

Pearson Education, Inc. 2019. “uInvestigate Lab Topic 1: Introduction to Matter Elevate Science Course 1.” Pearson Education Inc.: Chandler, AZ.



# Modeling Atoms and Molecules

*How can you make models of simple molecules and compounds?*

## Teacher Support

### Expected Outcomes

Upon successful completion of this activity, students will make models of elements combining to form molecules or compounds. This activity will help students understand that atoms of different elements combine to form molecules and that each molecule consists of discrete numbers of atoms bonded together. Students will also learn to distinguish molecules and compounds.

**Group Size** Pairs

**Class Time** 20 minutes

### Safety

Remind students that toothpicks are sharp and should be used with caution to avoid injuring themselves and others.

### Materials (per pair)

- styrofoam balls, 20
- toothpicks, 15
- colored markers, 4

### Advance Preparation (10 minutes)

Divide supplies ahead of time for each pair.

### Procedure Tips

To save time, you might suggest to students to color only a portion of each ball.

## **Procedure: Teacher Annotations**

**Step 3.** Sample answers:  $\text{H}_2\text{O}$ ,  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{CO}$ ,  $\text{HCN}$ ,  $\text{O}_2$ , and  $\text{H}_2$ .

## Think It Over: Teacher Annotations

- 1. Develop Models** Sample: I represented the four kinds of “atoms” with four different colors (green for C, black for H, yellow for O and, white for N). I used one toothpick to represent a single chemical bond. I used two toothpicks to show a double bond.
- 2. Apply Concepts** Sample: Of the three molecules, one was only a molecule ( $H_2$ ) and two were molecules and compounds (CO, HCN).
- 3. Use Models** Sample: I attached three black (hydrogen) balls to one white (nitrogen) ball. This required three bonds or toothpicks, one per N-H bond.



# Modeling Atoms and Molecules

*How can you make models of simple molecules and compounds?*

## Background

Each element is made of only one kind of atom. The atoms of different elements are different. A molecule is made of two or more atoms joined together. Compounds are molecules made of two or more different elements. In this activity, you will model compounds by combining objects that represent different elements.

## Materials (per pair)


- styrofoam balls
- Toothpicks
- colored markers

## Safety

Be sure to follow all safety procedures provided by your teacher. Find more information about the safety icons in the Safety Section.

## Procedure

- ☐ 1. Examine the objects supplied by your teacher. Each styrofoam ball should represent one kind of atom. Use the colored markers to create four kinds of “atoms.”
- ☐ 2. Assign a symbol to each of the four kinds of atoms. For example, one can be hydrogen (H) and another can be oxygen (O).

- ☐ 3.  Assemble three different molecules, including water, from the four kinds of atoms. Use the symbols you assigned to write a formula for each of the molecules you construct.

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### Think It Over

1. **Develop Models** How did you represent the four kinds of atoms? What represents a chemical bond?

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2. **Apply Concepts** Of the three molecules you assembled, how many were compounds?

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3. **Use Models** Suppose a black ball represents a hydrogen atom and a yellow ball represents a nitrogen atom. Describe how you would make a model of an ammonia molecule,  $\text{NH}_3$ .

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