



Marietta City Schools
2024–2025 District Unit Planner

Accelerated Physical Science

Unit title	<i>Chemical Reactions</i>	MYP year	<i>3</i>	Unit duration (hrs)	<i>10 Hours</i>
-------------------	---------------------------	-----------------	----------	----------------------------	-----------------

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GSE Standards

Standards

SPS3. Obtain, evaluate, and communicate information to support the Law of Conservation of Matter.

- a. Plan and carry out investigations to generate evidence supporting the claim that mass is conserved during a chemical reaction. (*Clarification statement:* Limited to synthesis, decomposition, single replacement, and double replacement reactions.)
- b. Develop and use a model of a chemical equation to illustrate how the total number of atoms is conserved during a chemical reaction. (*Clarification statement:* Limited to chemical equations that include binary ionic and covalent compounds and will not include equations containing polyatomic ions.)

Gifted Standards

- **MCS.Gifted.S4D.** Respectfully collaborate and effectively communicate exchanges of constructive/critical feedback.
- **MCS.Gifted.S6A.** Set appropriately high standards for work and behavior.
- **MCS.Gifted.S2D.** Apply components of creative thinking in finding, solving, and evaluating solutions to authentic real-world problems and dilemmas.

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

In fifth grade, students investigate the following:

S5P1. Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change.

- a. Plan and carry out investigations of physical changes by manipulating, separating, and mixing dry and liquid materials.

These students have not been exposed to the 8th Science GSE that lay the foundation for the high school Physical Science standards.

Concepts/Skills to be Mastered by Students

- Atomic and molecular motion
- Compounds: naming and writing formulas
- Conservation of matter

Key Vocabulary: (KNOWLEDGE & SKILLS)

Law of Conservation of Matter, chemical reaction, chemical equation, conserved, synthesis, decomposition, single replacement, double replacement, mass, binary ionic, covalent, coefficients, subscripts

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

How does matter and energy interact within the universe?

Unit Phenomena (LEARNING PROCESS)

How can we use our understanding of chemical reactions and LOCOM to develop a flameless heating source for cooking?

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

- Students may not be aware that mass is conserved, rather than lost, during chemical reactions.
- Students may confuse the four major types of chemical reactions.
- Students may have difficulty balancing chemical equations (using both coefficients and subscripts) in order to determine that atoms are conserved during chemical reactions.

Key concept	Related concept(s)	Global context
<p style="text-align: center;">Systems</p> <p>Systems are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex.</p>	<p style="text-align: center;">Balance (MYP)</p>	<p style="text-align: center;">Scientific and Technical Innovation</p> <p>Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.</p>
Statement of inquiry		
<p>Scientific and technical innovations allow us to visualize, model, and explain the balanced changes that occur in systems of matter during chemical reactions.</p>		
Inquiry questions		
<p>Factual</p> <p>What are the four major types of chemical reactions and what distinguishes them from one another? What is the Law of Conservation of Matter?</p> <p>Conceptual</p> <p>How can I generate evidence from an experiment to determine whether mass is conserved during a chemical reaction? How can I use a chemical equation as a model to illustrate how the total number of atoms are conserved during a chemical reaction?</p>		

Debatable		
What is the best design for a flameless heater? Why?		
MYP Objectives	Assessment Tasks	
What specific MYP <u>objectives</u> will be addressed during this unit?	Relationship between summative assessment task(s) and statement of inquiry:	List of common formative and summative assessments.
<p>Science: Criterion A: Knowing and Understanding</p> <p>I. describe scientific knowledge</p> <p>ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations</p> <p>Science: Criterion B: Inquiring and Designing</p> <p>I. describe a problem or question to be tested by a scientific investigation</p> <p>Iv. design scientific investigations</p> <p>Science: Criterion C: Processing and Evaluating</p> <p>I. present collected and transformed data</p> <p>ii. interpret data and describe results using scientific reasoning</p> <p>Science: Criterion D: Reflecting on the Impacts of Science</p>	<p>SOI: Scientific and technical innovations allow us to visualize, model, and explain the balanced changes that occur in systems of matter during chemical reactions.</p> <p>Students are required to demonstrate their understanding of SPS3, which includes planning and carrying out an investigation to support the claim that mass is conserved during a chemical reaction. This will require students to use evidence from their investigation to explain their reasoning in a CER format. During this process, students also explore the four major types of chemical reactions. Additionally, students will use models, including chemical equations, to demonstrate how atoms are conserved during a chemical reaction and identify the type of chemical reaction occurring. The summative assessment will task students with using models to effectively balance chemical equations, identify the type of reaction occurring, and predict reactants and products of chemical reactions.</p>	<p>Formative Assessment(s):</p> <p>Balancing Chemical Equations CFA</p> <p>Summative Assessment(s):</p> <p>Chemical Reactions UA Paper I and Paper II</p>

<p>I. describe the ways in which science is applied and used to address a specific problem or issue</p> <p>Design: Criterion A: Inquiring and Analyzing</p> <p>iii. analyze a group of similar products that inspire a solution to the problem</p> <p>Design: Criterion B: Developing Ideas</p> <p>I. develop a design specification which outlines the success criteria for the design of a solution based on the data collected</p> <p>iii. present the chosen design and outline the reasons for its selection</p> <p>Design Criterion D: Evaluating</p> <p>ii. explain the success of the solution against the design specification</p>		
---	--	--

Approaches to learning (ATL)

Category: Communication
Cluster: Communication Skills
Skill Indicator: Make inferences and draw conclusions.

Learning Experiences		
Add additional rows below as needed.		
Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<p>SPS3. Obtain, evaluate, and communicate information to support the Law of Conservation of Matter. a. Plan and carry out investigations to generate evidence supporting the claim that mass is conserved during a chemical reaction.</p>	<ul style="list-style-type: none"> ● Chemical Reactions Lab (Kit-Based) ● Designing a Flameless Heating Device ● LOCOM Practice Problems (grams) 	<ul style="list-style-type: none"> ● Discovery Education High School Chemistry Science Techbook ● NGSS Case Studies for Differentiated Learners ● Next Generation Science Standards: "All Standards, All Students" ● Extensions – Enrichment Tasks/Projects <p>All information included by PLC in the differentiation box is the responsibility and ownership of the local school to review and approve per Board Policy IKB.</p> <p>Task-Specific Differentiation</p> <ul style="list-style-type: none"> ● Modeling ● Small Group ● Multiple Means of Engagement ● Multiple Means of Content Representation (laboratories, SIM, NearPod, DE Techbook) ● Multiple Means of Action and Expression (Choice of Design, Modeling LOCOM)
<p>SPS3. Obtain, evaluate, and communicate information to support the Law of Conservation of Matter. b. Develop and use a model of a chemical equation to illustrate how the total number of atoms is conserved during a chemical reaction.</p>	<ul style="list-style-type: none"> ● Balancing Chemical Equations PhET ● Chemical Reactions Lab Follow-Up Sheet ● LOCOM Practice Problems (Balancing Atoms) 	
Content Resources		
<p>Discovery Education High School Chemistry Science Techbook Unit 5: Representing Chemical Substances</p> <ul style="list-style-type: none"> - Concept 5.3: Chemical Reactions and Equations - Concept 5.4: Mathematics of Formulas and Equations 		

PhET: Balancing Chemical Equations

Holt Science Spectrum Textbook

The Periodic Table of Elements

GaDOE Instructional Segment: Where Oh Where Did My Candle Go?