**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_ Partner \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Lab 4-2: Distinguishing Ionic and Covalent Compounds- Pre-lab**

**Ionic Compounds:**

* When Substances which are formed by ionic bonds are dissolved in water, the ions separate from each other allowing the electric current to flow through the solution.
* Ionic compounds can usually be identified by their high melting point
* Because of their high melting point, they are usually solids at room temperature.

**Covalent Compounds:**

* Covalent compounds are made of molecules
* Weak intermolecular forces hold the molecules of these materials together
* These weak interparticulate forces are responsible for their relatively low melting points
* They are usually liquids or gases at room temperature. (some exceptions exist)
* With a few important exceptions, covalent compounds do not conduct electricity when dissolved in water

***In this laboratory investigation, you will identify the type of bonds formed in a compound, based on the properties of the compound.***

**You will investigate the following compounds**: Sucrose, glycerin, Sodium hypochlorite, calcium carbonate, aluminum chloride, Isopropyl alcohol

**QUESTION:** What type of compound are each of these substances, Ionic or covalent?

* You will **investigate** the state of matter of several compounds at room temperature
* You will **measure** the conductivity of several solutions
* You will **research the literature** using the “*Handbook of Chemistry and Physics*” to determine the melting points of each compound.
* You will **demonstrate your understanding** of relationship of properties to bond type
* You will **predict** whether the compounds are more likely to be Ionic Compounds or Covalent Compounds.

**Construct a Claim /Hypothesis based on your knowledge of the properties of covalent and ionic compounds. (Remember, this should be an “If…. Then….” statement, which answers the question, your best educated guess!)**

|  |
| --- |
| **Claim/Hypothesis:** |

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_ Partner \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Lab 4-2: Distinguishing Ionic and Covalent Compounds**

In this laboratory investigation, you will identify the type of bonds formed in a compound, based on the properties of the compound.

**You will be investigating the following compounds**: Sucrose, glycerin, Sodium hypochlorite, calcium carbonate, aluminum chloride, Isopropyl alcohol

**QUESTION:** What type of compound are each of these substances, Ionic or covalent?

* You will **investigate** the state of matter of several compounds at room temperature
* You will **measure** the conductivity of several solutions
* You will **research the literature** using the “*Handbook of Chemistry and Physics*” to determine the melting points of each compound.
* You will **demonstrate your understanding** of relationship of properties to bond type
* You will **predict** whether the compounds are more likely to be Ionic Compounds or Covalent Compounds.

|  |
| --- |
| **!CAUTION!: *Many of the solutions you will be examining are toxic, and some are very corrosive. Avoid contact with your skin and eyes! Follow proper chemical hygiene procedures.***   * ***Wear goggles and an apron at all times. Do not take them off until the lab is completely clean.*** * ***Wash your hands thoroughly after completing this lab.*** * ***Do not walk around the lab with open chemicals*** |

**Experiment/ Procedure: (each Lab team)**

1. Collect:
   1. 1 small beaker with 6 small test tubes in it
   2. one dropper,
   3. one electronic probe
   4. 6 disposable pipettes
2. Label each of your test tubes 1-6, using masking tape and pen
3. Obtain solution # 1, using a clean pipette place 15 drops of the solution in test tube #1.
4. **Record the name and formula of the solution** in your table as solution #1
5. Obtain solution # 2, using a clean pipette place 15 drops of the solution in test tube #2.
6. **Record the name and formula** of the solution in your table as solution #2
7. Continue the previous process until each solution has been added to its own, separate beaker, labeled properly and recorded in your data table. **BE SURE TO USE A NEW PIPETTE FOR EACH SOLUTION!**
8. Insert the probe ware tester into the first test tube; **record the conductivity** in your data table.
9. Repeat this process for each of the samples. **BE SURE TO WASH AND DRY, with paper towel, YOUR PROBE BETWEEN EACH SAMPLE!**
10. At the station on the front lab table, inspect the samples in their undissolved states.
11. **Record the state of matter** of each substance, at room temperature, In your data table
12. Use a reference book, the “*Handbook of Chemistry and Physics*” to find the melting point of all of the substances used in this lab
13. **Record your findings** in your data table.
14. **Complete the data table with your predictions about the bonding type of each substance!**

**Evidence/Data and Observations**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Solution #** | **Formula** | **Name** | **Conductivity** | **State at room temp.** | **Melting point** | **Predicted bond type** |
| **1** | **C12H22O11** | **Sucrose** |  |  |  |  |
| **2** | **C3H8O3** | **Glycerin** |  |  |  |  |
| **3** | **NaClO** | **Sodium hypochlorite** |  |  |  |  |
| **4** | **CaCO3** | **Calcium Carbonate** |  |  |  |  |
| **5** | **AlCl3** | **Aluminum Chloride** |  |  |  |  |
| **6** | **C3H7OH** | **Isopropyl Alcohol** |  |  |  |  |

**Analysis and Conclusion:**

1. What are the properties that you observed which indicate that the substance is a covalent compound?
2. What are the properties that you observed which indicate that the substance is an ionic compound?
3. What causes some of these substances to be good conductors of electricity and others to be poor or non-conductors of electricity?
4. What role do interparticular forces play in the state of matter at room temperature?

|  |
| --- |
| **Next Question:** |

**Prepare a poster presentation for this lab.**