

LESSON SIX

What is a complex 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

Complex molecules are formed when hundreds or thousands of atoms bond together. In this lesson, students build on their knowledge of simple molecules. Students gather information about complex molecules while they read an online text, construct complex molecules using a computer-based simulator, and demonstrate understanding of complex molecules in a written explanation.



STANDARDS

● Common Core State Standards

- 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
- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. CCSS.ELA-LITERACY.RST.6-8.9
- 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.

Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).

● 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 complex molecules are made up of many atoms that are bonded together in a repeating pattern.
- Explain complex molecules using support from texts and explorations.



- 1 Build complex molecules from atoms.
- 2 Identify main ideas and supporting details from text.
- 3 Reference relevant and appropriate details and evidence from text(s) and discussion to support written summary and explanation.
- 4 Write an explanation that differentiates between a simple and complex molecule, including at least one example of each.



SUMMARY OF LESSON TASKS

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



Write a one to two-paragraph explanation describing simple and complex molecules. Using information from the text(s), discussions, and simulations, explain how atoms bond together to form molecules that range from simple to complex. Support your claim with evidence. Cite your sources.

PART I: INTRODUCTION

RECORD AND DISCUSS INITIAL UNDERSTANDINGS AND DISCUSS

Ask students to formulate two to four sentences in their *Science Notebooks* where they summarize their current thinking about complex molecules. Remind students to include supporting evidence. When students have recorded their ideas, discuss students' initial thinking as a whole group. Students use written understandings to support their participation in whole group discussion.



ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If student responses require clarification or evidence, press students to provide accurate information, additional evidence, and reasoning. Possible probes include:

- What do we know? What's our evidence?
- How can we check to make sure?
- What do you think? Why do you think that?

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_properties1.shtml) (http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/bonding/structure_properties1.shtml). The text, available on the BBC website, gives students information about simple and complex molecules. In this lesson, students read the remaining sections about complex molecules. Note that this is a lengthy text and may be especially challenging for students. You might consider reading the text together, periodically stopping to discuss the main ideas and supporting details. Alternatively, you may choose to have students read specific sections of the online text.

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 use the Double Entry Journal to organize main ideas and supporting details in the text, and practice paraphrasing prior to participating in discussion. As a whole class, discuss the opening question, "What is a complex molecule?"



- 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 and listening to the responses students provide during discussion.



ANTICIPATED RESPONSE PEDAGOGICAL ACTION

If you notice students share responses and provide insufficient support, press for reasoning. You might ask:

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

WRITE A SUMMARY Students write a one-paragraph summary of text [Structure, Properties, and Uses](#) for the sections students read today.



- Reference relevant and appropriate details and evidence from text(s) and discussion to support written summary.

Check that summaries demonstrate understanding of the reading, include main ideas of the text, and relevant and appropriate details to support the main ideas.

CONDUCT INVESTIGATION AND RECORD Students will continue to use the [Phet Build a Molecule](https://phet.colorado.edu/en/simulation/legacy/build-a-molecule) (<https://phet.colorado.edu/en/simulation/legacy/build-a-molecule>) simulator to build examples of complex molecules. Students work independently or in pairs, building at least complex molecules and recording the complex molecule arrangements in their Science Notebooks. Students using a Triple Entry Journal format to keep track of these arrangements. Students require access to a laptop or tablet that has the

computer simulator installed. If no laptop or 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 complex molecules from atoms.

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

PART III: CULMINATING TASK



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

Illustrate your Molecule	Name the molecules that make up your element.	How many atoms of each element are used to make up your molecule?