

Investigating Chemical Bonds

Background:

In this lab, we made hypotheses about the molecular bonds between different materials, basing them on two control substances. After we did the experiments, we recorded whether or not we thought the substance was formed using Ionic Bonds or Covalent Bonds.

Materials:

- Hot Plate
- Tongs
- Glass Rod
- Beaker
- Evaporation dish
- Chemical Scraper

Methods:

First, we set up the hot plate and got our materials. Next, we experimented by taking a small sample of the substances mentioned in the lab instructions. When we tested to see if we could smell the substance, we “wafted” the air from the substance towards us, as not to put our face in the petri dish and smell it directly. After recording that result, we then filled a beaker about halfway with water and stirred up the substance to see if it would dissolve. While my partner was putting another portion of the substance in the Evaporation Dish, I cleaned out the beaker and was ready to take the dish off the hot plate in case it started to melt.

Results:

Substance	Volatility	Solubility	Does it melt?	OUR CONCLUSION
PDP [Control]	Yes	No	Yes	Covalent Bond
Driveway Salt [Control]	No	No	Yes	Ionic Bond
Chocolate	Yes	No	Yes	Covalent Bond
Table Salt	No	Yes	No	Ionic Bond
Candle Wax	No	No	Yes	Covalent Bond
Epsom Salt	No	No	Yes	Ionic Bond

Discussion: Part 1

1. When a positively charged atom “gets near” a negatively charged atom, they feel the need to complete their goal in their “life”- filling the Valence, or the outer energy shell that holds the electrons. Next, they “make a deal” and either trade (Ionic) or share (Covalent) their atoms. Lets say that Atom “A” has 1 electron in the outer shell, and Atom “B” comes along and has 7 electrons in its outer shell. The atoms trade off or share, forming another compound and/or element, so that they both have a full valence.
2. When you get right down to it, there are two types of bonds; **Ionic** and **Covalent** bonds. The ionic bonds are “Tradeoffs” if you will. This is when two or more atoms completely obtain or “give away” electrons in their outer shell. Covalent bonds are the opposite. The atoms form a close relationship and both atoms get the electron, although the more mass the one atom has the more it “gets” the electron.

3. Chemical reactions can be *created* by having unstable atoms. Take nuclear fission for example. If bonds didn't occur, different compounds wouldn't form, and that would mean that there would be nothing different to have something to bond to; because all of the atoms would be the same. Different materials create different reactions, and without bonds, the reaction wouldn't complete.

Discussion: Part 2

What new tools or techniques did you learn in this lab? Write a description of these tools and techniques and how they were used. What errors may have occurred during this lab? Describe them if any, and if they were from a flaw in the design or lab due to your performance with the tools & techniques.

Admittedly, I didn't learn about any new tools during this lab. What I did learn though, is that Ionic bonds have a higher melting point than Covalent bonds. I also learned that if you let Epson Salt melt into a crust, it takes some effort to remove, especially in the evaporation dish. I think that the Epson Salt wasn't supposed to melt, because as shown in the Results Table, it's a Ionic bond, which should have a higher melting point. I believe that we left the substance on the hot plate for longer than we were supposed to, even though it didn't exceed the one minute limit.

Find a relationship of this lab to the current classroom subject matter. Look at the textbook to current, previous, or future sections to see which text topics relate to the lab topics. You should cite the chapter and page number from the textbook. After you list the book info, describe how it is related to this lab.

In the textbook, on page thirty-nine, it describes and shows us the picture and description of a **covalent bond** between a carbon atom and two oxygen atoms. Covalent bonds made up about 50% of this lab, and the other half was Ionic bonds. According to classroom notes, Covalent bonds are found in most living things, as opposed to Ionic bonds ("The risk takers").

Summarize what you learned from this lab. This section should include definitions, explanations, and descriptions. This is the most important essay question!

In class, we learned about atoms, and then moved on to molecules. Molecular bonds are what this whole lab was **about**. As you stated in class, this chapter is the fundamental building block of chemistry. The lab we just completed gave us a firsthand experience that we probably would not have come up with on our own. We confirmed that ions have a much higher melting point than covalent bonds. Ions TRADE electrons to make a full valance, and covalent bonds just SHARE. However, the atom with the bigger mass gets 'more' of the electron than the smaller one (this is only true in covalent bonds).

In summary, by using Driveway Salt and Mothballs as control substances, we were able to determine the different properties and differences between the two types of molecular bonds (IONIC and COVALENT).