

## Unit 5: Matter and Its Interactions

### 7<sup>th</sup> Grade Science

18 Class Meetings

*Edited July 2021*

#### Essential Questions

- How does atomic composition effect matter?
- How does energy effect substances?

#### Enduring Understandings with Unit Goals

**EU 1:** Atoms make up everything from simple molecules to extended structures.

- Identify the relevant components of simple molecules and extended structures.
- Describe relationships between atomic and molecular components

**EU 2:** Chemical reactions can change physical compositions of matter but do not change the type of atom in the reactant

- Distinguish between substances at the macro level.
- Determine whether a chemical reaction has occurred and identify the product.

**EU 3:** There are changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed

- Demonstrate systemic energy transfer and its effect on kinetic energy and a pure substance's state of matter.
- Discuss the relationship between pressure and the state of matter in a system.

**EU 4:** Physical and chemical changes to natural resources can form synthetic materials that impact society.

- Compare and contrast the physical and chemical properties of matter and how they contribute to the function of a synthetic material.
- Demonstrate and explain the effects of the production and use of synthetic materials on society.

#### Standards

##### Next Generation Science Standards:

- MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.
- 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.
- MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
- 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.
- 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.
- MS-PS1-6: Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical process.

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### **Common Core State Standards:**

- 7.RP.A.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- 7.RP.A.2: Recognize and represent proportional relationships between quantities.
- 7.RP.A.2c: Represent proportional relationships by equations.
- CCSS.ELA-LITERACY.RL.7.1: Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

### **ISAAC Vision of the Graduate Competencies**

**Competency 1:** Write effectively for a variety of purposes.

**Competency 2:** Speak to diverse audiences in an accountable manner.

**Competency 3:** Develop the behaviors needed to interact and contribute with others on a team.

**Competency 4:** Analyze and solve problems independently and collaboratively.

**Competency 5:** Be responsible, creative, and empathetic members of the community.

### **Unit Content Overview**

#### **1. Atomic Composition**

- Identify the relevant components of simple molecules and extended structures.
- Describe relationships between atomic and molecular components

#### **2. Molecular State**

- Discover substances (solids, liquids, and gases at the macro level).
- Determine whether a chemical reaction has occurred.
- Compare and contrast physical and chemical properties before, during, and after an interaction.
- Compare and contrast pure substances and mixtures.

#### **3. There are changes in particle motion, temperature, and a state of a pure substance when thermal energy is added or removed**

- Measure the average kinetic energy of particles in a contained system
- Distinguish between the thermal energy and temperature of a contained system
- Demonstrate systemic energy transfer and its effect on kinetic energy and a pure substance's state of matter
- Discuss the relationship between pressure and the state of matter in a system

#### **4. Synthetic materials come from natural resources.**

- Discover chemical processes for creating synthetic materials
- Distinguish between and explain how physical and chemical properties contribute to the function of a synthetic material.
- Demonstrate and explain the effects of the production and use of synthetic resources on society.

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**Interdisciplinary Connection:**

- Language Arts - Word Problems
- Art – Illustrate the periodic table
- Social Studies – Locate geographic locations of fossils

**Daily Learning Objectives with *Do Now Activities***

**Students will be able to...**

- Identify and explain the relevant components of simple molecules and extended structures.
- Describe relationships between atomic and molecular components.
- Compare and contrast the characteristics of the states of matter at the macro level.
- Determine and explain whether a chemical reaction has occurred.
- Distinguish between physical and chemical properties before, during, and after an interaction.
- Compare and contrast pure substances and mixtures.
- Measure the average kinetic energy of particles in a contained system.
- Distinguish between the thermal energy and temperature of a contained system.
- Demonstrate systemic energy transfer and its effect on kinetic energy and a pure substance's state of matter.
- Discuss the relationship between pressure and the state of matter in a system.
- Contemplate and explain why the number and types of atoms do not change in a chemical reaction, they are just rearranged.
- Develop a model where the reactants and products in a reaction are identified.
- Discover and explain chemical processes for creating synthetic materials.
- Analyze the structure and function of synthetic materials.
- Demonstrate and explain the effects of the production and use of synthetic resources on society.
- Compare and contrast physical and chemical properties contribute to the function of a synthetic material.
- Create a device that absorbs or releases thermal energy through a chemical reaction.\*
- Demonstrate content knowledge for success on the unit exam.

**Instructional Strategies/Differentiated Instruction**

- Whole group instruction
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Graphic Organizer
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Homework
- Word walls with visuals
- Small group instruction

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**Assessments**

**FORMATIVE ASSESSMENTS:**

- Warm-ups (NGSS IAB)
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Accountable Talk Discussions
- Do Now
- Student-led instruction
- Homework
- Performance Task- “Icy Hot Experiment”
  - Future Rubric Assessment in 2021-2022

**SUMMATIVE ASSESSMENTS:**

- Quiz - EU 1-3
- Quiz – EU 4 & 5
- Performance Task- “Icy Hot Experiment”
- Unit 5 Test

**Unit Task**

**Unit Task Name:** “Icy Hot Experiment”

**Description:** In this task, students will use their knowledge of chemical reactions and thermal energy to design and construct a device that absorbs or releases thermal energy. After explaining how the device works they will test this device and explain what went wrong and what was successful. If their device didn’t work they will modify it based on their write-ups and try it again. This time they will explain what they did differently and why they believe that their new plan was (or should have been) a success (EU 5).

**Evaluation:** Summative Assessment and Future Rubric in 2021-2022 school year

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**Unit Resources**

- Next Gen Science Standards
- Khan Academy
- OpenSciEd
- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- Google Slides
- NGSS Practice