

Atoms & Molecules Lesson 1: “The Solve”

Educator’s Resource Guide

The Solve contains two mini lessons: The [live video lesson](#) and the [animation lesson](#). For the most comprehensive learning experience, conduct both. If you’re short on time, choose one. Which lesson?

- For a more structured lesson, choose the animation (the lesson below).
- For a more inquiry-based lesson, choose the live video lesson and assign the animation for homework.

Objective:

In The Solve, students will:

1. Solve a mystery involving atoms & molecules
2. Create a mind map to explore relationships among new chemistry vocabulary
3. Communicate understanding that while some substances appear the same to the human eye, they may be made of different molecules.

Time Required: 45-80 minutes

Materials Required	Safety Considerations	Science & Engineering Practices
<ul style="list-style-type: none">• Student Guide (<i>includes student agenda and vocabulary handout</i>)• Atoms & Molecules Episode• Computer with speakers• Scissors• Glue or Tape	None	<ul style="list-style-type: none">• Developing and Using Models• Constructing Explanations or Arguments From Evidence

Episode Description:

The heat is on in Chef Crystal’s kitchen! When a stream of customers return Chef Crystal’s famous creme brulee, Mosa is called to figure out what is behind this sudden change in taste. Mosa and her team use their quantum microscope to explore what is going on at the molecular level and find out that an unlikely collection of atoms and molecules may be to blame.



Inquiry Scale: Leveling Information

The Solve can be completed in various settings, including presentation-style, small groups, or individually. In the case of a flipped or blended classroom, it can be completed entirely at home.

Level 1: Most teacher-driven *(recommended for grades 4–5)*

View the animated mystery twice: once in full, and a second time along with the discussion questions, pausing the video as needed to answer the episode questions as a group. Project and complete the Mind Map as a class-wide activity. This can be done digitally or on paper. Have students informally quiz each other on the vocabulary until you feel they're familiar with the terms. Use the discussion questions at the bottom of the Mind Map to have a group discussion. Finally, have students complete the quiz digitally or on paper as an exit ticket.

Level 2 *(recommended for grades 5–6)*

View the animated mystery in full. Afterwards, have students work through the episode questions to the best of their ability in small groups. Play the mystery a second time, pausing the video to discuss each question. Direct students to complete the Mind Map in small groups, either digitally or on paper. Come back as a class to review correct answers, as needed. Have students informally quiz each other on the vocabulary until you feel they're familiar with the terms. Use the discussion questions at the bottom of the Mind Map to have a group discussion. Finally, have students complete the quiz digitally or on paper as an exit ticket.

Level 3 *(recommended for grades 6–7)*

Provide students with their student URL and have students view the animated mystery in small groups. Have students play the animated mystery once in full and then answer episode questions in their table groups to the best of their ability. Then, as a class, project the mystery, pausing, as needed, to discuss episode questions in a think-pair-share format. Have students complete the Mind Map in table groups, either digitally or on paper. Have students quiz each other on the vocabulary until you feel they're familiar with the terms. In table groups, have students go through the discussion questions on their own, and review answers as a class. Finally, have students complete the quiz digitally or on paper as an exit ticket.

Level 4 *(recommended for grades 7–8)*

Provide students with their student URL and have students view the animated mystery and complete episode questions in pairs. Have students review their answers with a neighboring table group. Have students complete the Mind Map in pairs, either digitally or on paper. Have students quiz each other on the vocabulary until they feel they're familiar with the terms. Have these same pairs go through the discussion questions. Finally, have students complete the quiz digitally or on paper as an exit ticket.

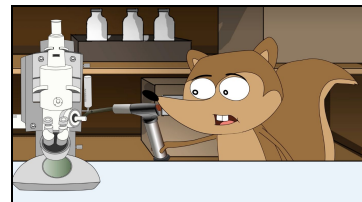
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Agenda

I. Solve the Atoms & Molecules Video Mystery (20 minutes)

Differentiation Tip: The Video Mystery can be viewed as a class, in small groups, individually, or completed for homework. For additional support, students can view the episode twice: once before completing the questions and once with teacher guidance, pausing the video to discuss each answer.

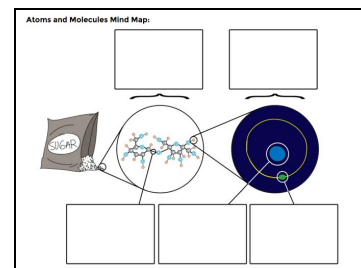
1. Play the animated Mosa Mack Mystery on Atoms & Molecules.
2. Students answer questions either digitally on the Mosa Mack platform or on paper in the Student Guide as they watch. Encourage students to cite the specific time codes in the episode to promote writing with supporting evidence. Answers can be found in the key below.
3. View the answer video to confirm student understanding.



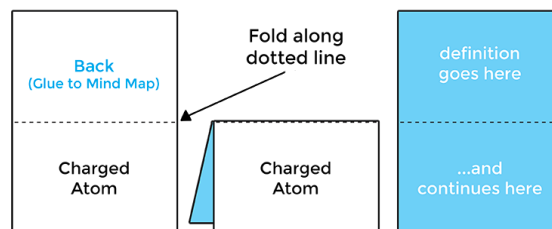
II. Vocabulary Mind Map Activity (15–45 minutes)

Differentiation Tip: The Mind Map can be done as a class, in small groups, individually, or completed for homework. It can be done digitally or on paper.

1. Students may complete the Mind Map **digitally**. Follow directions below. (15 minutes)
 - a. Go to <https://mosamack.com/home/atoms-molecules>
 - b. Select **Lesson 1: The Solve**.
 - c. Select **Vocabulary** and complete **Part 1**: matching terms with definitions.
 - d. Complete **Part 2**: matching terms and definitions with images on a diagram.



2. To complete the Mind Map **on paper**, follow the directions below (45 minutes).
 - a. Print and pass out the Student Guide: Atoms & Molecules Lesson 1: *The Solve*.
 - b. Introduce the warm up task: students will be making a Mind Map of the vocabulary for this Atoms & Molecules unit.
 - c. Model the directions carefully, emphasizing the following. Students should:
 - **cut** out the vocabulary cards on the **solid** lines only
 - **fold** the cards at the **dotted** lines
 - write the definition of the term on the inside of the card using definitions provided



- d. Students use the clues from the Mind Map images, definitions, and terms to place the cards in the correct location in the Mind Map.
- e. Check that the students have matched their cards correctly before moving on.
- f. Students use glue or double-sided tape to connect the back of the vocabulary card to the correct place on the Mind Map.
- g. Students discuss the questions with their group or as a class when they have completed the Mind Map.

Teacher Tips:

- Since this is the first time many of the students will have seen these vocabulary terms, have students work together to use the images, definitions, and collaborative thinking to figure out where the terms go.
- Check in on student groups throughout this process. When you see students or groups who have placed their card in the correct place, ask a facilitating question such as, “Why do you think that term goes there?” or, “What evidence leads you to believe that term goes there?” When students explain their thinking, this is a great opportunity to provide positive reinforcement. Then, encourage them to share their reasoning to the class or to other groups who may have trouble identifying the location of that specific term.
- If you do not have access to a color printer, provide students with black and white copies and project the colored Mind Map at the front of the room so that students can reference both images.

III. Exit Ticket: Check for Understanding (10–15 minutes)

Differentiation Tip: This can be done in groups, pairs, individually, or more formally as a quiz online.

1. Students complete the exit ticket to check for understanding. This can be done online by selecting the **Quiz** button in Lesson 1 or on paper in the Student Guide. Answers are in the Answer Key section below.

The image shows a screenshot of the 'MOSA MACK SCIENCE STUDENT GUIDE' Exit Ticket section. It includes a title 'III. Exit Ticket: Check for Understanding' and a sub-instruction 'Complete the exit ticket below or you can take the quiz online!'. There are fields for 'Name:' and 'Date:'. Below these are four multiple-choice questions related to chemistry concepts like molecules, atoms, electrons, and chemical formulas.

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STUDENT GUIDE

III. Exit Ticket: Check for Understanding
Complete the exit ticket below or you can take the quiz online!

Name: _____ Date: _____

1. What is the smallest indivisible unit that everything in the world is made up of?
a. Molecules
b. Atoms
c. Electrons
d. Protons
2. If a neutral Sodium has 11 protons, how many electrons does it have?
a. 22
b. 1
c. 11
d. 30
3. The hydrogen atom refers to itself as part of a "team." What is the chemical name of the team he is referring to?
a. Sodium-Chloride
b. Carbon
c. Oxygen
d. Sucrose
4. A molecule is made up of one or more atoms connected by _____.
a. Bonds
b. Chemicals
c. Other atoms
d. Wiring

Answer Key

Episode Questions

1. After speaking with Chef Crystal, how do Mosa and her crew first figure out that something is wrong with the sugar on the creme brulee?

When they torched the creme brulee, the sugar on top did not brown.

2. When Mosa and her team use the quantum microscope to look at a grain of sugar, what do they find out everything in the world is made up of?

Atoms!

3. What makes atoms different from one another? In other words, what makes hydrogen, “hydrogen”?

The number of Protons.

Ex: Hydrogen has 1 proton, Carbon has 6, Oxygen has 8

4. How is Mosa able to guess that Carbon has 6 electrons and Oxygen has 8 electrons?

The number of electrons = the number of protons

5. What is a single molecule of sugar called? What is it made up of?

A single molecule of sugar is called “sucrose” and is made up of hydrogen, carbon, and oxygen.

6. What happens when Billy torches the sugar? What is the brown stuff that results?

The heat breaks up the bonds, and over some time makes carbon dioxide and water and a caramel compound that is brown. The caramel compound contains a lot of carbon, with hydrogen and oxygen.

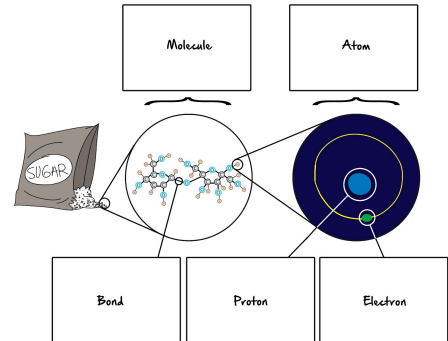
7. Oxygen was made up of atoms that shared electrons. How is sodium-chloride different?

Chlorine “stole” one of Sodium’s electrons.

8. Help Mosa solve the mystery. What is different about the “suspicious” sugar? What is the reason behind Chef Crystal’s terrible creme brulee?

The suspicious “sugar” is actually salt! That is why it does not brown when torched, and that is why Chef Crystal’s creme brulee does not taste good.

Mind Map



Quiz:

1. What is the smallest unit that everything in the world is made up of?
 - a. Molecules
 - b. Atoms**
 - c. Sucrose
 - d. Carbon
2. If Sodium as a neutral atom has 11 protons, how many electrons does it have?
 - a. 22
 - b. 1
 - c. 11**
 - d. 10
3. The hydrogen atom refers to itself as part of a “team.” What is the chemical name of the team he is referring to?
 - a. Sodium-Chloride
 - b. Carbon
 - c. Oxygen
 - d. Sucrose**
4. A molecule is made up of one or more atoms connected by _____.
 - a. Bonds**
 - b. Chemicals
 - c. Other atoms
 - d. String
5. What is different about a molecule of sucrose and a molecule of sodium chloride? Choose all that apply.
 - a. They are made up of different kinds of atoms.**
 - b. They are not different.
 - c. Sodium chloride has extra atoms.
 - d. They bond in different ways; sucrose involves sharing electrons while sodium chloride involves stealing electrons.**