

How can I move water with just a comb?



Learn how static electricity can move water.

Setting: Indoors

Time: 30 minutes

Concepts: static electricity

Skills: predicting, observing

Subject(s):

✓ Physics

✓ 6-8

✓ 9-11

Ages:

Materials:

- Water tap
- Plastic comb
- Hair that is clean, dry and without conditioner



Safety First!

Avoid the use of hot water.

What to do!

1. Adjust the tap so that the water flows in a thin, even stream.
2. Run a clean, dry comb through your hair 5 – 10 times.
3. Hold the comb close to the stream of water. What happens to the water?

What's happening?

The effect, seen with both hair and water, is due to static electricity. Static electricity is so-called because no current is flowing. It is created when an electrical charge builds up on the surface of an object. In this experiment, static electricity results when two objects are rubbed against each other and electrons are transferred from the surface of one object to the surface of the other. One surface loses electrons and becomes positively charged, while the other surface gains electrons and becomes negatively charged. As with magnetic forces, like charges will repel and unlike charges will attract each other.

When the comb is passed through dry hair, electrons from the hair collect on the comb making it negatively charged. The thin stream of water carries a positive charge. When the comb is brought near the stream, the positive charge of the water and the negative charge on the comb are attracted to one another, causing the water to bend.

After combing, the hair is left positively charged. This can cause each hair to repel the hairs that are near it, resulting in the familiar “wild” hair do.

Why does it matter?

Static electricity is what happens when you touch a doorknob and “get a shock”. Walking across a carpet or rubbing your arms on your clothing will build up a static charge because you will rub some electrons off the surface. That gives you a negative charge. When you touch the doorknob, the electrons will jump from you to the doorknob. This results in the “shock” you feel.

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A similar thing happens when you take off a sweater. If you remove your sweater in the dark, you will see flashes of light due to electrical discharge. The drier the air, the more likely a static charge will develop.



Investigate further!

- What happened to your hair as it was combed?
- Will a balloon rubbed on your hair produce the same effect as the comb? What do you think is happening? What do you think will happen if you put the charged balloon on a wall?
- Try this activity using different materials. Rub a plastic rod with different cloths made of cotton, wool, silk, etc. and place it next to the water. Does the water move? Does it move towards or away from the plastic rod?