

Conductivity and Bonding

Student Sheet:

Name _____

Period _____

Purpose: Measure the conductivity of several compounds and solutions in order to predict the bond types (ionic or covalent) in the substances tested.

Safety Cautions: There is danger of electrical shock, the electrical apparatus must be turned off when placing it in or removing from a sample. All the KClO_3 portions as well as the AgCl portion will be demonstrated by your teacher behind a safety shield or in the hood, record your observations from the demo in your data table—DO NOT do those portions yourself. Keep alcohols away from flames; avoid skin, eye, lung contact.

Procedure:

1. After donning your safety goggles, obtain the compounds and prepare the solutions listed in the table, then follow the general directions for each type of substance listed in step 3 to test for conductivity of each condition.
2. To test for conductivity lower electrodes into the material in the well. Rate the conductivity of each test material as good (blinks), poor (faint light), or NDC (No Detectable Conductivity). Record the rating and other observations.
3. Solids—partially fill beaker with crystals, test for conductivity, retain a small amount for more testing, return the remainder to its container.
Dilute Water Solution: add 5-10 crystals of solid to 30 mL of distilled water.
Water Solution: add about 1 g of solid to 30 mL of distilled water.
Alcohol Solution: add about 1 g of solid to 30 mL of alcohol.
4. Clean-up: pure alcohol and all solids should be returned to the reagent table. All water solutions may be rinsed down the drain using plenty of water.

Table:

Test Material	Conductivity	Other Observations
Distilled water (30 mL in beaker)		
Tap water (30 mL in beaker)		
Alcohol (30 mL in beaker) CAUTION		
NaCl (solid)		
NaCl (dilute water solution)		
NaCl (water solution)		
NaCl (alcohol solution)		
Sucrose (solid)		
Sucrose (water solution)		
Sucrose (alcohol solution)		

KClO ₃ (solid) TEACHER DEMO		
KClO ₃ (water solution) TEACHER DEMO		
KClO ₃ (molten 3 g) TEACHER DEMO		
KCl (solid)		
KCl (water solution)		
KCl (alcohol solution)		

Analysis Questions:

1. What was the purpose of using both alcohol and water as solvents?
2. Why is the result from tap water different from distilled water?
3. Based on these experiments, what conclusions can you draw about the bonding in the four solids tested?
4. What effect does concentration of solution have on conductivity?
5. Predict the conductivity of KBr and CaS using the table of electronegativity.

Summary/Conclusion: