



Mystery of the Strong String

Comparing Ionic & Covalent Bonds

Student Handout

Introduction: Atoms bond to form two different types of compounds: ionic and covalent. Ionic compounds form when a metal (the cation) transfers electrons to a nonmetal (the anion). Covalent compounds form when two nonmetals share electrons. As a result, ionic bonds are much stronger than covalent compounds.

The strong bonds of ionic compounds give them very distinct properties. For example, they are not brittle and can conduct electricity extremely well. They also have higher melting and boiling points, since it takes more energy to separate their tightly held particles. The table summarizes ionic versus covalent compounds. In this lab, you will see how the bonds in ionic compounds differ from those in covalent compounds.

Ionic Compounds	Property	Covalent Compounds
Metal + Nonmetal	Elemental Composition	Nonmetal + Nonmetal
Strong	Type of Bond	Weak
High	Melting Point	Low
High	Boiling Point	Low
High	Conductivity	Low

Data: Record observations about how each string burned when it was set on fire.

OBSERVATIONS OF BURNING	
Unsoaked String	Saltwater-Soaked String

Discussion Questions: Answer these questions after completing the demo.

#1 Which string represents the ionic bond and which represents the covalent bond? Use data as evidence to support your answer.

#2 The chemical formula for salt is NaCl and the chemical formula for cotton is $C_6H_{12}O_5$. Does this support your answer to #1? Explain why or why not.



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Teacher Handout

Materials:



MATERIALS RECEIPT	
PRICES ARE APPROXIMATE	
Cotton String (75ft)	\$3.00
Salt	\$0.50
Scissors	\$1.00
Ruler	\$2.00
Water	N/A
Spoon	N/A
Cup/Bowl	N/A
Timer (Phone)	N/A
TOTAL	\$6.50

Procedure:

1. Fill a cup with hot tap water.
2. Add 4 spoons of salt to the water. Stir until ALL of the salt dissolves and the solution is clear.
3. Cut 1 foot of cotton string with a pair of scissors.
4. Soak the string in the saltwater solution for at least an hour.
5. After an hour, remove the string, and gently set it down to dry for another hour.
6. After the string's done drying, cut another foot of string.
7. Tie and suspend the unsoaked string to an inflammable, metal rod structure (like a sink faucet or a fence frame).
8. Use a grill lighter to light the bottom of the unsoaked string, and record what happens.
9. Tie and suspend the string that was soaked overnight.
10. Light the bottom of the string, and record what happens.