HPS Ionic vs Covalent Compounds Lab 2020 Name:

**Introduction**

Chemical compounds can be separated into two major categories: ionic compounds and covalent compounds. The properties of these compounds are summarized in the table below.

|  |  |
| --- | --- |
| Ionic Compounds | Covalent Compounds |
| Made of a metal and a nonmetal | Made of a nonmetal and a nonmetal |
| One atom takes electrons, one loses | Atoms share electrons |
| Higher melting and boiling points | Lower melting and boiling points |
| Generally solids at room temperature | Often liquids and gases at room temp |
| Usually hard/brittle | Often softer |
| Conduct electricity (electrolytes) | Do not conduct electricity |
| Dissolve readily in water | Do not dissolve readily in water |

**Purpose:** To determine if two unknown substances are ionic or covalent compounds.

**\*\*Safety - use of open flame (Bunsen burner), hot crucibles and tongs, unknown substances\*\***

**Procedure**

1. Collect your materials. You will need:

100-150 mL beaker Stir rod Water Clay triangle

Crucible Bunsen burner Ring stand Stopwatch

Conductivity probe Striker/lighter *Potassium Chloride* *Paraffin Wax*

**Calcium Chloride** **Sucrose** Tongs **Unknown** **1** & *Unknown 2*  
  
(\*Please note that your group will complete the following tests for 3 samples and share your data with another group to complete your data table.)

1. Melting point test: (1 min, 30 seconds → 2 min max)

Light a Bunsen burner and adjust it to a medium sized hot flame. Place a **small sample** of the desired compound in a clean crucible. Place the crucible in a clay triangle and use a ring stand to suspend the substance in the hottest part of the flame (the tip of the inner bright blue cone of flame). Use the stopwatch to measure how long it takes the substance to melt and record this value in the data table. If the substance does not melt write “does not melt” in the table. Clean the crucible thoroughly and let cool before testing the next substance.

1. Solubility test

Place 50 mL of water in a 100-150 mL beaker. Add 1 medium sized scoop of the desired compound. Use a stir rod to stir the substance into the water thoroughly. In the data table record how readily the substance dissolved. If it dissolved quickly and easily write “very soluble.” If it took some time or only partially dissolved write “partially soluble.” If it did not dissolve at all write “insoluble.”

1. Conductivity test

Take the beaker containing the mixture of water and compound and place the conductivity probe in the solution. Record the microSiemens/cm in the column provided.

1. Take your beaker over to the sink and thoroughly clean it with soap and water, making sure to clean out all of the compound residue. Once your beaker is clean, repeat these steps with the next compound.

**Data**

|  |  |  |  |
| --- | --- | --- | --- |
| Compound | Melting point test (time it took for substance to melt) | Solubility test (how easily substance dissolved) | Conductivity test |
| **Sucrose (covalent)** |  |  |  |
| *Potassium Chloride (ionic)* |  |  |  |
| **Calcium Chloride** |  |  |  |
| *Paraffin Wax* |  |  |  |
| **Unknown #1** |  |  |  |
| *Unknown #2* |  |  |  |

**Analysis**

1. For unknown compounds 1 & 2 determine if each was ionic or covalent and provide several pieces of evidence as to why you think so.

Unknown #1: Ionic or Covalent? (circle one)

Evidence:

Unknown #2: Ionic or Covalent? (circle one)

Evidence:

2. How different was the solubility of sucrose versus that of potassium chloride? Would a solubility test be a good way to tell the two apart? Are ionic and covalent compounds always different in every way?

3. What other tests could you think of to tell the difference between ionic and covalent substances? (Hint: look at the table of properties in the introduction section)

4. What do you imagine are some uses for ionic compounds? What would be some uses for covalent compounds?