McKenna Kirby
CHEM 1210-215
Demonstration Document

## Demonstration Introduction

The scientific principle that this demonstration exhibits is the basic structure of atoms and molecules. The SEEd standard this demonstration correlates is Standard Grade 8.1.1: "Develop a model to describe the scale and proportion of atoms and molecules. Emphasize developing atomic models of elements and their numbers of protons, neutrons, and electrons, as well as models of simple molecules". The demonstration can be performed with most any grades above grade 6.

## List of Essential Supplies

| | Item | Quantity | Suggested Source/Vendor |
|---|---|---|---|
| PART 1 | Demonstration Table | One | Walmart |
| | Colored Construction Paper | At least 4 Different Colors, 8.5"X11" | Any craft store, Walmart |
| | Glue/Glue Stick | One | Any craft store, Walmart |
| | Scissors | One pair | Office supply store, Walmart |
| | Ruler | One | Office supply store, Walmart |
| | Pencils | One | Office supply store, Walmart |
| PART 2 | Large Red Apples | Two | Any Grocery Store |
| | Medium Sized Green Apples | One | Any Grocery Store |
| | Toothpicks | Two | Walmart |

## Demonstration Instructions

### PART 1: 2D Water Molecule

1. Gather all the supplies for Part 1 and have them in front of you on a demonstration table.
2. Assign different colored paper to represent different things. One will be the back ground, one will be hydrogen, one will be oxygen, and the last will be bonds.
3. Show the different colored sheets and tell the students what each color represents.
4. Explain that the ratio of radii of a hydrogen atom to an oxygen atom is 1 to 0.9 and that you will be using this ratio to properly show the proportions of atoms in a water molecule.
5. Take the chosen oxygen paper and draw a dot, that will represent the center of the circle.

6. Then with the ruler measure out at least four points from that point with a radius of 0.9 inches.
7. Once you have the points, trace around and connect the dots to create a circle.
8. Cut out the circle.
9. Repeat steps 5-8 but with the chosen hydrogen paper but using 1 inch as the radius and doing it two times. Remind the students that a water molecule has 2 hydrogen atoms and 1 oxygen atom.
10. Take your chosen bond paper and cut out to lines or skinny rectangles.
11. You will now take your chosen background paper and place the oxygen atom (first circle cut out) and glue that to the center of the page. Tell students that in a water molecule, the oxygen atom is the central atom.
12. Then take a minute to explain that because of the number of electrons in a water molecule, the shape is bent. Glue the bonds to the oxygen atom, one on each side, bent down, creating about a 104° to 109° angle between both bonds.
13. Then take the hydrogen atoms and glue them to the other ends of the bonds.

**PART 2: 3D Water Molecule**

1. Gather all the supplies for Part 2 and have them in front of you on a demonstration table.
2. Wash the apples and your hands before handling the fruit.
3. Show the students that the two large apples represent the hydrogen atoms, the green apple represents the oxygen atom, and the toothpicks represent the bonds.
4. Emphasize the importance of size difference between the hydrogen and oxygen atoms to properly represent the proportion of atoms in a water molecule.
5. Take the green apple, oxygen atom, and place one toothpick on each side, where they are placed and how they are angled in the 2D model.
6. Then take the red apples, hydrogen atoms, and stick them into the other ends of the toothpicks.

## Safety Precautions

Have caution when using the scissors and toothpicks, they are sharp and can cause damage to skin if not used safely. If there are any allergies to supplies, they can be replaced with supplies that don't cause any allergies. Ex. if allergic to glue, use tape, if allergic to apples, use another fruit like oranges.

## Disposing of Supplies

Most of the supplies can be reused. The scissors, glue, pencil, and ruler are all reusable and can be stored anywhere out of reach of small children. Extra toothpicks can be saved and stored. Extra construction paper can be recycled or thrown away. If hands and fruit were washed, fruit can be eaten or thrown away. Used toothpicks can be thrown away.