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**Lab:** Experiment 2.2

**Research Question:**

How can we experimentally determine the difference between ionic and covalent compounds?

**Introduction:**

Ionic compounds are solid at room temperature, and covalent compounds are sometimes liquid or in a gaseous state. Ionic bonding can only form between metals and non-metals, making them able to conduct electricity, while covalent bonds form between non-metal elements. Ionic bonds also have a high polarity, while covalent bonds have a low polarity.

**Procedures:**

First, we poured approximately 150 mL of distilled H<sub>2</sub>O into each beaker. Second, we mixed 1 spatula of baking soda into one beaker, and using the other spatula, we mixed 1 spatula of sugar into the other beaker. We thirdly prepared the battery with a lead attachment. Then we inserted the leads into the sugar H<sub>2</sub>O first. Lastly, we inserted the leads into the baking soda H<sub>2</sub>O.

**Results:**

On the lead battery attachment, the red wire goes to the positive terminal, and the black wire goes to the negative terminal. When we put the leads into the sugar H<sub>2</sub>O, nothing happened. When we put the leads into the baking soda H<sub>2</sub>O, the copper on the end of the black wire started fizzing and bubbling, but the copper on the end of the red wire only had a few bubbles on it. After about 5 minutes, the black wire was still fizzing about as much as it was when we first put it in. A moment later, when we took the leads out of the mixture, we saw that the copper on the end of the red wire was discolored, but the black wire was not.

**Conclusion:**

We can experimentally determine the difference between ionic and covalent compounds by using an electric current. If it is ionic, it has metal in it, so it will conduct electricity, while covalent compounds are made of non-metals, so it will not conduct electricity. Sugar is covalent, so nothing happens when we put the leads into the mixture. Baking soda is ionic, so when we put the leads into the mixture, a chemical reaction happens. Water is made of 1 oxygen atom, and 2 hydrogen atoms. The hydrogen atoms broke off and went to the negative terminal (the black wire), and the oxygen atom went to the positive terminal (the red wire). Thus, the black wire was bubbling because of the hydrogen atoms coming out, and the red wire oxidized, turning it a blueish-green color.

The definition of a compound is any substance composed of identical molecules consisting of two or more chemical elements. The definition of a chemical reaction is a process in which one or more substances are changed into others. The definition of an ionic compound is a compound formed by ions bonding together through electrostatic forces. The definition of a covalent compound is a chemical bond that involves the sharing of electrons to form electron pairs between atoms. The definition of electrolysis is a chemical change produced in an electrolyte by an electric current. The definition of a mixture is a substance that contains different compounds and/or elements. The definition of a solution is a form of matter having constant chemical composition and characteristic properties.

