NOEO SCIENCE CHEMISTRY 2

EXPERIMENT GUIDE

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EXPERIMENT GUIDE

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unit 1:
ATOMS AND MOLECULES

WEEK 1: THE PARTS OF THE ATOM

Activity: Brownian Motion

Our Question

What is Brownian motion?

Materials

Included in Kit

- Food coloring

From Home

- Two clear glasses or jars
- Hot and cold water

Instructions

1. Fill one glass with hot water, and one with cold water.
2. Drop a couple of drops of food coloring into each glass, and write down what happens in each glass.

What We Learned

While the glass with cold water moved sluggishly and took longer to diffuse the dye, the warm water moved much faster, and diffused the dye in half the time of the cold water. This is because of Brownian motion, which is what we call the movement of molecules. Heat is actually just molecules moving really quickly, and cold is molecules moving really slowly. So, the hot water distributed the dye much faster, because its molecules were moving much faster.

WEEK 1: THE PARTS OF THE ATOM

Experiment: Dancing Balls

Our Question

How does staticelectricity work?

Materials

Included in Kit

- Plastic sheet
- 7 styrofoam balls

From Home

- Tape
- Aluminum foil
- Cereal box

Instructions

1. Cut the front off of a cereal box, so that the box is open.
2. Line the box with aluminum foil, so it even goes up the walls.
3. Put the styrofoam balls into the box, and place the plastic sheet on top. Rub the plastic, and watch what happens.

What We Learned

Static electricity is caused by objects rubbing together, and trading electrons–one object takes some electrons from the other. Since electrons have a negative charge, that means the thing that took the electrons is negatively charged, and the thing that had its electrons taken has a positive charge. When things have opposite charges, they are attracted to one another.

The two objects in this case were the plastic, and the styrofoam balls. By rubbing the plastic, you gave it some of your electrons, and it gained a negative charge, so the positively charged balls were pulled up to it!

WEEK 2: HOW MOLECULES AND ATOMS COMBINE

Experiment: Gas Underwater

Our Question

Does gas actually take up space?

Materials

From Home

- Clear glass or jar
- Notebook paper
- Container of water taller than the glass (bucket, tub, etc.)

Instructions

1. Ball up a piece of paper, not too small, so that it will lodge and stay in the bottom of the cup when it's flipped over.
2. Put the ball of paper into the cup, flip it over, and push the cup straight down inside the container of water.
3. After a few moments, remove the cup straight up from the container. Be sure not to tilt the cup as you lift it.
4. Examine the paper. Write down your findings.

What We Learned

Yes, air and other gasses do take up space! The glass was full of air and paper when you put it inside the water, and if you didn't tilt the glass as you put it in and took it out of the water, then none of the air escaped, and the paper remained dry!

unit 2: SOLIDS, LIQUIDS, AND GASES

WEEK 3: THREE STATES OF MATTER

Experiment: Smoke Rings

Our Question

How would cold water flow through warm water?

Materials

Included in Kit

- Rubber band
- Food coloring

From Home

- Large-mouthed, clear container (jar, etc.)
- Small cup (baby food jar, etc.)
- Aluminum foil
- Sharp pencil
- Ice cube

Instructions

1. Fill the small cup with cold water, and add an ice cube.
2. Fill the large container with warm water, up until a couple inches from the top.
3. Take the ice cube out of the small cup, and add a couple of drops of food coloring.
4. Cover the mouth of the cup with aluminum foil, and keep it in place with a rubber band.

5. Make a small hole in the foil with a sharp pencil.
6. Hold the smaller cup over the warm water, and quickly flip it over, so that the hole in the aluminum foil is right below the surface of the warm water.
7. Slowly tap the bottom of the cup gently with your finger, and watch what happens.

What We Learned

When the cold water joins the hot water, it sinks, because cold water molecules are closer together, and therefore heavier.

WEEK 3: THREE STATES OF MATTER

Experiment: 1 + 1 ≠ 2

Our Question

When does
1 + 1 ≠ 2?

Materials

From Home

- Large clear glass jar
- 1 cup sugar
- Tape (masking tape, scotch tape, etc.)
- Permanent marker

Instructions

1. Fill the jar with a cup of water.
2. Microwave the water until the glass is beaded with condensation. You may have to microwave it a couple more times before the end of the experiment.
3. Add a piece of tape to the outside of the jar, and draw a mark on the tape at the water line.
4. Add a cup of sugar to the jar, and stir until all of the sugar is combined. If the sugar is having trouble combining, you may have to microwave the water again.

5. Add another piece of tape to the outside of the jar, and put another mark at the current waterline.

What We Learned

Even though we added equal parts sugar and water together, the mixture did not double in "size". This is because sugar molecules can fit in the spaces between the water molecules when they're hot enough and moving around. If the water was cold and the molecules weren't moving around, then the sugar wouldn't have had enough space to fit, and the mixture's volume would have increased much more.

WEEK 3: THREE STATES OF MATTER

Experiment: Finding Volume

Our Question

How do we measure the volume of irregularly shaped solids?

Materials

From Home

- Measuring cup
- Mixing bowl
- Dishwashing tub or other container, larger than the bowl
- Objects to measure

Instructions

Follow the 'See For Yourself' instructions on page 17 of The Usborne Science Encyclopedia.

What We Learned

When you put the object into the bowl, the water that spilled out of the bowl was equal in volume to the volume of the object!