**Introduction**

**Purpose** To observe and determine properties of Ionic versus Covalent compounds.

**Discussion**

Without knowing the electronegativity difference for certain compounds, it may be difficult to determine whether the compound is ionic or covalent. However, by observing various properties, one should be able to identify each compound.

**Hypothesis**

If four properties are known, then the substance can be identified as an ionic or covalent compound.

**Procedures**

1. Open the video: <http://somup.com/c06u0eBR4e> (15:46).

2. List the four properties that will be observed in the video.

A.

B.

C.

D.

3. Complete the chart below based on information from the video.

* Note that “A” – “D” are the four properties being observed.
* Type the information into the chart (which may take more than one line).
* For “C” use “bright”, “dim”, none for electrical conductivity.
* For “D” give the time it takes to melt each substance.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KI | KCl | C6H12O6  Glucose | KNO3 | C6H4Cl2  Paradichloro-benzene | C6H5COOH  Benzoic  Acid | CH3COOH  Acetic Acid | Paraffin | HCl |
| A |  |  |  |  |  |  |  |  |  |
| B |  |  |  |  |  |  |  |  |  |
| C |  |  |  |  |  |  |  |  |  |
| D |  |  |  |  |  |  |  |  |  |

What does the fact that acetic acid is a liquid and HCl is a gas tell you about the melting points of these compounds compared to the solids tested?

**Conclusions**

Based on the lab results, determine whether each compound is ionic or covalent in nature.

1. Complete the chart below by using an “I” for an ionic compound and a “C” for a covalent molecule.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| KI | KCl | C6H12O6  Glucose | KNO3 | C6H4Cl2  Paradichloro-benzene | C6H5COOH  Benzoic  Acid | CH3COOH  Acetic Acid | Paraffin | HCl |
|  |  |  |  |  |  |  |  |  |

2. Were any of the compounds/molecules more difficult to determine whether it was ionic or covalent in nature? Explain.

3. What would be a more objective way to determine whether it was ionic or covalent in nature?

4. What is the function of distilled water in the electrical conductivity test?

**Answers**

2. List the four properties that will be observed in the video.

A. Appearance & state of matter

B. Solubility in water

C. Electrical conductivity

D. Melting time

3. Complete the chart below based on information from the video.

* Note that “A” – “D” are the four properties being observed.
* Type the information into the chart (which may take more than one line).
* For “C” use bright, dim, none, for electrical conductivity.
* For “D”

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KI | KCl | C6H12O6  Glucose | KNO3 | C6H4Cl2 | C6H5COOH  Benzoic  Acid | CH3COOH  Acetic Acid | Paraffin | HCl |
| A | Solid, crystals | Solid, powder | Solid, powder | Solid, pellets | Solid, waxy | Solid, crystals | Liquid | Solid, transparent pellets | Gas |
| B | Soluble | Soluble | Soluble | Soluble | Insoluble | Insoluble | Soluble | Insoluble | Soluble |
| C | Yes, bright | Yes, bright | No | Yes, bright | No | No | Yes, dim | No | Yes, bright |
| D | 1:20 | Indefinite | 0:12 | 0:30 | 0:03 | 0:10 | Liquid already | 0:05 | Gas already |

What does the fact that acetic acid is a liquid and HCl is a gas tell you about the melting points of these compounds compared to the solids tested?

These compounds have very low melting points and are therefore covalent.

**Conclusions**

Based on the lab results, determine whether each compound is ionic or covalent in nature.

1. Complete the chart below by using an “I” for an ionic compound and a “C” for a covalent molecule.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| KI | KCl | C6H12O6  Glucose | KNO3 | C6H4Cl2 | C6H5COOH  Benzoic  Acid | CH3COOH  Acetic Acid | Paraffin | HCl |
| I | I | C | I | C | C | C | C | C |

2. Were any of the compounds/molecules more difficult to determine whether it was ionic or covalent in nature? Explain.

*Acetic Acid and HCl were more difficult to determine whether they were ionic or covalent in nature because they have very low melting points which is a characteristic of covalent bonds but also conduct electricity which is characteristic of ionic bonds.*

3. What would be a more objective way to determine whether it was ionic or covalent in nature?

*Determine the electronegativity difference.*

4. What is the function of distilled water in the electrical conductivity test?

*It acts as a control for the electrical conductivity test.*