



**Grade 8 Science – Course 3**  
**Unit 1 – Physical Science**  
**Topic 2 Chemical Reactions – 15 Days**

**Unit Overview** - Students will look at patterns as they explore atomic theory, structure, bonding, and acids and bases. This will lead to an understanding of chemical reactions and how materials are created. The final topic of forces and motion allow for students to build upon prior knowledge while having students construct and study models to explain the relationship between speed, velocity, and acceleration.

**Topic Essential Question:** How can you determine when a chemical reaction has occurred?

**Lessons**

- Topic Launch/Quest Kickoff
- Lesson 1 Mixture and Solutions
- Lesson 2 Chemical Change
- Lesson 3 Modeling Chemical Reactions
- Lesson 4 Producing Useful Materials (Enrichment)
- Topic Close – Assessment, Quest Findings

**NYSSLS Performance Expectations**

**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.** [Clarification Statement: Examples of chemical reactions could include burning of a wooden splint, souring of milk and decomposition of sodium bicarbonate. [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, color change, gas production and odor.]

**MS-PS1-8. Plan and conduct an investigation to demonstrate that mixtures are combinations of substances.** [Clarification Statement: Emphasis should be on analyzing the physical changes that occur as mixtures are formed and/or separated. Examples of common mixtures could include salt water, oil and vinegar, and air.] [Assessment boundary: Assessment is limited to separation by evaporation, filtration and magnetism.]

**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.** [Clarification Statement: Emphasis is on the law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] [Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.]

**MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy during a chemical and/or physical process.\*** [Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and amount of a substance. Examples of designs could include combining vinegar and baking soda, activating glow sticks at various temperatures and dissolving ammonium chloride or calcium chloride.] [Assessment Boundary: Assessment is limited to the criteria of substance amounts, reaction time, and observed temperature changes.]

**Topic Opener**

**PE:** MS-PS1-6

**SEP:** Constructing Explanations and Designing Solutions

**DCI:**

**PS 1.B – Chemical Reactions**

- (NYSED) Some chemical reactions release energy, others absorb energy. (MS-PS1-6)

**CCC – Structure and Function**

**Savvas**

**Highlighted labs are important to the understanding of the instructional concepts in this lesson and must be completed during Science instructional time.**

- Topic Readiness Test
- *u*Connect Lab – What Happens When Chemicals React?
- Quest Kickoff Video – How can you design and build hot packs and cold packs?

<p><b><u>Lesson 1 – Mixtures and Solutions</u></b>  <b>PE:</b>MS-PS1-2; MS-PS1-8  <b>SEP:</b> Planning and Carrying Out Investigations; Analyzing and Interpreting Data  <b>DCI:</b>  <b>PS 1.A – Structures and Properties of Matter</b></p> <ul style="list-style-type: none"> <li>• (NYSED) Each substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)</li> <li>• (NYSED) Mixtures are physical combinations of one or more samples of matter and can be separated by physical means. (MS-PS1-8)</li> </ul> <p><b>CCC:</b> Patterns</p>	<p><b>Savvas</b>  <b>Guiding Objectives:</b></p> <ul style="list-style-type: none"> <li>• Students will identify properties to differentiate between a mixture and a solution.</li> <li>• Students will analyze data to describe the molecular and atomic properties of mixtures.</li> <li>• Students will cite design investigations to identify and describe: Different kinds of mixtures; the methods and tools needed to separate mixtures.</li> </ul> <p><b>Literacy Connection</b></p> <ul style="list-style-type: none"> <li>• Draw Evidence</li> </ul> <p><b>Vocabulary</b></p> <table border="0"> <tr> <td>• mixture</td> <td>• solvent</td> </tr> <tr> <td>• colloid</td> <td>• solute</td> </tr> <tr> <td>• suspension</td> <td>• solubility</td> </tr> <tr> <td>• solution</td> <td></td> </tr> </table> <p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• dissolve</li> </ul> <p><b>Connect</b> - TE/SB p.68</p> <ul style="list-style-type: none"> <li>• Connect It!</li> <li>• Quest Connection</li> <li>• Poll – Mixing Solutions</li> </ul> <p><b>Investigate</b> - TE/SB pp.69-75</p> <ul style="list-style-type: none"> <li>• <b>uInvestigate Lab – Particles in Liquids*</b></li> <li>• Video – Mixtures and Solutions</li> <li>• Interactivity – Separating a Mixture</li> <li>• Plan It! (p.70)</li> <li>• Literacy Connection (p.73)</li> <li>• Reading Checks (pp.72; 74)</li> <li>• Math Toolbox (p.73)</li> </ul> <p><b>Synthesize</b> - TE/SB pp. 75-76</p> <ul style="list-style-type: none"> <li>• Interactivity – Inside a Water Treatment Plant</li> <li>• Quest Check-In Lab – Energy Salts</li> <li>• Quest Check-In</li> </ul> <p><b>Demonstrate</b> – TE/SB p.76</p> <ul style="list-style-type: none"> <li>• Lesson 1 Check</li> <li>• Lesson Quiz 1</li> </ul> <p>*Denotes accompanying lab video</p>	• mixture	• solvent	• colloid	• solute	• suspension	• solubility	• solution	
• mixture	• solvent								
• colloid	• solute								
• suspension	• solubility								
• solution									

**Lesson 2 – Chemical Change****PE:** MS-PS1-2**SEP:** Analyzing and Interpreting Data**DCI:****PS 1.A – Structures and Properties of Matter**

- (NYSESED) Each substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)

**PS1.B – Chemical Reactions**

- (NYSESED) Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different particles and these new substances have different properties from those of the reactants. (MS-PS1- 2),(MS-PS1-5)(Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)

**CCC:** Patterns**Savvas****Guiding Objectives:**

- Students will analyze and interpret data about the properties of substances to determine if a change in matter is physical or chemical.
- Students will identify and describe the factors that affect the rate at which a chemical reaction occurs.

**Literacy Connection**

- Cite Textual Evidence

**Vocabulary**

- physical change
- chemical change
- reactant
- product
- exothermic reaction
- endothermic reaction

**Academic Vocabulary**

- rate

**Connect - TE/SB p. 78**

- Connect It!
- Quest Connection
- Inquiry Warm-Up Lab: Presto Change-O!

**Investigate - TE/SB pp.79-84; 86**

- Video – Chemical Change
- *u*nvestigate Lab – Changes in a Burning Candle\*
- Interactivity – Evidence of Chemical Reactions
- Virtual Lab – Chemistry of Glow Sticks
- Literacy Connection (p.80)
- Model It! (p.80)
- Reading Check (pp.81; 83; 84 )
- Math Toolbox (p.86)

**Synthesize - TE/SB pp. 85; 87-88**

- Interactivity – Analyze Exothermic and Endothermic Graphs
- Quest Check-In Interactivity: Design Your Pack
- Quest Check-In

**Demonstrate – TE/SB p.88**

- Lesson 2 Check
- Lesson 2 Quiz

\*Denotes accompanying lab video

**Lesson 3 – Modeling Chemical Reactions****PE:** MS-PS1-5**SEP:** Developing and Using Models**DCI:****PS1.B** – Chemical Reactions

- (NYSED) Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different particles and these new substances have different properties from those of the reactants. (MS-PS1- 2),(MS-PS1-5)(Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)
- The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)

**CCC:** Energy and Matter**Savvas****Guiding Objectives:**

- Students will cite, interpret and develop models to identify components of a chemical reaction including: Products; reactants; number of atoms and molecules.
- Students will use chemical equations to model mass conservation during a chemical change.

**Literacy Connection**

- Integrate with Visuals

**Vocabulary**

- law of conservation of mass
- open system
- closed system

**Academic Vocabulary**

- decomposition

**Connect** - TE/SB p.90

- Connect It!
- Quest Connection
- Write – When Wood Burns

**Investigate** - TE/SB pp. 91-95; 96

- **Investigate Lab – Is Matter Conserved?**
  - Video – Modeling Chemical Reactions
  - Interactivity – Conservation of Matter
  - Interactivity – Model a Chemical Reaction
  - Interactivity – Reactants and Products
  - Literacy Connection (p.91)
  - Reading Check (pp.93; 94)
  - Model It! (p.92)
  - Math Toolbox (p.95)
- Synthesize** - TE/SB pp. 95-97
- Interactivity – Model the Conservation of Mass
  - Quest Check-In Lab: Pack Building
  - Quest Check-In
- Demonstrate** – TE/SB p.97
- Lesson 3 Check
  - Lesson 3 Quiz

**CLRI Connections:**

- [Lloyd Albert Quarterman Article](#) (Gale Database)  
In hidden laboratories across the United States during World War II (1939-45), scientists engaged in a race against enemy forces to build the first atomic bomb. Lloyd Albert Quarterman was in the forefront of this race. A chemist by training, Quarterman helped split the first atom and create the first atomic reactor. He later developed peaceful uses for nuclear energy and experimented with new chemical compounds and often lectured students on rewarding and interesting careers in science.

**Lesson 4 – Producing Useful Materials -****Enrichment****PE:** MS-PS1-3**SEP:** Obtaining, Evaluating, and Communicating Information**DCI:****PS 1.A – Structures and Properties of Matter**

- (NYSESED) Each substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2) (Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)

**PS1.B – Chemical Reactions**

- (NYSESED) Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different particles and these new substances have different properties from those of the reactants. (MS-PS1- 2),(MS-PS1-5)(Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)

**CCC:** Structure and Function**Savvas****Guiding Objectives:**

- Students will gather, read, and synthesize information from multiple sources in order to explain how synthetic materials are made from natural resources.
- Students will assess the credibility, accuracy, and possible bias of sources they use in order to assess how the production and use of synthetic materials from natural resources affect society.

**Literacy Connection**

- Evaluate Information

**Vocabulary**

- synthetic
- natural resource
- polymer

**Academic Vocabulary**

- replicate

**Connect - TE/SB p.98**

- Connect It!
- Quest Connection
- Class Discussion – Making Synthetic Materials

**Investigate - TE/SB pp. 99-102**

- **Investigate Lab – Making Plastic From Starch**
- Video – Producing Useful Materials
- Interactivity – Describe the Impact of Synthetics
- Reading Check (p.102)
- Model It! (p.102)
- Math Toolbox (p.100)

**Synthesize - TE/SB pp. 103-105**

- Interactivity – The Impact of Synthetics
- Quest Check-In Lab: Heat It Up or Ice It Down
- Literacy Connection (p.103)
- Reading check (p.104)
- Quest Check-In

**Demonstrate – TE/SB p.105**

- Lesson 4 Check
- Lesson 4 Quiz

**CLRI Connections:**

- [George Washington Carver Article](#) (Gale Database) George Washington Carver devoted his life to research projects connected primarily with southern agriculture. The products he derived from the peanut and the soybean revolutionized the economy of the South by liberating it from an excessive dependence on cotton. By 1938, peanuts had become a \$200 million industry and a chief product of Alabama. Carver also demonstrated that 100 different products could be derived from the sweet potato.

<p><b>Topic Close</b></p> <ul style="list-style-type: none"> <li>• Topic 2 Assessment and Remediation TE/SB pp. 108-111</li> <li>• Quest Finding and Reflection TE/SB p. 111</li> </ul>	<p><b>Topic 2 Enrichment</b></p> <p><b>Topic 2 - Lesson 1 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – Chemistry of Ice Cream</li> <li>• <i>u</i>Engineer It! – Making Water Safe to Drink (p.77)</li> </ul> <p><b>Topic 2- Lesson 2 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – Changes in Matter</li> <li>• It's All Connected – the Art of Chemical Change</li> </ul> <p><b>Topic 2 - Lesson 3 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – Formula for Success</li> </ul> <p><b>Topic 2 – Lesson 4 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – How Sweet it Is</li> <li>• Case Study – Is Plastic Really So Fantastic (p.106)</li> </ul>
<p><b>English Language Learners (ELL) Enhancements</b> To access <a href="#">hyperlinked</a> material, you must be logged into your BPS Google Drive</p>	<p><b>Listening</b></p> <ul style="list-style-type: none"> <li>• <b>Cross- Linguistic Practices:</b> Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates).</li> <li>• <b>Activating Prior Knowledge</b> Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content.</li> <li>• <b>Visuals</b> - GIFs, pictures- will assist students in understanding what they are listening to. Use <b>visual thinking strategies</b> to set the lens for learning.</li> <li>• Video to review or introduce a topic – use <b>closed captioning</b> to help students see the words and pronunciations while they listen to the content.</li> <li>• <b>Word stretching / Vowel stretching</b> when instructing allows students to listen closely to the pronunciation of the word.</li> <li>• <b>Performance Level Descriptors</b> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening. Scroll for grade 8.</li> </ul> <p><b>Speaking</b></p> <ul style="list-style-type: none"> <li>• <b>Sentence Stems/Frames</b> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i></li> <li>• <b>Academic Conversation Starters:</b> Have a visual of a list of academic sentence starters that students can refer to in a discussion.</li> <li>• <b>Choral Reading</b> - To build fluency, self-confidence and motivation with <a href="#">reading/speaking</a>.</li> <li>• Create <b>movement</b> to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning.</li> <li>• <b>Performance Level Descriptors</b> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grade 8.</li> </ul> <p><b>Reading</b></p> <ul style="list-style-type: none"> <li>• Supplementary Text to help reinforce concepts.</li> <li>• <b>Visual Aids</b> - Pictures or models to support vocabulary words and concepts</li> <li>• Video to review or introduce a topic - use <b>closed captioning</b> to help students read along while they listen to the content.</li> <li>• <b>4 Square / Frayer models</b> to help students gain a deeper understanding of vocabulary.</li> <li>• <b>Highlighting</b> important text to assist students in answering questions after the reading.</li> <li>• <b>Chunking</b>-Break reading of text into chunks or paragraphs</li> <li>• <b>Vocabulary Morphology</b>- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student's vocabulary.</li> </ul>

	<ul style="list-style-type: none"> <li>● <a href="#">Performance Level Descriptors</a> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grade 8.</li> </ul> <p><b>Instructional Accommodations (depending on the student’s needs)</b></p> <ul style="list-style-type: none"> <li>● <b>Extended time</b> for tests in class, projects and assignments</li> <li>● <b>Directions read.</b> Broken down as necessary</li> <li>● <b>Model</b> how to complete the activity in the lesson</li> <li>● <b>Oral simplification</b> of directions or questions</li> <li>● <b>Translated version</b> of test when available. Student may have both version English and native language version</li> <li>● Use of <a href="#">approved bilingual glossaries</a> from NYS in each subject</li> </ul>
<p><b>Special Education Modifications</b></p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><b>Instructional</b></p> <ul style="list-style-type: none"> <li>● <b>Pre-teach</b> vocabulary</li> <li>● Use <b>picture vocabulary</b></li> <li>● Scaffold <b>Depth of Knowledge</b> questions</li> <li>● Provide copy of notes/<b>notes in “cloze”</b> form</li> <li>● Use of <b>Think, Pair, and Share</b> strategy to help process information</li> <li>● <b>Scaffold</b> written assignments with the use of <b>graphic organizers</b></li> <li>● Allow for <b>multiple ways to respond</b> (verbal, written, response board)</li> <li>● Provide <b>model of performance task</b></li> <li>● <b>Modify informational text</b> to fit the needs of the students</li> <li>● Provide a digital or paper <b>interactive notebook</b></li> <li>● Present complex <b>tasks in multiple ways</b></li> <li>● Provide <b>mnemonic strategies</b> for scientific concepts</li> </ul> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>● <b>Audio</b> reading of text</li> <li>● <b>Text to type</b> functions</li> <li>● <b>Videos</b> to clarify/visualize science concepts</li> <li>● <b>Record class lecture/discussions</b> and make accessible to student</li> <li>● <b>Nearpod-</b> interactive presentations of notes</li> </ul> <p><b>In Class Assessments</b></p> <ul style="list-style-type: none"> <li>● Provide <b>multiple options</b> for projects</li> <li>● <b>Use of timer</b> in class</li> <li>● Break all complex tasks into chunks</li> </ul>
<p><b>Step Up to Writing</b></p> <p>Step Up to Writing Materials can be found in BPS Science K-12 Schoology Folder Grade 8 Resources Grade 8 SUTW materials</p>	<ul style="list-style-type: none"> <li>● Easy Two-Column Notes</li> <li>● Breaking Down Definitions</li> <li>● Paragraph Frame- What I Learned</li> <li>● <a href="#">Performance Level Descriptors</a> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grade 8.</li> </ul>
<p><b>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</b></p>	<ul style="list-style-type: none"> <li>● Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications</li> <li>● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population</li> <li>● All students are given an opportunity to engage in science discourse</li> <li>● Teacher demonstrates high expectations for all students</li> </ul>