Move That Can: Static Electricity

Introduction

Have you ever heard the phrase “opposites attract?” In science, this means that two things that are opposite from one another like to be close to each other. Because of the way atoms are made, when you bring a positive charge near a negative charge, they are attracted to each other! This means they will stick as close together as possible.

Activity:

In this experiment, students will create static electricity to move a can and create (3) distinct types of charges, which are:

- positive (+)
- negative (-)
- neutral (0)

Materials

An empty can, a PVC pipe or plastic rod, a piece of cloth (wool works great!)

Directions:

1. Rub the PVC pipe or plastic rod with a piece of cloth for about 40 seconds. You can sing your favorite song while you do it.
2. Place the can on a smooth and flat surface like your kitchen table.
3. Hold the piece of cloth as close to the can as possible without touching it and move your hand slowly… What do you see?
4. The can should follow your hand movement without you touching it!

Think Like A Scientist:

1. What do you think is happening as you move the cloth back and forth? Why do you think the can moves?
2. What do you predict would happen if we did not use a piece of cloth on the PVC pipe or plastic rod?
3. Could you use something other than a piece of cloth? What other items do you think would work? Share your ideas in the comments below!

What is the Science Behind it?

In this experiment, the can is positively charged, and the PVC pipe/plastic rod is negatively charged. The can and the PVC pipe/plastic rod have opposite charges! This means that the positively charged can is attracted to the negatively charged plastic rod, which makes the can follow the plastic rod without touching it.

This experiment works because of something called static electricity. Static electricity is when electrical charges (which can be positive or negative) build up on the surface of an object. The motion of the cloth caused the buildup of charge, and when you get enough charge on an object, the attraction, or the opposite, when objects repel, can become strong enough to do things like cause another object to move!

Bubble Trouble: Static Electricity

Introduction:
We see static electricity every day. It can even build up on us! You might have experienced it when, after shuffling your feet over a carpet, you touched a doorknob and got zapped! In this lesson we will learn about static electricity, which is the buildup of an electrical charge on the surface of an object. It is called “static” because the charges remain in one place for a while, rather than flowing to another area, as in current electricity.

Activity:
In this activity students will experiment with bubbles and static electricity!

Materials:

- A smooth surface (like a laminated tabletop)
- Aluminum foil
- Straw
- Bubble solution or Dish soap
- Water
- PVC Pipe or empty plastic bottle
- Dish towel

Directions:

1. Mix some dish soap with water or use your bubble solution.
2. Coat the smooth surface with the soapy water.
3. To blow a bubble, suck up some soapy water with the straw (**NOT all the way! Don’t drink it!**) and then blow it gently onto the smooth surface.
4. Charge the PVC pipe/ empty plastic bottle by rubbing it with your dish towel, and then bring the side of the pipe/bottle near the soap bubble. Observe what happens.
5. Blow a smaller bubble inside the bigger bubble and see what happens when you place the charged plastic bottle near them.

Think Like a Scientist:

1. What effect do you think the PVC pipe / bottle is having on the bubbles? Why do you think the bubbles react the way they do?
2. Do you think other materials besides soap could create a similar effect? Does the amount of soap in the solution change how the bubbles react?

What is the Science Behind it?

The soap bubble is electrically neutral (it has the same number of positive protons and negative electrons), but it also contains “impurities” that are ions, particles that are either charged positively or negatively, and that can move around. Thus, when you bring a negatively charged object (charged pipe/plastic bottle) near the bubble, the negative electrons in the bottle attract the positively charged ions within the bubble–remember, opposite charges attract—and the bubble moves towards the pipe/bottle. The smaller bubble inside the bigger bubble doesn’t move, because it is not attracted to the bottle. The bigger bubble isolates the smaller bubble from the electric charges outside.

Slime: Polymers & Monomers

Introduction:
Atoms are the basic building blocks of everything you can see around you, and even lots of things you can't see, like the air that you breathe. Atoms are so small that about 5 million hydrogen atoms could fit on the tip of a pin. Atoms joined together make a molecule (the smallest fundamental unit of a chemical compound that can take part in a chemical reaction.) When similar molecules join, they form polymers. A polymer is a substance that has a molecular structure consisting mostly or entirely of many similar units bonded together. Examples of polymers include wool, silk, and plastic.

Activity:
In this activity students will create polymers by mixing monomers and other polymers.

Materials:

- Baking Soda
- Glue
- Saline Solution
- Jumbo Popsicle Stick
- 9 oz Clear Cup
- Spoon

Directions:

1. Add 2 drops of food coloring into your container with glue.
2. Using the jumbo popsicle stick to mix in the food coloring into the glue.
3. Next, add water into your clear cup about ¾ of the way full.
4. Then add baking soda into the same cup and mix well (until all baking soda dissolves).
5. Next, pour 3 spoonsful of the baking soda solution (water and baking soda mixture) into the container of glue.
6. Add saline solution to the mixture until your slime is no longer sticky.
7. Let's mix! Whip up your slime mixture in no time. You need to stir fast like you are trying to really whip up something!

Think Like a Scientist:

1. What changes did you observe while mixing the slime?
2. How can you make your slime more viscous (thicker or looser)? What adjustments to the procedure or materials could achieve this?
3. Is your slime more of a liquid or solid? Can you think of any good ideas for using this slime in everyday life?

What's the Science Behind It?
Atoms can join together - they form bonds together - to make molecules. For example, two atoms of hydrogen hook together to form a molecule of hydrogen, $H_2$for short. Polymers, like slime, are made up of many molecules all strung together to form long chains of atoms.