

# Static Electricity

## INTRODUCTION

Opposites attract. The power of static electricity can be seen by watching oppositely charged objects attract each other or objects with the same charges repel. These charges cannot be seen, but their effects can be. A charged balloon can make your hair stick up or push another balloon away. You can use static electricity to make bubbles stay in the air or to guide a Ping-Pong ball around a table without even touching it.

## MATERIALS

Balloons

String

Paper

Plastic comb

Wool

Ping-Pong balls

Puffed rice

Soap bubbles

Salt and Pepper

## WHAT TO DO

1. Blow up a balloon and ask a student to rub it on his or her head. This will give the balloon a negative charge because it picks up electrons from the student's hair. The hair, now missing some electrons, will be positively charged. The positive charge on the hair and the negative charge on the balloon attract each other, so the hair stands up toward the balloon.
2. Cut paper into very small pieces and make a pile on a desktop or table. Charge a balloon by rubbing it in someone's hair or by rubbing it with a piece of wool. Hold the charged balloon just above the pile of paper pieces and the paper will jump. First, the paper will be attracted to the negative charge on the balloon so it will jump up and stick to the balloon. But by coming into contact with the balloon the paper picks up some of the negative charge. Since like charges repel, the paper will then jump off of the balloon.
3. Blow up two balloons and tie a separate piece of string around the knot in each of them. Attach one balloon to the underside of a desk or table by taping the string. Make sure the balloon can hang without touching anything else. Rub the hanging balloon with wool to charge it. Charge the second balloon the same way, then hold it by the string. Move the free balloon near the hanging balloon and watch them push away from each other. Their negative charges repel. If a piece of paper is placed between the two balloons they will come together quickly because they will both be attracted to the paper. Remove the paper and they will again repel each other.
4. Charge a plastic comb by rubbing it with wool. Bring the comb near a Ping-Pong ball on a tabletop and slowly move the comb around. Because the ball is attracted to the negative charge on the comb, the ball will follow the comb.
5. Charge a balloon by rubbing it with wool. Blow a few soap bubbles into the air and bring the charged balloon near one of the bubbles. The bubble will be attracted to the charge on the balloon, so with practice the balloon can be used to keep the bubble in the air without popping.
6. Catch a soap bubble on the end of the bubble-blowing wand and slowly bring a charged comb or balloon near it. Watch as the bubble distorts and stretches toward the charge until it finally detaches from the wand and pops when it slams into the comb.
7. Separate a mixture of salt and pepper quickly and without touching it by holding a charged comb or balloon over the mixture and slowly bringing it closer. The lighter pepper will be picked up and the heavier salt will be left behind.

## QUESTIONS TO ASK STUDENTS

1. Why does your hair stick up when you rub a balloon on it?
2. What else can you make a balloon "stick" to? How? Why?

3. How can you move a Ping-Pong ball without touching it or the table it is sitting on? How else could this new skill be used?
4. What other tricks can you do using static electricity?
5. Why do the bubbles move and stretch toward the charged balloon or comb?
6. Why is the pepper picked up but not the salt? If there were not any pepper, would the salt be picked up?

## **SUMMARY**

Static Electricity refers to separation of charges. Rubbing a balloon on someone's hair takes some electrons from the hair and gives them to the balloon. Electrons have a negative charge, so the balloon with extra electrons is negatively charged and the hair, which is missing some electrons, is left with a positive charge. Opposite charges attract, so the hair will be attracted to the balloon. Also important to remember is that like charges repel each other, so all of the pieces of positively charged hair will push away from each other.

Things that are not charged can still be attracted to something like a balloon or a comb that is charged. Everything, including the bubbles, hair, salt and pepper and ping-pong balls we used have electrons and protons, the negative and positive parts of atoms. Protons are positively charged, so they are attracted to negative charges. If a balloon with extra electrons (with a negative charge) is brought near a bubble, the protons, which are attracted to the negative charge, will move so they are closer to it and the electrons, which are repelled by the negative charge, will move farther away from the charge. This movement within the bubble can make the side of the bubble closest to the balloon have a little bit of a positive charge, so the bubble and the balloon are attracted to each other. The comb and the ping-pong ball and the salt and pepper interact similarly.

## **SOURCES**

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"The Science Book of Electricity." Neil Ardley, Harcourt Brace and Company: London, 1991, p. 20-21