

## LAB: Conductivity of Molecular and Ionic Compounds

### Background:

The salt and sugar on your kitchen table both dissolve easily in water, but the solutions they form have an important difference. One of those kinds of white crystals is an ionic compound, and when it dissolves, it dissociates into ions. The ions are free to move in the solution, and the solution, therefore, conducts electricity. The other kind of crystal, however, is a molecular compound, and its molecules remain whole when they dissolve. With no ions, the solution conducts no electricity.

This investigation involves testing several different liquids that are distributed among the work areas in the lab. When you measure the conductivity of each liquid, you will find that some are good conductors, some are fair or poor conductors, and some are nonconductors. Using the conductivities you have measured, you will decide which solutions contain ionic compounds, and which contain molecular compounds.

### Pre-lab Questions:

1. What are ions, and how do they form?
2. What is an ionic bond?
3. What is a covalent bond?
4. How do aqueous solutions of ionic and molecular compounds differ?
5. When some ionic compounds dissolve, not all of their bonds dissociate. What kind of conductivity would you expect such a solution to have?

### Objective:

Determine which solutions have ionic bonds.

### Materials:

Goggles      conductivity tester

### Solutions:

vegetable oil  
household ammonia  
dishwasher detergent(aq)  
hand soap(aq)  
carbonated drink  
tap water  
sodium hydroxide (1M)  
coffee

14 beakers  
salt water  
sugar water  
liquid  
household bleach(aq)  
distilled water  
hydrochloric acid (1M)  
vinegar

**Procedure:**

1. Put on your goggles.
2. Using the conductivity tester, demonstrated by your instructor, test each solution at the 14 stations. Caution: some of the test solutions may be corrosive, or may stain or discolor clothing. Avoid spills and splashes. If spills occur, wash with plenty of water and notify your teacher immediately. Avoid inhaling fumes from the bleach or ammonia solutions. Do not mix bleach or ammonia solutions. The resulting vapors are toxic.
3. Note which lights are glowing and indicate the degree of conductivity in your data table according to the chart on the tester.
4. Place the conductivity probe back on paper towel after the test and the class will rotate at the same time to the next lab station.
5. Move to the next lab station and check the conductivity of the solution at that station in the same manner. Record your results in your data table.
6. Repeat the steps above until you have tested all solutions.
7. Wash your hands before leaving the lab.