

## Molecule Maker

You may have heard of the words atom and molecule before, but what are they?

Atoms are the smallest units of matter that still have the properties of an element, such as Helium, Oxygen, and Uranium. A molecule is a group of two or more atoms.

Just like atoms contain a different number of protons, neutrons, and electrons, molecules are made up of various combinations of atoms.

A couple common molecules are Water ( $H_2O$ ) and Hydrogen Peroxide ( $H_2O_2$ ). H refers to Hydrogen and O refers to Oxygen, while the numbers show how many atoms of each element are in the molecule. Since molecules are smaller than our eyes can see, scientists use models to represent them.

Now let's make our own molecular models!



### MATERIALS:

- Styrofoam balls (various colors)
- Toothpicks

### NV SCIENCE STANDARDS:

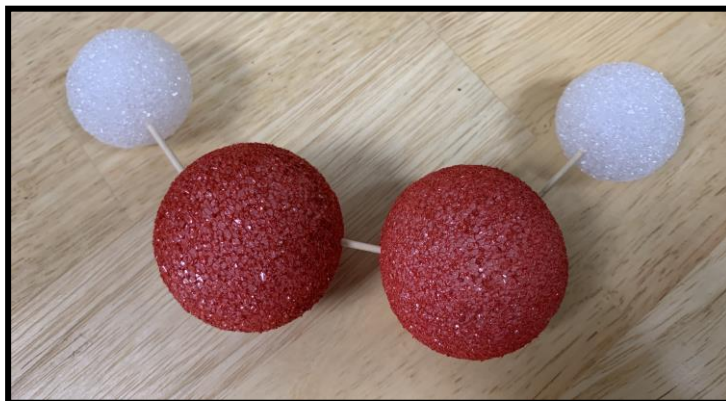
Structure and Properties of Matter 5-PS1.A (5-PS1-1)

**Part 1:** We'll create the Water ( $H_2O$ ) molecule first. Think of a molecule's chemical formula like a recipe, Water is two parts Hydrogen ( $H_2$ ) and one part Oxygen (O). You can see in the photo above that we used the red Styrofoam ball for Oxygen and the white balls for Hydrogen. The toothpick represents the bond between the atoms.

Take the red ball and stick a toothpick in diagonally on both sides, then place a white ball at the end of each toothpick. Congratulations, you just crafted your first molecular model!

**Part 2:** Next, we'll create the Hydrogen Peroxide ( $H_2O_2$ ) molecule. Just like Water, Hydrogen Peroxide is two parts Hydrogen ( $H_2$ ), but instead of one part, it's two parts Oxygen ( $O_2$ ). A small change can make a big difference!

Take two red balls and connect them horizontally using a toothpick, then stick toothpicks in diagonally on the other side of the balls. Place a white ball at the end of each toothpick.



Now that you've built two molecular models, look up other molecules and add them to your collection! Keep track of their formulas on the lines below. Challenge yourself by seeing what's the most complicated molecule you can make using the materials you have.

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**QUESTION (ANSWER ON BACK):** The gas Ethane has a chemical formula of  $C_2H_6$ . Using what you've learned about molecules, how many Carbon and Hydrogen atoms do you think it takes to create Ethane?

**FUN FACT:** The molecule Ozone ( $O_3$ ) can be produced by lightning strikes, which gives it that unique smell you may have noticed after a storm.

**ANSWER:** Ethane is made up of 2 Carbon and 6 Hydrogen atoms.