

Properties of Bonds Lab Exercise  
Chemistry  
10 points

**\*\*NOTE: Only title, heading, goal, research, data, and conclusion need to be written in the lab book.\*\***

Goal:

The goal of this lab is to determine some properties of ionic and covalent bonds.

Introduction/Background:

In this lab, the melting points of six compounds will be estimated using a Bunsen burner. The electrical conductivity of two of the compounds will also be checked using a conductivity tester.

Research (You may use your notes or a book to answer these):

- 1) What elements make up an ionic bond?
- 2) What happens to the electrons to make an ionic bond?
- 3) What elements make up a covalent bond?
- 4) What happens to the electrons to make a covalent bond?
- 5) Which do you predict will have a lower melting point, chemicals with ionic bonds or chemicals with covalent bonds? Why do you think so?
- 6) Which do you predict will conduct electricity in solution, chemicals with ionic bonds, chemicals with covalent bonds, both, or neither? Why do you think so?

Materials:

1 ringstand	1 iron ring
1 Bunsen burner	1 sparker
1 heat resistant pad	1 14 cm x 30 cm piece of aluminum foil
2 stirring rods	1 test tube brush
0.1 g sucrose ( $C_{12}H_{22}O_{11}$ )	0.1 g potassium iodide
0.1 g calcium chloride	0.1 g urea ( $NH_2CONH_2$ )
0.1 g sodium chloride	0.1 g acetaminophen ( $C_8H_9NO$ )
1 permanent marker	2 50 mL beakers
1 conductivity tester	1 ruler
1 stopwatch	

Hazards:

The student safety contract applies. Sucrose is not considered hazardous. Calcium chloride is slightly toxic by ingestion and a mild irritant to skin, eyes, and mucous membranes. Sodium chloride is very slightly toxic by ingestion, and its dust may cause minor irritation to mucous membranes upon inhalation. Potassium iodide is irritating to body tissues and a possible sensitizer. Avoid all body tissue contact with potassium iodide. Acetaminophen is slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, and of inhalation.

Procedure:

1. Fold the piece of aluminum foil in half.
2. Attach the iron ring to the ringstand 21 cm above the mouth of the Bunsen burner.
3. Label six places on the aluminum foil for the six chemicals being used.
4. Carefully obtain a small sample of each of the six chemicals. (Chemicals may be placed directly on the aluminum foil. Make sure the chemicals don't touch each other and don't fall off the foil!)
5. Place the aluminum foil directly on the iron ring.
6. Light the Bunsen burner.
7. Heat the chemicals on a LOW flame (no inner cone!) for at least five minutes.
8. Observe what happens to the chemicals, especially noting their order of melting.
9. After at least five minutes, turn off the Bunsen burner.
10. Physically and chemically clean the two beakers and the two stirring rods.
11. Label one beaker with the name of one of the chemicals that melted quickly.
12. Obtain a microspoon of the fast-melting chemical in the first labeled beaker.
13. Add 15 mL of distilled water to the beaker.
14. Stir to make it into a solution.
15. Label the other beaker with the name of one of the chemicals that melted slowly (or didn't melt in three minutes).
16. Obtain a microspoon of the slow-melting (or non-melting) chemical in the second labeled beaker.
17. Add 15 mL of distilled water to the beaker.
18. Stir to make it into a solution.
19. Use the conductivity tester to see if the solutions conduct electricity. (If the conductivity tester is working, touching its two electrodes together will make the light bulb light up. If a solution conducts electricity, the light bulb will light up!)
20. Clean up!
  - (a) Pour the two solutions into the labeled waste containers.
  - (b) Place the COOL aluminum foil into the labeled waste container.
  - (c) Remove the labels on the beakers.
  - (d) Clean the beakers.
  - (e) Show the teacher the clean beakers and clean desk for a clean-up signature.

Post-lab questions (in place of a conclusion—answer in your lab book in blue/black ink):

- Please answer in complete sentences! Don't write the question!

- 1) List the name of each of the six chemicals used in this lab. Tell which elements make up each chemical. (Example: Water is made of hydrogen and oxygen.)
- 2) Which chemicals contain covalent bonds? Which chemicals contain ionic bonds? How did you decide?
- 3) If a chemical melted quickly, does it have a high or low melting point?
- 4) Which had a higher melting point, the chemicals with ionic bonds or the chemicals with covalent bonds?
- 5) Which chemical solution(s) conducted electricity, the chemical with an ionic bond, the chemical with a covalent bond, both, or neither?
- 6) Based on your data, what are two properties of chemicals with ionic bonds?
- 7) Based on your data, what are two properties of chemicals with covalent bonds?