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Chemistry

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Experiment 2.2 Lab Report

Research Question

What is the difference between ionic and covalent compounds experimentally? How can we break the bond of compounds?

Introduction

Ionic bonds happen between metals and nonmetals and must have a large difference of electronegativity between the atoms involved. Ionic bonds are solid at room temperature and have high melting and boiling points; they also conduct electricity.

Covalent bonds happen between non-metals and require a very small, or none at all, difference of electronegativity between the atoms involved. Covalent bonds also are sometimes liquid or gaseous at room temperature and have low melting and boiling points; they do not conduct electricity.

Procedure

First, we poured approximately 150 mL of distilled water into two separate beakers. Then, we put one rounded spatula full of sugar into the first beaker and mixed thoroughly until the sugar dissolved. Then, using a new spatula, we put one rounded spatula of baking soda into the second beaker and mixed until the baking soda dissolved. Next, we connected a cap with wires on it to a

nine volt battery. After that, we put the ends of the wires into the beaker of the sugar water. After observing it for a minute, we took the wires out of the sugar water and put them into the baking soda water and observed it for a few minutes. Each time we put the wires into the water solutions we were careful not to let the ends of the wires touch.

Observations

When we put the wire ends into the sugar water, we saw nothing happen. Since there was no evident electricity being conducted, sugar must be a covalent compound. However, when we put the ends of the wires into the baking soda water and left it for a few minutes, bubbles formed all over the bare end of the wires. When we moved the wires around in the water, the black (negative) wire released tons of tiny bubbles that resembled smoke. We added more baking soda to the solution after a minute or two, and found that even more bubbles formed because of this. As the wires sat in the water, the tip of the red (positive) wire turned a bluish-green color. Because electricity was being clearly conducted, baking soda must be an ionic compound.

Conclusion

Baking soda is ionic because it conducted electricity; likewise, sugar is a covalent compound because it did not conduct electricity. Ionic compounds conduct electricity because they have metals in them, and metals conduct electricity. The reason that the tip of the red wire turned blue in the baking soda solution was that it was made of copper and had a positive charge. The positive charge attracted the negatively charged oxygen atoms of the water molecules. When the oxygen atoms came to the copper wires, a chemical reaction called oxidation occurred, turning the wire bluish green.

Vocabulary

The definition of compound is a substance that can be decomposed by chemical means.

The definition of chemical reaction is a process by which one or more substances change into one or more different substances.

The definition of ionic compound is a compound formed by ions.

The definition of covalent compound is a compound formed by atoms that share electrons.

The definition of electrolysis is a process where an electric current passes through a substance, effecting a chemical change.

The definition of mixture is a substance that contains different compounds and/or elements.

The definition of solution is the result of one or more solutes being dissolved in a solvent.