/reactants and products (Lesson 8)

Target 4

Research a simple compound (Lesson 9)

- Research a simple compound (Lesson 9)

Learning Goal 3

Mass remains the constant during chemical reactions.

- Mass remains the constant during chemical reactions.

SCI.MS-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.
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Target 1

Construct a generalized law of conservation of mass definition (Lesson 12)

- Construct a generalized law of conservation of mass definition (Lesson 12)

Summative Assessment

All assessments are differentiated and aligned to the science standards and curriculum. Alternate assessments may include projects or presentations, or a common paper/pencil assessment, or both.

Common summative assessment will include the assessment contained in the corresponding STC Kit.

The summative assessment from *STC Experimenting with Mixtures, Compounds, and Elements* under tab 4, letter R.

Common Assessment administered through LinkIt.

21st Century Life and Careers

CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
CAEP.9.2.8.B.4	Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally.
CAEP.9.2.8.B.6	Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.
CAEP.9.2.8.B.7	Evaluate the impact of online activities and social media on employer decisions.

Formative Assessment and Performance Opportunities

- Paper and Pencil test
- science notebook
- Student displays
- Student experiments
- Student presentations
- student sheets

Differentiation

- compacted assignments
- flexible grouping
- interest topic assignments
- presentation method choice
- re-asses essential skills
- real world applications
- reteach essential skills
- Student notebook entries
- student notebook entries
- tiered assignments
- varies assignments

Enrichment

- Atoms family
- Bill Nye/Brain pop
- Current event
- Examine labels on cakes mixes
- Introduce Atomic Theory
- Investigate sewage treatment and how filtering is used
- Learn the names and symbols of the chart
- Make ice cream
- posters
- presentation
- Research Fool's Gold
- Research how the differing composition of volcanic rock affects the nature of a volcanic eruption
- Research other ways that chromatography is used
- Research project
- Research the Hindenburg disaster
- Select a metal from lesson 10. Research the primary compound (ore), where is it mined (US and worldwide) and how it is used.
- What type of work is done by a forensic scientist?

Unit Resources

- Black line masters
- Digital Camera
- Document Camera
- Flash Drives
- Flip Camera
- Global Positioning Handhelds
- Interactive White Board
- Internet
- Listening Centers
- Pasco Probes
- Scanners
- Student Laptops
- Student Response Systems
- Supplemental text.