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CHEMISTRY

Title: Conductivity of Molecular and Ionic Compounds

PLEASE READ

Intro: The salt and sugar on your kitchen table both dissolve easily in water, but the solutions they form have an important difference. One of those kinds of white crystals is an ionic compound, and when it dissolves, it dissociates into ions. The ions are free to move in the solution, and that solution, therefore, conducts electricity. The other kind of crystal, however, is a molecular compound, and its molecules remain whole when they dissolve. With no ions, that solution conducts no electricity.

This investigation involves testing several different liquids that are distributed among the work areas in the laboratory. When you measure the conductivity of each liquid, you will find that some are good conductors, some are fair or poor conductors, and some are nonconductors. Using the conductivities you have measured, you will decide which solutions contain ionic compounds, and which contain molecular compounds.

After you have classified your solutions, you will examine sugar and salt from another point of view. Bonding theory generally predicts that ionic compounds should form from combinations of elements that are far apart on the periodic table; while molecular compounds should form from elements that are close together. You will see whether your findings on conductivity agree with this prediction.

Target: By completing this activity students will be able to use conductivity as a means to determine if a solution contains ionic compounds (ionic bonds) or molecular compounds (covalent bonds).

Procedures:

1. Put on your goggles and lab apron.
2. Create a table to record all your data. The table should contain the following columns: Test solution, red bulb, green bulb, numeric scale, and conductivity.
3. Using the conductivity tester as described by your teacher, test the solution(s) at your lab station.
4. Note whether the test light is lit, and if so, how brightly. Record your observations in the Data Table.
5. **IMPORTANT!** Rinse the conductivity probes with distilled water over an empty beaker.
6. Move to the next lab station and check the conductivity of the solution(s) at that station in the same manner. Record your observations.
7. Repeat steps 2 – 5 until you have tested and recorded data for all the solutions.
8. Clean up your lab area as instructed by your teacher.

Analysis:

1. What types of bonds do you think the good conductors have? Explain
2. What types of bonds do you think the nonconductors have? Explain
3. How do you account for the fair and poor conductors of electricity?

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4. What kind of ions does sodium chloride produce when it dissolves?
5. Where are sodium and chlorine found on the periodic table? Do the relative positions of these elements in the periodic table agree with the prediction made in the Introduction about their structure? Explain
6. The chemical formula for sucrose is $C_{12}H_{22}O_{12}$. Where are the elements that form sucrose found on the periodic table? Do the relative locations of these elements in the periodic table agree with the theoretical prediction about the kind of compound these elements should form?
7. Make a Venn diagram of your solutions.

Reflection:
Write a reflection for this lab.