# LESSON SEVEN

What is a chemical reaction?

#### SCIENCE

Constructing Explanations, Engaging in Argument and Obtaining, Evaluating, and Communicating Information

**ENGLISH LANGUAGE ARTS** Reading Informational Text, Writing an Explanation

GRADE 8

90 minutes



In this lesson, students learn about the process of chemical reactions, setting a foundation for subsequent lessons. Students formulate conjectures about chemical reactions and gather information from text to revise these conjectures. Students work with their peers to revise and document these developing understandings.



#### Common Core State Standards

- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. CCSS.ELA-LITERACY.WHST.6-8.2.B
- <u>Use precise language and domain-specific vocabulary to inform about or</u> <u>explain the topic</u>. CCSS.ELA-LITERACY.WHST.6-8.2.D
- <u>Gather relevant information from multiple print and digital sources,</u> using search terms effectively; assess the credibility and accuracy of each source; <u>and quote or paraphrase the data and conclusions of others</u> <u>while avoiding plagiarism and following a standard format for citation</u>. CCSS.ELA-LITERACY.WHST.6-8.8
- Draw evidence from informational texts to support analysis, reflection, and research. CCSS.ELA-LITERACY.WHST.6-8.9





#### Common Core State Standards

• Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced. CCSS.ELA-LITERACY.SL.8.3

#### Next Generation Science Standards

- Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS-1-2
- Structures and Properties of Matter. PS1.A

Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.

• Chemical Reactions. PS1.B

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 reactants.

#### Science and Engineering Practices

- <u>Constructing explanations</u> and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and <u>communicating information</u>



#### LEARNING GOALS

- Understand that atoms rearrange during a chemical reaction.
- Explain the process of a chemical reaction.





## SUCCESS CRITERIA

- 1 Identify components of chemical reactions (reactants and products).
- 2 Construct an explanation of chemical reactions.
- **3** Reference relevant and appropriate evidence to support explanation of the process of a chemical reaction.



## SUMMARY OF LESSON TASKS

- 1 Record and discuss initial conjectures.
- 2 Read and annotate: Middle School Chemistry Chapter 6.
- 3 Complete Double Entry Journal and discuss.
- 4 Write explanation.



## CULMINATING TASK

Write a one to two-paragraph explanation in response to the question, "What is a chemical reaction?" Include information that describes chemical reactions, including what happens when one takes place. Support your explanation with evidence from the demonstration, texts, discussions, and other sources. Cite your sources.

## PART I: INTRODUCTION

**ACTIVATE PRIOR KNOWLEDGE** Open the lesson with a connection to what students have previously learned about atoms and molecules. You may wish to review some of the charts you created with students in previous lessons.

**INTRODUCE THE TOPIC** Explain that in today's lesson, students will explore what happens to atoms and molecules during a chemical reaction. By the end of the lesson, students should be able to answer the question: What is a chemical reaction? To begin this exploration, conduct a short demonstration illustrating a chemical reaction. Ask students to think about what is happening and encourage them to ask questions while you are conducting the demonstration. Possible demonstrations: Briggs-Rauscher Oscillating Color Change Reaction (http://chemistry.about.com/cs/demonstrations/a/aa050204a.htm) or Formation of Silver Crystals (https://www.youtube.com/watch?v=rgYhkVy5cBU).



**RECORD AND DISCUSS INITIAL CONJECTURES** Provide students with time to construct a Double Entry Journal in their Science Notebooks. In the left-hand column, students record initial conjectures about the process of chemical reactions, using their observations and knowledge about atoms and molecules. Students record their reasoning in the right-hand column of the Double Entry Journal. When students complete their individual Double Entry Journal, they work in small groups to discuss what they have observed and compare initial conjectures about what might be happening during a chemical reaction. Students should record group-level conjecture(s) and prepare to share these with the whole class. Remind students to select group roles, including recorder and reporter. Record student contributions in a whole class Double Entry Journal visible to all students.

## PART II: GUIDED PRACTICE

**READ AND ANNOTATE** Provide students with a copy of <u>Middle School Chemistry</u> <u>Chapter 6</u>

(http://www.middleschoolchemistry.com/pdf/chapter6/chapter6\_student\_reading.pdf). The text gives information about chemical reactions, including explanations of what these are and descriptions of what happens when one occurs. Inform students that they will read pages 680 – 683. Remind them to consider the question, "What is a chemical reaction?" as they read. At this point students have probably read and annotated several texts and are ready to do annotate with minimal support. Nonetheless, the text may present specific challenges for some students. If this is the case, read and annotate the first few paragraphs of the text together, periodically stopping to discuss the main ideas and supporting details. After a few sections, allow students to read the remaining text independently.



#### SUCCESS CRITERION EVIDENCE-GATHERING OPPORTUNITY

· Identify main ideas and supporting details.

As students read and annotate the text, gather evidence of learning by looking at student annotations. Check that students are accurately identifying the main ideas and supporting details in the text.







#### ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If you notice that students have difficulty identifying main ideas or supporting details, support students by conducting a guided annotation. You may choose to first read and annotate one paragraph together. Then, release responsibility gradually by having students annotate one paragraph on their own with your support, if needed. Repeat the process, alternating between teacher-led annotation and independent student annotation with paragraphs or text sections until students are successful.

## COMPLETE DOUBLE ENTRY JOURNAL AND DISCUSS After

students read and annotate text, they work with a partner or two to record main ideas and supporting details. Each student will construct their own Double Entry Journal in their Science Notebooks. Pairs or triads should discuss and decide on the main ideas and supporting details in the text. Students use the Double Entry Journal to organize main ideas and supporting details in the text, and practice paraphrasing prior to participating in discussion. Bring the class together and first lead a discussion of the main ideas and supporting details in the text. Then, discuss the opening question, "What is a chemical reaction?" Return to the recorded responses at the beginning of the class period and revise responses using the information from the text.



#### SUCCESS CRITERION EVIDENCE-GATHERING OPPORTUNITY

• Identify and paraphrase main ideas and supporting details.

Gather evidence of learning by checking Double Entry Journals as students work to paraphrase main ideas and supporting details. During the whole class discussion, check students' developing understanding of chemical reactions. Note the language students use to describe chemical reactions. Take this opportunity to assess the degree to which students refer to information from the text or other sources to support their discussion.





## ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If during discussion you notice that students do not reference the text to support their responses, you might press for evidence and support by asking the following questions:

- What in the text makes you say that?
- How did you arrive at that conclusion?

# PART III: CULMINATING TASK

**WRITE EXPLANATION** In the final task, students write an explanation that shows they understand that atoms are not lost but simply rearrange during a chemical reaction. The explanation includes a description of the process that occurs during a chemical reaction. Students use information from the text, discussion, and/or demonstration, to support their explanation. The explanation:

- provides an accurate description of the process that occurs during a chemical reaction
- demonstrates the understanding that atoms rearrange during a chemical reaction
- includes appropriate use of key content vocabulary
- references relevant and appropriate evidence to support explanation



#### Background

 <u>Middle School Chemistry Teacher Guide</u> http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson3





#### DOUBLE ENTRY JOURNAL: INITIAL CONJECTURES

What is a chemical reaction?	What is your reasoning?





#### DOUBLE ENTRY JOURNAL: MIDDLE SCHOOL CHEMISTRY

Supporting details

