What's Salt Got To Do With It?

Why does our body need salt?

You have probably experienced the sting of salty sweat getting in your eye after some exercise or a game of basketball. Maybe you tasted salty sweat as it ran down your face and onto your lips. What's salt got to do with us and our ability to play basketball?

HERE IS WHAT YOU WILL NEED:

- Water
- Salt
- 2 Popsicle Sticks
- Aluminum Foil
- Electrical tape
- Jar or Cup
- Ruler
- 3 Pieces of Insulated Copper Wire
- 9 Volt Battery
- Christmas Light
- Teaspoon
- Pencil
- Journal

WARM-UPS

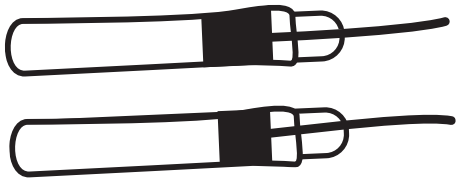
Your body has a lot of working parts, and it is important to provide it with the nutrients it needs to function properly. Most of these nutrients come from things that you eat and drink. What do these necessary nutrients have to do the sweat on your skin?

Let's build a simple contraption and see if we can find out.

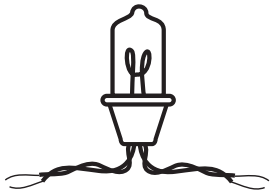
Let's get started.

Wrap two popsicle sticks tightly with aluminum foil, so that both sticks are completely covered.

Place a piece of copper wire so that it overlaps about two centimeters from the top of each covered popsicle stick and tape it securely in place covering the exposed wire, like this:



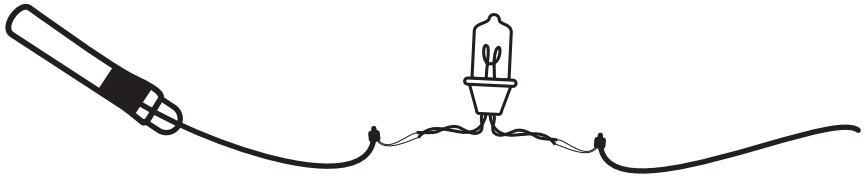
Cut a Christmas light from a strand and remove the plastic covering so that about a centimeter of wire on both sides is exposed. It should look like this:



Attach the end of one of the copper wires to the exposed wire of one side of the Christmas light, like this:

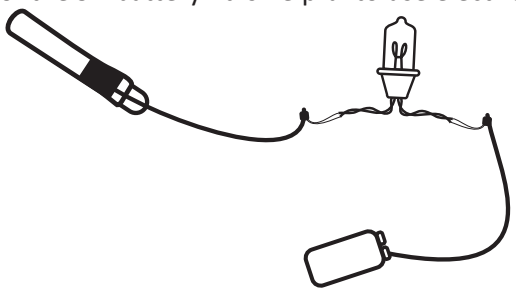
Then wrap it with tape.

Attach the third copper wire to the other exposed wire on the other side of the Christmas light, like this:

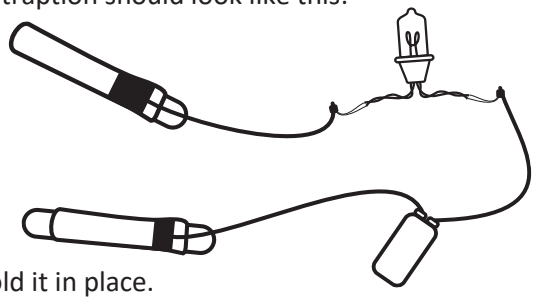


Then wrap it with tape.

Attach the remaining open end of the copper wire to one of the terminals of the 9V battery. It is helpful to use electrical tape to hold it in place.



Connect the copper wire attached to the other foil-covered popsicle stick. Your contraption should look like this:



Use tape to hold it in place.

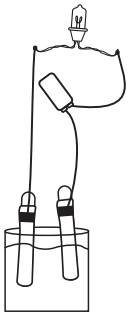
Test your apparatus by touching the two foil-covered popsicle sticks together and observing what happens to the light bulb.

What happens when the two sticks touch? Why?

Does anything happen to the light bulb if the popsicles sticks are not touching each other? Why?

Pro tip: If you have trouble getting the bulb to light up, you may need to check all of your wire connections.

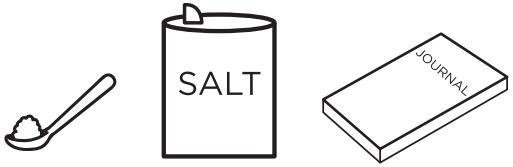
Fill your jar or cup with water but leave a little room at the top. Together everything should look similar to the diagram below.



Now place two popsicle sticks in the water, but don't let them touch. Did the light bulb illuminate?

Take the popsicle sticks out of the water. Using a teaspoon, measure a teaspoon of salt and stir it into the water. Now place the popsicle sticks in the water. Did the light bulb illuminate?

Repeat these steps until the light bulb illuminates. How many teaspoons of salt were required to make the light bulb illuminate? Record this in your journal.



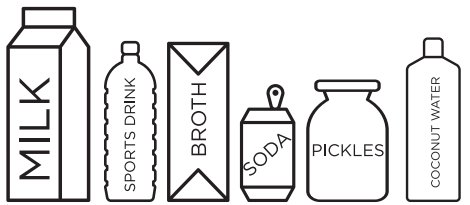
When you stir salt into the water you create an **electrolyte solution. Electrolytes** are substances that produce an electrically conductive solution when dissolved in water.

Sodium is one of these nutrients our body needs, and one that we often consume as salt, or sodium chloride, in our food or in our drinks. Sodium helps our body retain water needed inside and outside our cells. Sodium also helps regulate blood pressure. Both nerves and muscles require electrical currents to function, and these electrical currents are made possible by electrically charged molecules, like the sodium in our bodies. These currents make our muscles move, and this electrical activity allows our nerves to communicate with each other.

GAME TIME

Making a light bulb illuminate is a fun way to explore electrolytes, but they are also essential to our survival. Our bodies could not function without them. In addition to sodium, other electrolytes our bodies need include chloride, potassium, magnesium, and calcium.

Let's explore liquids and solutions around us to find which ones contain electrolytes. Gather drinks and solutions that you think may contain electrolytes. You may consider using sports drinks, sodas, broth, milk, coconut water, pickle juice, or other liquids.



Before you get started, mark your cup or jar with a line that shows where the water is filled to. This mark will indicate the fill line for your experiment and allow you to keep the amount of liquid the same for each test. Once your cup is marked, pour out the salt solution.

Create a table to record your test results. Make sure to include the types of liquid you are testing and a place to record your predictions about whether or not each liquid will have the electrolytes needed to allow the electrical current to pass through it.

Let's get started. Pick a liquid. Write it in your table. Pour the liquid into your cup up to the fill line. Make a prediction of whether or not you think the light bulb will light up. Test your prediction by dipping in the aluminum foil-covered popsicle sticks in the solution. Be sure not to let the popsicle sticks touch each other. Record whether or not the light bulb lit up in your table.

Continue testing liquids. Be sure to rinse out the cup between different liquids.

Pro tip: Touch the popsicle sticks together periodically to complete the circuit and illuminate the light bulb. If the light bulb does not illuminate check your wire connections. If your wires are connected adequately check to see if the light bulb has burned out.

ANALYZE THE REPLAY
What happened?

After you have tested all of the solutions and drinks, look at your table. Were you able to correctly predict which liquids would allow the light bulb to illuminate?

Were you surprised that any of the liquids didn't light up the light bulb?

Did any of the solutions that you didn't expect allow the light bulb to illuminate?

What characteristics did the liquids that allowed the bulb to light up brightly share?

Where there any shared characteristics between the liquids that did not allow the light bulb to illuminate?

Do your findings change the way you think about different drinks?

OVERTIME
Let's take it a step further

You may have noticed that when you did the experiments, the light bulb did not always illuminate to the same brightness. Some solutions may have allowed the light bulb to illuminate very dimly, while others allow the bulb to burn very bright. Why do you think this happened?

Look at your table. Do you recall which solutions allowed the light to shine bright and which barely let it illuminate at all?

You may change the table so that instead of allowing you to only indicate if the light bulb came on, you can indicate if the light was not lit, dim, average, or bright. You may need to test again if you do not recall. If you need help deciding what to indicate as average, this can refer to the brightness of the illumination allowed by the salt water solution that you originally created.

You can also continue your experiments by retesting the liquids that did not allow the light bulb to illuminate. To do this make a new table that includes the name of the liquid and how much salt you must add to it before it allows the light bulb to illuminate. You may not have to add much salt, so find a way of consistently adding the same amount of salt. You may use a measurement as simple as a pinch, but try to keep you amounts the same each time.

Using what you observed in GAME TIME and your discoveries from ANALYZE THE REPLAY, try to predict how much salt would have to be added. You may want to look at the **Nutrition Facts Label** located on the drinks. These labels are required on packaged foods in many countries including the United States.

Nutrition Facts
Serving Size 1 cup (228g)
Servings Per Container about 2

Amount Per Serving	
Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	**18%**
Saturated Fat 3g	**15%**
Trans Fat 3g	
Cholesterol 30mg	**10%**
Sodium 470mg	**20%**
Total Carbohydrate 31g	**10%**

Does the information on this label make it easier for you to predict how much salt is going to have to be added to the solution to allow the light bulb to illuminate?

COACH'S CORNER

Additional information and explanations for parents and educators

In this activity we examined what an electrolyte is and experimented in finding solutions that they are abundant in. We primarily used table salt, though other electrolytes were likely contained in the liquids used in the activity. This activity focused on using liquids to test for electrolyte content, though electrolytes are often acquired by consuming fruits and vegetables. This activity is not meant to inform dietary decisions or address issues of nutrition. This activity does not address issues related to salt consumption in diets or heath concerns form electrolyte imbalance.

Though you may choose to discuss that electrolytes are lost through sweat, and sweat tastes salty, please also take time to discuss that this activity is not meant to be a health lesson.

DO YOU WANT TO LEARN MORE?

Research:

conductive, electric current, electrolyte, solution, solute, solvent

	OKLAHOMA STANDARDS			
Science		3rd grade	4th grade	5th grade
PS1-1	Matter and Its Interactions			•
PS1-4	Matter and Its Interactions			•
PS2-3	Motion & Stability	•		
PS2-4	Motion & Stability	•		
PS3-1	Energy			•
PS3-3	Energy		•	
PS3-4	Energy		•	

DEVON THUNDER EXPLORERS

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