

LESSON FIVE

What is a simple molecule?

SCIENCE

Asking Questions, Investigating, Constructing Explanations, and Obtaining, Evaluating, and Communicating Information

ENGLISH LANGUAGE ARTS

Reading Informational Text, Writing an Explanation

GRADE 8

90
minutes



PURPOSE

Molecules are formed when two or more atoms bond together. In this lesson, students learn about the formation of simple molecules. Students gather information while they read an online text, construct simple molecules using a computer-based simulator, and demonstrate understanding of simple molecules in a written explanation.



STANDARDS

● Common Core State Standards

- Cite specific textual evidence to support analysis of science and technical texts. CCSS.ELA-LITERACY.RST.6-8.1
- 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). CCSS.ELA-LITERACY.RST.6-8.7
- 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
- Use precise language and domain-specific vocabulary to inform about or explain the topic. CCSS.ELA-LITERACY.WHST.6-8.2.D



STANDARDS CONTINUED

● Common Core State Standards

- 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. CCSS.ELA-LITERACY.WHST.6-8.8

● Next Generation Science Standards

- Develop models to describe the atomic composition of simple molecules and extended structures. MS-PS-1-1
- 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.

● Science and Engineering Practices

- Asking questions and defining problems
- Planning and carrying out investigations
- Constructing explanations and designing solutions
- Obtaining, evaluating, and communicating information



LEARNING GOALS

- Understand that simple molecules are made up of a few atoms that are bonded together.
- Explain simple molecules using support from texts and explorations.



- 1 Build simple molecules from atoms.
- 2 Identify main ideas and supporting details from text.
- 3 Write an explanation of a simple molecule that includes at least one example.
- 4 Reference relevant and appropriate evidence from texts and discussion to support written explanation of a simple molecule.



SUMMARY OF LESSON TASKS

- 1 Record and discuss initial understandings.
- 2 Read: [Structure, properties, and uses](#).
- 3 Complete Double Entry Journal.
- 4 Write an explanation.
- 5 Conduct investigation.
- 6 Write a self-assessment reflection.



Reflect on your learning. Write a description of what you have learned about simple molecules. Include evidence from the texts and simulation to support your description.

PART I: INTRODUCTION

their ideas, discuss as a whole group. Students use their writing to support them in discussion as they will have had time to think about the topic and formulate their own ideas before participating in a whole group discussion.



ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If students provide responses that demonstrate unclear or partial understanding, probe student thinking by asking questions to elicit information and remind them to reference the Triple Entry Journal in their Science Notebooks or the one displayed in class, if available. Possible probes include:

- What do we know? What's our evidence?
- Why do you think that?
- How does this connect to what we have learned previously?

READ Provide students with access to the online text [Structure, Properties, and Uses](http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/bonding/structure_propertiesrev1.shtml) (http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/bonding/structure_propertiesrev1.shtml). The text, available on the BBC website, gives students information about simple and complex molecules. In this lesson, students read the first section about simple molecules. They will read the sections on complex molecules in Lesson Six.

COMPLETE DOUBLE ENTRY JOURNAL AND DISCUSS Students complete a Double Entry Journal where they record the main ideas and supporting details of the text, paraphrasing the information. Students can engage with the ideas of the text a second time, differentiating main ideas from the details in the text, putting these ideas into words before participating in discussion. As a whole class, discuss the main ideas and supporting details students recorded in their Double Entry Journals. Once students have reviewed the main ideas and details in the text, push student thinking by returning to the opening question, “What is a simple molecule?”.



SUCCESS CRITERION EVIDENCE-GATHERING OPPORTUNITY

- Identify and paraphrase important information from text.

Gather evidence of learning by checking Double Entry Journals as students work to paraphrase main ideas and supporting details and listening to the responses students provide during discussion.



ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If you notice students share responses but do not provide sufficient reasoning, press for reasoning and justification. You might ask:

- Why do you think that?
- How did you arrive at that conclusion?



PEER AND SELF-ASSESSMENT

Provide students with time to make note of ideas that have been clarified up to this point. Students share current thinking with a partner or small group. Examples of questions that can guide their comments might be:

- What do I know now that I did not know before?
- What am I prepared to explain?



SUCCESS CRITERION EVIDENCE-GATHERING OPPORTUNITY

- Write an explanation of a simple molecule.
- Reference relevant and appropriate evidence from texts and discussion to support written explanation of a simple molecule.

Check that explanations define simple molecules and provide at least one example.

CONDUCT INVESTIGATION AND RECORD In this investigation, students will use a computer-based simulator to develop examples of simple molecules. Introduce the investigation activity: [Phet Build a Molecule](https://phet.colorado.edu/en/simulation/legacy/build-a-molecule) (<https://phet.colorado.edu/en/simulation/legacy/build-a-molecule>). Students work independently or in pairs, depending on the number of available laptops and on your knowledge of students. Give students time to explore and become familiar with the simulator. Students use the simulator to build at least four simple molecules. Students record the simple molecule arrangements in their Science Notebooks using a Triple Entry Journal format. Students require access to a laptop/tablet that has the computer simulator installed. If no laptop/tablet is readily available, the teacher may use an alternative investigation activity using manipulatives. This will require a bit more time for preparation of materials.



SUCCESS CRITERION

EVIDENCE-GATHERING OPPORTUNITY

- Build simple molecules from atoms.

As students use the simulator to build simple molecules, check-in with individual students or pairs and review the notes they have recorded in their Science Notebooks.



If you notice students have difficulty using the simulator or understanding the relationship between atoms, elements, and simple molecules, refer to the periodic table and guide students in making connections.

PART III: CULMINATING TASK



SUCCESS CRITERION

EVIDENCE-GATHERING OPPORTUNITY

Review individual students' Science Notebooks to gather additional evidence of student learning. Check that students have built at least four molecule arrangements using the simulator, included illustrations for each molecule, named the elements that comprise each simple molecule described, and identified the correct number of atoms for each element that makes up each simple molecule.



ADDITIONAL LESSON RESOURCES

Background Information

- [Build A Molecule Guide](https://phet.colorado.edu/services/download-servlet?filename=%2Fteachers-guide%2Fbuild-a-molecule-guide.pdf) – <https://phet.colorado.edu/services/download-servlet?filename=%2Fteachers-guide%2Fbuild-a-molecule-guide.pdf>

TRIPLE ENTRY JOURNAL

What is the difference between an atom and a molecule?	How do you know? Record your evidence and include source.	Why do you think that? Include your reasoning.