Activity #3 - Testing for Conductivity

Concepts # 12, 13, 17

#12 Liquids with dissolved salts (ions) conduct electricity.
#13 Solids with metals conduct electricity.
#17 Fresh and salt water have different properties.

Objective:

Students will test the conductivity of selected liquids and solids.

Materials:

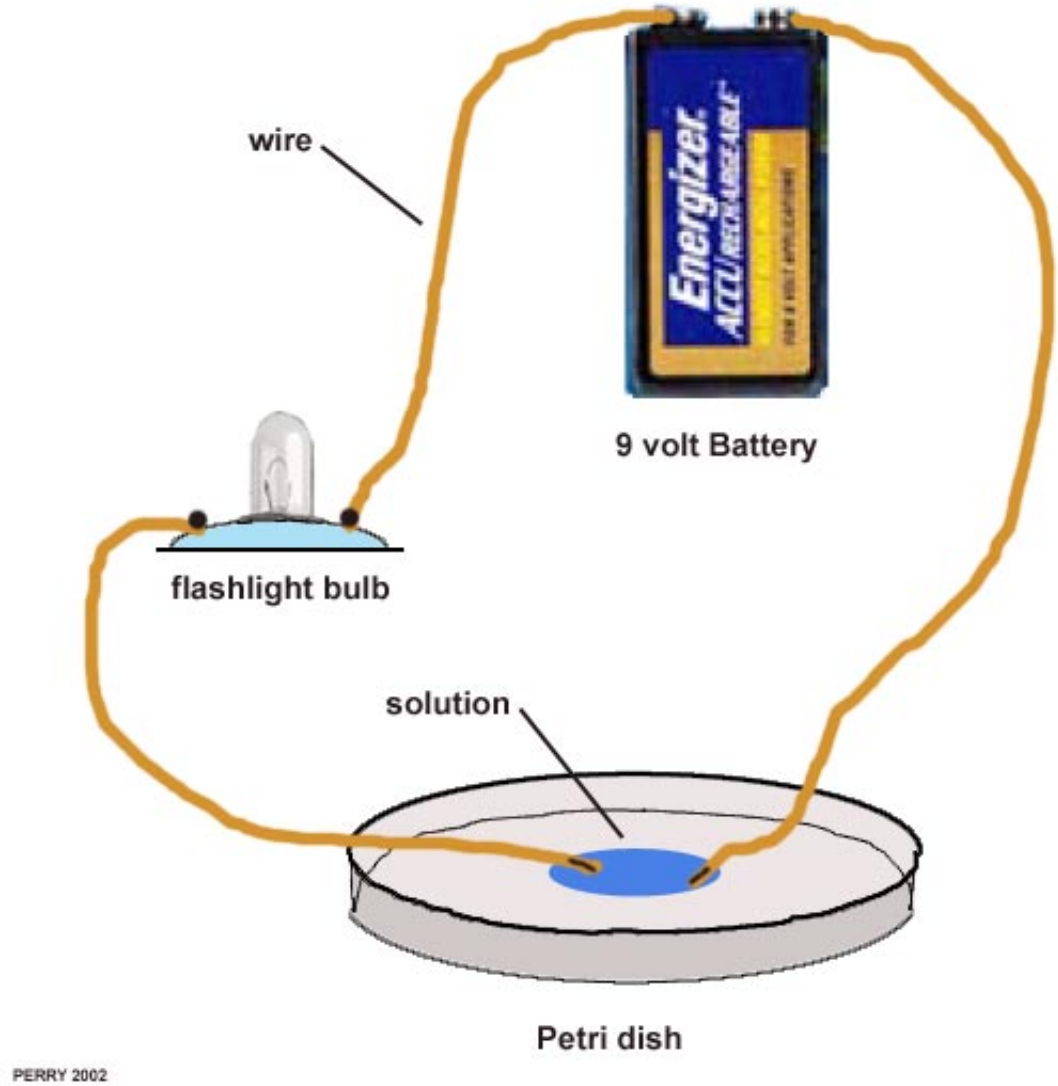
- copper wire
- scissors
- sandpaper
- 5 watt flashlight bulb and holder
- 9 volt battery
- stirring rod
- 5 petri dishes
- distilled water
- ethyl alcohol
- vegetable oil
- detergent
- kosher salt
- small pieces of: wood, aluminum foil, rubber, cardboard, plastic, brass, aluminum rod

Procedures:

1. Set up materials as shown in the diagram.
2. Remove 5 cm of insulation from both ends of each wire.
3. Sand the wire with sandpaper until it is bright.
4. Wrap the end of one wire around the screw of the bulb holder.
5. Attach a second wire to the other screw.
6. Take the loose end of the second wire and attach it to the battery.
7. Attach the third wire to the other terminal of the battery.
8. Test the circuit by touching the two free ends of the wires together. If your circuit is complete the light bulb will burn bright.
9. Place about 1 tbsp. of distilled water in two petri dishes and 1 tbsp. of the other liquids in separate petri dishes.
10. Add ¼ tsp. salt at a time to one dish of distilled water until you reach 2 tsps. (Stir the salt water well after each addition). After each addition test the salt water solution. Record the data after each addition.
11. Predict if each item will or will not conduct electricity before testing. Write the predictions in the table.
12. Test each item and record the observations in the table. (Make sure to sand the wires so they are bright after each test).

Evaluation:

- Which salt water solution was the best conductor of electricity? (The salt solution with 1¼ - 1½ tsp. salt dissolved.)
- Which items were conductive? (Aluminum foil, brass, aluminum rod, salt water)
- What kinds of bonds do compounds that conduct electricity have? (ionic bonds; these dissolve in water to form charged ions).
- Oceanographers use conductivity meters to determine the salinity of seawater. Explain how this is possible. (Salinity is a measure of the amount of dissolved ions; conductivity increases as the amount of dissolved ions increases.
- What conducts electricity?



Activity #3 - Conductivity Data Chart

Materials tested		Prediction of Conductivity	Observed Conductivity
Distilled water			
Ethyl Alcohol			
Vegetable Oil			
Detergent			
Rubber			
Aluminum Foil			
Aluminum Rod			
Cardboard			
Brass Rod			
Plastic			
Wood			
Salt Water	¼ tsp.		
	½ tsp.		
	1 tsp.		
	1 ¼ tsp.		
	2 tsp.		