# Water Wire

## Electricity flowing through water

Water is a liquid but it can behave like solid metal wire. Copper wires in your home carry electricity to your lights when you turn on the switch. Water can also carry electricity to a light, when an electrolyte is present. Pure water will not allow electricity to flow through it but as soon as you add salt like sodium chloride, this salt water begins to conduct electricity. Any salt is called an electrolyte when it is used help to conduct electrical currents through a liquid. We have enough electrolytes in our body to conduct electrical signals from our brains to muscles causing them to contract and relax as we walk or run. We usually get enough electrolytes like sodium chloride and potassium chloride from our regular diet to allow these electrical signals to flow. We get plenty of sodium and chloride from the table salt that is used to flavor foods and even some drinks. And, foods such as bananas and raisins are a rich source of potassium. In this activity, you will detect the amount of energy that can flow through a sodium chloride electrolyte solution with a light sensor. A bright light will show you have a large amount of energy flowing through the liquid and a dim light will show you have a small amount of energy flowing through the liquid.

### Materials

3 mini craft sticks
Aluminum foil
Light *(any Mini Lamp 1.5 V - 25mA similar to Radio Shack, model #272-1139)*
9V battery
Transparent tape
Permanent marking pen
5 disposable plastic cups (9 oz.)
1 paper towel sheet
Distilled water
Salt – Sodium Chloride

### Procedure Experiment I

1. Write on five plastic containers: Salt Water-1000, Salt Water-500, Salt Water-250, Salt Water-125, and Pure Water-000.
2. Salt Water-1000: To this container add ¼ tsp salt and 1 cup distilled water. Mix with craft stick until all the salt dissolves.
3. Salt Water-500: To this container add ½ cup Salt Water 1000 and ½ cup distilled water.
4. Salt Water-250: To this container add ½ cup Salt Water 500 and ½ cup distilled water.
5. Salt Water-125: To this container add ½ cup Salt Water 250 and ½ cup distilled water.
6. Pure Water 000– to this container add ½ cup distilled water. (Now you should have 5 plastic containers with ½ cup of solution in each cup.)
7. Completely cover two of the craft sticks with aluminum foil. Do not cover the third stick with aluminum, leave this bare wood.
8. Next grab your test light. Have your adult partner use the transparent tape to attach the white wire to the positive end of the battery. It will have a "+" sign. If necessary, cut some the plastic coating away to expose more copper wire. Have an adult help with cutting.
9. Have your adult partner use the transparent tape to tape the black wire to a craft stick covered with aluminum foil.
10. Then have an adult partner tape the other craft stick covered with aluminum to the negative end of the battery. It may have a "–" sign or be unmarked.
11. Take the aluminum covered craft sticks and place them about an inch apart from each other and lock them in place with the bare craft stick with transparent tape. Your electrolyte light sensor should now be ready.
12. Dip the light sensor's two aluminum sticks in the cup labeled Pure Water-000. Did the Light glow at all? Record your results and note how bright the light was for each solution. "What Did You Observe?"
13. Rinse the craft sticks with the distilled water and wipe them dry with a paper towel, making sure there is no liquid left on the sticks.
14. Repeat steps 8 and 9 with the Salt Water-125, the Salt Water-250, Salt Water-500, and Salt Water-1000.
15. Thoroughly clean the work area and wash your hands. If possible, place the plastic cups and foil from the craft sticks in a recycling bin.

### Procedure for Challenge Experiment

1. Hide the labels on all five cups and mix up the order of the cups.
2. Can you use what you observed with the labeled cups to place the cups in order from lowest to highest?

3. Test each cup with the light sensor and arrange them with lowest on the left to brightest light on the right.
4. Reveal the labels and you should find the cups in order 000, 125, 250, 500, 1000 from left to right.

**Where's the Chemistry?**

Although electrical energy is invisible, and dissolved electrolytes are also invisible to our eyes, you detected electricity flowing through water and how much electrolyte was present when you saw the light sensor glow. In this experiment, the electricity from the battery was passed through the aluminum foil on the first craft stick. The electrolyte solution water acted like a wire by letting the electricity flow from battery through the first craft stick, through water to the second craft stick, through the light, and back to the battery. The Light got brighter the more salt electrolyte present. The more electrolyte, the more electrical energy could flow through water! So in this experiment Pure Water-000 had no electrolyte and no light and Salt Water-1000 had the most electrolyte and was the brightest light.

**Try this**…Test whether other liquids act like metal wire, such as milk, soda or lemonade, if they do the light turns on and there is an electrolyte present. Hint: Sodium Chloride Salt is not the only electrolyte.

*Activity from International Year of Chemistry website - American Chemical Society*

SCIENCE LESSON

## Sock Seeds

Contributed by Gloria Ramsey

Every fall or spring as I visited elementary classes I found students germinating lima bean seeds. Now I don't have anything against lima beans but I wondered how germination could be connected to the world or school grounds that the students were a part. The following activity is not something I produced but rather that I found on the Internet at "Zoom" on PBS/kids.org. This is a great resource for teachers and students. What appealed to me because a viewer sent it in from Texas who is 12 years old.

It is an inexpensive way for you to begin to identify the plants that live in the biome that surrounds your school. This could be the engagement or exploration for an inquiry based unit on germination rates, seed adaptations, and the needs of plants. I added some ideas to help you begin to think about how you can use this idea to learn more about plants and the environments they grow in. Wouldn't it be a great idea to connect with other classrooms across the district or country and share socks?

*Materials*

An old sock
A shoebox
Garbage bag or plastic wrap
Potting soil
Scissors

- A good time to do this is early fall or late summer. But if you have a field around your school that has not been mowed all winter you can do this if it has been dry for a while.
- Take an old fuzzy sock that is big enough to fit over your shoe or shoes.
- Wander around out side walking in a grassy area or a space that has not been mowed in a while. A wooded area or just a lot that is full of weeds.
- Go back in and carefully remove the sock. Take a look at some of the seeds that have attached them selves to the sock.
- Line the shoebox with a garbage bag or plastic wrap.
- Fill the box with potting soil.
- Cut the sock down the middle so you can lay it flat into the box of soil. Make sure the side with the seeds is pointing up.
- Cover it with a thin layer of soil and water it.
- In a week or so the seeds will begin to spout.
- This is when you can begin to determine which seeds germinated first by using resources to identify the plants. Were there more of one kind of plant than another? If so, why do you think it happened? Did any of the seeds not germinate? How could you find out? Can you figure out the reason for them not germinating? How are the plants all alike? Different? Take out some of the plants and locate and identify the parts that make up the plant? Do any of them develop flowers? What does that tell about the plants?