**Lab: Ionic or Covalent?**

**Purpose:** To identify and classify some household substances as ionic, polar covalent, or nonpolar covalent compounds based on physical properties.

Use the data table to record your results.

**Procedure:**

1. Gather some materials for study and testing, such as:
   1. Table salt, NaCl
   2. Baking soda, NaHCO3
   3. Butter or margarine or shortening
   4. Vegetable oil
   5. Water
   6. Soda (aqueous)
   7. Rubbing alcohol, aqueous C2H5OH
   8. Solid air freshener (possibly scrape some pieces off of a solid cake or cone)
   9. Vinegar, dilute aqueous HC2H3O2
2. One of the properties to be investigated is hardness. Ionic compounds are generally hard solid at room temperature; covalent compounds are generally soft solids at room temperature. Fill in the data table fields highlighted in the column titled hard or soft? Which of the non-aqueous compounds above should be classified as ionic? Covalent?
3. Which of the compounds in the list, by nature of their formulas, are ionic compounds, that is they have a metal and a nonmetal in the formula or a metal and a polyatomic ion in the formula? Record this in the “Ionic or Covalent due to nature of formula” column of the data table.
4. A saying in chemistry is “Like dissolves like.” In other words, polar solutes will dissolve in polar solvents and nonpolar solutes will dissolve in nonpolar solvents. Try dissolving some NaCl in water and also in vegetable oil. What observations can you make? Record in the “Step 4 observations” column of the data table. Then, try dissolving a small amount of butter or margarine in vegetable oil and water. Record in the “Step 4 observations” column of the data table.
5. Are vegetable oil and water mutually soluble (miscible)? Vinegar and water? Vinegar and oil? Record in the “Step 5 observations” column of the data table.
6. If you have some solid air freshener, try dissolving some in water and in vegetable oil. Record observations in the “Step 6 observations” column on the data table.
7. Does baking soda dissolve in water or vegetable oil? Is it ionic or nonpolar covalent by its formula? Record in the “Step 7 observations” column of the data table.
8. Try dissolving NaCl in the Coca Cola. Does it dissolve? Record in the “Step 8 observations” column of the data table.
9. Is rubbing alcohol polar or nonpolar? Try dissolving the NaCl and the butter. Record in the “Step 9 observations” column of the data table.
10. Melting point is another indication whether a solid substance is polar or nonpolar. Polar and ionic materials have very high melting points. Nonpolar covalent materials have very low melting points or are liquids at room temperature. Very gently, try heating some of the NaCl in a saucepan. DO NOT spend a long time doing this. If the salt does not melt in a minute, consider it to have a very high melting point. Try the same with the butter. Record in the “Step 10 observations” column of the data table.

**Analysis:**

Using all the observations, decided if each substance is ionic or covalent. Record in the “Ionic or Covalent?” column of the data table.

**Questions:**

In the dry cleaning process, organic solvents are used that are not water-based. What solvents are they and why would dry cleaning remove some stains that detergent and water would not?

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| Substance | Hardness | Ionic or Covalent due to nature of formula | Step 4 Observations | Step 5 Observations | Step 6 Observations | Step 7 Observations | Step 8 Obserations | Step 9 Observations | Step 10 Obserations | Ionic or Covalent? |
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