Jan. 4E Gr. 8: Chemical Reactions and Equations

Content Area: **Science**
Course(s):
Time Period: **January**
Length: **2 Weeks**
Status: **Published**

Unit Overview

A chemical reaction occurs when two elements are joined with one another. In this concept, you will learn how and why chemical reactions occur when we combine different elements.

Enduring Understandings

- **Lesson Objectives**

  By the end of the lesson, students should be able to:

  - List the indicators that a chemical reaction has occurred and explain what happened.
  - Identify the reactants and products in a chemical reaction.
  - Distinguish between endothermic and exothermic chemical reactions.
  - Explain the law of conservation of mass.
  - Explain how chemical reactions are represented so that mass is conserved.
  - Correctly balance given unbalanced chemical equations.
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Essential Questions

- **Focus Questions**

  - How do substances combine or change (react) to make new substances?
  - How does one characterize and explain these reactions and make predictions about them?

- **Lesson Questions**

  - How do scientists represent chemical reactions?
  - How is it determined that a chemical reaction has occurred?

- How are chemical equations written to show that mass is conserved?

- **Can You Explain?**

  - What happens during a chemical reaction, how do you know when a chemical reaction has occurred, and how can you represent chemical reactions with equations?

Instructional Strategies & Learning Activities

Science 8th grade
Law of Conservation of Mass
Atoms, Elements, Bonding and Compounds

Dalton's Atomic Theory in Action

Objective(s)
Students will learn about the fundamental forces which create and control the interactions between atoms to form all matter. Students will understand how scientists prove mathematically chemical reactions do not create or destroy mass.

Goal(s)
Students will recognize how the physical construction of an atom through its subatomic particle count and configuration dictates its placement on the periodic table of the elements and consequently controls its interactions with other elements. These interactions include various types of bond formation which lead to the creation of compounds both natural and synthetic.

Students will be able to name reaction types according to the products that are created (synthesis, decomposition and replacement). Additionally, students will be able to prove that atoms are not created or destroyed during the chemical reaction process, only rearranged according to Dalton's Atomic theory.
Procedures
Students will use their informational packets and handouts in order to complete their lessons.
students will use a variety of informational sources including text, video, demonstrations, labs and online research.
Course Material TCI Bring Science Alive- Matter- Unit 1:1 Atoms and Elements
Assessment
class discussion
review of assignments
quizzes
tests
projects/ labs

Differentiation

<u>Change the Pace:</u>

pre-testing

curriculum compacting

tiered activities (start with more difficult activities and skip the easier ones)

independent study

learning centers (skip centers that student has mastered)

Change the Delivery/Content:

mini-lessons for small groups

use different resources (higher level books, higher level response questions, open ended questions/problems…)

curriculum compacting

independent study

open-ended questions

teacher conferences

reading journals

Change the Product:

choice boards or Tic Tack Toe menus

student choice options

game creation

technology-based products/presentations

Change the Process - Add Depth:

tiered activities

open-ended activities

higher-level questions

student experts

increase complexity, decrease structure

Change the Process - Add Breadth:

choice boards or Tic Tack Toe menus

interdisciplinary units

Integration of Career Readiness, Life Literacies and Key Skills

Students will work in small groups or partnerships, as chemists, to conduct investigations, build models or prototypes and present findings.

	An individual's strengths, lifestyle goals, choices, and interests affect employment and income.
	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
	Multiple solutions often exist to solve a problem.
9.2.8.CAP.10	Evaluate how careers have evolved regionally, nationally, and globally.
9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
	Increases in the quantity of information available through electronic means have heightened the need to check sources for possible distortion, exaggeration, or misrepresentation.
9.4.8.IML.1	Critically curate multiple resources to assess the credibility of sources when searching for information.
9.4.8.IML.3	Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.

Technology and Design Integration

Technology is fully integrated using Discovery Techbook.

	People use digital devices and tools to automate the collection, use, and transformation of data. The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.

Interdisciplinary Connections

MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
MA.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RI.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
LA.RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
LA.RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LA.RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LA.RI.8.7	Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to present a particular topic or idea.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LA.RI.8.8	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.

LA.RST.6-8.10	By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
LA.RI.8.10	By the end of the year read and comprehend literary nonfiction at grade level text-complexity or above, with scaffolding as needed.
LA.W.8.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.WHST.6-8.1.A	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
LA.WHST.6-8.1.B	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
LA.WHST.6-8.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
LA.WHST.6-8.1.D	Establish and maintain a formal/academic style, approach, and form.
LA.WHST.6-8.1.E	Provide a concluding statement or section that follows from and supports the argument presented.
LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.WHST.6-8.2.A	Introduce a topic and organize ideas, concepts, and information using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.
LA.WHST.6-8.2.C	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
LA.WHST.6-8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.WHST.6-8.2.E	Establish and maintain a formal/academic style, approach, and form.
LA.WHST.6-8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
LA.WHST.6-8.4	Produce clear and coherent writing in which the development, organization, voice, and style are appropriate to task, purpose, and audience.
LA.WHST.6-8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LA.WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
LA.WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LA.WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
LA.W.8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate

eye contact, adequate volume, and clear pronunciation.

Differentiation

Struggling Students

1. Using a two-column chart, ask students to compare and contrast exothermic and endothermic reactions.
2. Have students create a diagram that depicts conservation of mass during chemical reactions that involve changes in state.

ELL

1. Assist students in identifying familiar prefixes and/or words within words for each glossary term (e.g., *endothermic* is from the Greek word *endon*, which means "in" or "within" and *thermic* is from the Greek word *thermos*, which means "hot" or "warm").
2. Encourage students to demonstrate their understanding by drawing concepts. For example, they can create a diagram showing a molecule, atom, electron, and bond.

Accelerated Students

1. Before they read the Core Interactive Text, have students use their previous knowledge of chemical reactions to describe how they would know whether a chemical reaction had taken place. Make a list and have students generalize the ideas, e.g., changes in state, changes in properties.
2. Using their current knowledge of chemical reactions, ask students to brainstorm further S.T.E.M. connections to other disciplines.

Differentiation in science can be accomplished in several ways. Once you have given a pre-test to students, you know what information has already been mastered and what they still need to work on. Next, you design activities, discussions, lectures, and so on to teach information to students. The best way is to have two or three groups of students divided by ability level.

While you are instructing one group, the other groups are working on activities to further their knowledge of the concepts. For example, while you are helping one group learn the planet names in order, another group is researching climate, size, and distance from the moon of each planet. Then the groups switch, and you instruct the second group on another objective from the space unit. The first group practices writing the order of the planets and drawing a diagram of them.

Here are some ideas for the classroom when you are using differentiation in science:

- Create a tic-tac-toe board that lists different activities at different ability levels. When students aren't involved in direct instruction with you, they can work on activities from their tic-tac-toe board. These boards have nine squares, like a tic-tac-toe board; and each square lists an activity that corresponds with the science unit. For example, one solar system activity for advanced science students might be to create a power point presentation about eclipses. For beginning students, an activity might be to make a poster for one of the planets and include important data such as size, order from the sun, whether it has moons, and so on.

- Find websites on the current science unit that students can explore on their own.

- Allow students to work in small groups to create a project throughout the entire unit. For example, one group might create a solar system model to scale. Another group might write a play about the solar system. This is an activity these groups can work on while they are not working directly with you.

Differentiation in science gets students excited to learn because it challenges them to expand their knowledge and skills, instead of teaching the whole group concepts they have already mastered

Modifications & Accommodations

Refer to QSAC EXCEL SMALL SPED ACCOMMOCATIONS spreadsheet in this discipline.

Modifications and Accommodations used in this unit:

In addition to differentiated instruction, IEP's and 504 accommocations will be utilized.

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Benchmark Assessments

Benchmark Assessments are given periodically (e.g., at the end of every quarter or as frequently as once per month) throughout a school year to establish baseline achievement data and measure progress toward a standard or set of academic standards and goals.

Schoolwide Benchmark assessments:

Aimsweb benchmarks 3X a year

Linkit Benchmarks 3X a year

Additional Benchmarks used in this unit:

Pre and post assessments to measure growth.

Formative Assessments

Assessment allows both instructor and student to monitor progress towards achieving learning objectives, and can be approached in a variety of ways. **Formative assessment** refers to tools that identify misconceptions, struggles, and learning gaps along the way and assess how to close those gaps. It includes effective tools for

helping to shape learning, and can even bolster students' abilities to take ownership of their learning when they understand that the goal is to improve learning, not apply final marks (Trumbull and Lash, 2013). It can include students assessing themselves, peers, or even the instructor, through writing, quizzes, conversation, and more. In short, formative assessment occurs throughout a class or course, and seeks to improve student achievement of learning objectives through approaches that can support specific student needs (Theal and Franklin, 2010, p. 151).

Formative Assessments used in this unit:

See assessments located in links above.

Summative Assessments

Summative assessments evaluate student learning, knowledge, proficiency, or success at the conclusion of an instructional period, like a unit, course, or program. Summative assessments are almost always formally graded and often heavily weighted (though they do not need to be). Summative assessment can be used to great effect in conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches.

Summative assessments for this unit:

See assessments located in links above.

Instructional Materials

See materials located in links above.

Discovery Techbook

Teacher made materials

Additional labs are available through NJCTL on-line curriculum

Standards

MS-PS1	Matter and its Interactions
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.

	Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.
PS1.B	Chemical Reactions
	Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.
	Energy and Matter
	Matter is conserved because atoms are conserved in physical and chemical processes.
6-8.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.
6-8.MS-PS1-5.PS1.B	Chemical Reactions
6-8.MS-PS1-5.PS1.B.1	Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.
6-8.MS-PS1-5.PS1.B.2	The total number of each type of atom is conserved, and thus the mass does not change.