Marietta City Schools

2023–2024 District Unit Planner

Accelerated Physical Science

Unit title	*Chemical Reactions*	**MYP year**	*3*	**Unit duration (hrs)**	*10 Hours*

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.)

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)

Operation of a car and/or rocket.

Unit Phenomena (LEARNING PROCESS)
How do atoms rearrange to form new substances?
How do we use elements, compounds, and chemical reactions to develop substances designed to heat or cool?

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
Systems 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.	Balance (MYP)	**Scientific and Technical Innovation** 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.

Statement of inquiry

Scientific and technical innovations allow us to visualize, model, and explain the balanced changes that occur in systems of matter during chemical reactions.

Inquiry questions

Factual

What are the four major types of chemical reactions and what distinguishes them from one another?
What is the Law of Conservation of Matter?

Conceptual

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?

Debatable

What is the best fuel source for a rocket? Why?
What is the best design for a flameless heater? Why?

What is the best design for a hot pack? Why?		
MYP Objectives	**Assessment Tasks**	
*What specific MYP **objectives** will be addressed during this unit?*	***Relationship** between summative assessment task(s) and statement of inquiry:*	*List of common formative and summative assessments.*
Science: Criterion A: Knowing and Understanding I. describe scientific knowledge Ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations Science: Criterion B: Inquiring and Designing I. describe a problem or question to be tested by a scientific investigation Iv. design scientific investigations Science: Criterion C: Processing and Evaluating I. present collected and transformed data Ii. interpret data and describe results using scientific reasoning Science: Criterion D: Reflecting on the Impacts of Science I. describe the ways in which science is applied and used to	SOI: Scientific and technical innovations allow us to visualize, model, and explain the balanced changes that occur in systems of matter during chemical reactions. 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 occuring, and predict reactants and products of chemical reactions.	**Formative Assessment(s):** Balancing Chemical Equations CFA **Summative Assessment(s):** Chemical Reactions UA Paper I and Paper II

address a specific problem or issue Design: Criterion A: Inquiring and Analyzing Iii. analyze a group of similar products that inspire a solution to the problem Design: Criterion B: Developing Ideas I. develop a design specification which outlines the success criteria for the design of a solution based on the data collected Iii. present the chosen design and outline the reasons for its selection Design Criterion D: Evaluating Ii. explain the success of the solution against the design specification		
Approaches to learning (ATL)		
Category: Communication **Cluster:** Communication Skills **Skill Indicator:** Make inferences and draw conclusions.		

<table>
<tr><th colspan="3"><u>Learning Experiences</u>
Add additional rows below as needed.</th></tr>
<tr><th>Objective or Content</th><th>Learning Experiences</th><th>Personalized Learning and Differentiation</th></tr>
<tr><td>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.</td><td>● Chemical Reactions Lab (Kit-Based)
● LOCOM Lab
● Designing a Hot Pack or Flameless Heater
● LOCOM Practice Problems (grams)</td><td rowspan="2">● 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

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.

Task-Specific Differentiation

● 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)</td></tr>
<tr><td>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.</td><td>● Balancing Chemical Equations PhET
● Chemical Reactions Lab Follow-Up Sheet
● LOCOM Practice Problems (Balancing Atoms)</td></tr>
<tr><th colspan="3">Content Resources</th></tr>
<tr><td colspan="3">Discovery Education High School Chemistry Science Techbook Unit 5: Representing Chemical Substances
- Concept 5.3: Chemical Reactions and Equations
- Concept 5.4: Mathematics of Formulas and Equations</td></tr>
</table>

PhET: Balancing Chemical Equations

Holt Science Spectrum Textbook

The Periodic Table of Elements

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