**Partner: Carrie**

**Date of Lab: 4-24-2023**

**Assignment/Due Date: 4 - 25 - 2023**

**Comparing Ionic and Molecular Compounds**

**Purpose:**

**The purpose of this lab activity is to observe the properties of different compounds and to determine which compounds are ionic compounds.**

**Question:**

**Can you identify types of compounds based on properties?**

**Background Information (10 points):**

*Use the reference document to complete the following table*

**Table 1. Background information**

| **Properties of Ionic Compounds** | **Properties Covalent Compounds** |
| --- | --- |
| Hard but brittle, Crystalline solids  High melting points  When dissolved or as liquids, conduct electricity (because the particles are charged)  Strong bondsbetween the atoms cause the crystal structure and high melting points | Low solubility  Low melting points  Some soluble ones do NOT conduct electricity; some are acidic and do not conduct electricity;  Bonds are not as strong as ionic bonds  Tend to be amorphous solids |
| **Description of Ionic Bonds** | **Description of Covalent Bonds** |
| Made of 2 oppositely charged ions held together by an iconic bond | Mostly between nonmetals  Atoms share a pair (or more) of valence electrons |

**Hypothesis (10 points):**

*-using the “if…then…” wording, create a hypothesis by answering the question*

*the blank should include properties that ionic compounds have that you will test for in this lab)*

**If a compound has low solubility in water and has a low melting point, then it is a covalent compound.** *(the blank should include properties that covalent compounds have that you will test for in this lab)*

**Data and Observations** *(use the table provided for all data; there is no graph for this lab) (20 points)*

**Table 2. Observations**

**Well plat number: 12**

| ***Observation*** | ***Table Salt*** | ***Baking Soda*** | ***Corn Starch*** | ***Epsom Salts*** | ***Sugar*** | ***Rubbing alcohol*** | ***Distilled Water*** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Part A. Appearance in Well Plate at start*** | *Bubble form*  *Cohesive* | *Bubble form*  *Cohesive* | *Bubble liquid Cohesive* | *Liquid form*  *Cohesive* | *bubble form*  *Cohesive* | *Pure liquid*  *Amorphous* | *Kind of bubble form*  *Cohesive - ish* |
| 1/2 hr. appearance in well plate | *a liquid bubble form cohesive* | *a liquid bubble form cohesive* | *a liquid bubble form cohesive* | *a liquid bubble form cohesive* | *a liquid bubble form cohesive* | *evaporated amorphous* | *still in a bubble form Cohesive* |
| Next day, appearance in well plate | Crystalized | *Crystalized* | *evaporated/dried up/little bit of crystalized* | *adhesive and dried up* | *smudged in and dried up* | *evaporated and gone* | *evaporated* |
| Did a solid crystallize from the solution? | *yes* | *yes* | *no* | *no* | *no* | *no* | *no* |
| **Part B.**  **At room temperature, what phase is the material?** | *solid* | *solid* | *solid* | *solid* | *solid* | *liquid* | *liquid* |
| **Describe the appearance of the material.** | *course* | *fine* | *fine* | *course* | *crystalized* | *not cohesive* | *amorphous* |
| **As a solid, does the material conduct electricity?** | *no* | *no* | *no* | *no* | *no* | *no* | *no* |
| **As a liquid, does the material conduct electricity?** | *yes a lot* | *yes a lot* | *yes but less* | *yes* | *just a little yes* | *no* | *yes but less* |
| ***Observation*** | ***Table Salt*** | ***Baking Soda*** | ***Corn Starch*** | ***Epsom Salts*** | ***Sugar*** | ***Rubbing Alcohol*** | ***Distilled Water*** |
| **Other**  **Observations** |  |  |  |  |  |  |  |
| **Part C.**  **Chemical Name of Material** | sodium chloride | *sodium bicarbonate* | *Amylose* | *magnesium sulfate* | *sucrose* | isopropyl alcohol | water |
| **Chemical formula of Material** | **NaCl** | **HCO3** | **(C6H1005)n** | **MGS04** | **C12H22O11** | (CH3)2CHOH | *H20* |
| **Symbol of the cation formed in solution (+)** | **Na+** | **Na+** | not applicable | **MG 2+** | not applicable | not applicable | not applicable |
| **Symbol of the anion formed in solution (-)** | **Cl-** | **HCO3 -** | not applicable | **S04 -2** | not applicable | not applicable | not applicable |
| **Melting point** | **1480** | **Decomposes** | **257** | **1124** | **186** | **-89** | **0** |
| **Classification:**  **Ionic or Molecular** | **ionic** | **ionic** | **molecular** | **ionic** | **molecular** | **molecular** | **molecular** |
| **Reasons** | **The bubble in its liquid form turned into a crystalized structure because of its high melting point** | **Crystallized structure, bonds strong,high melting point** | **not crystallized low melting point**  **bonds not strong**  **made of ions** | **conducts electricity**  **high melting point** | **not crystalized low melting point** | **low melting point**  **not crystalline** | **low melting point**  **bonds are not strong**  **conducts electricity** |

**Materials**

Well-plate 4 pipettes magnifying glass

Solutions: table salt, table sugar, baking soda, rubbing alcohol, tap water and Epsom salt

Solids: table salt, table sugar, baking soda, and Epsom salt

Spoon and plastic dish Conductivity tester

**Procedure**

**Part A**

1. Bring a well plate tray to liquid buffet
2. Stir each solution as you go through the line
3. Place **1 drop** of each solution in a separate, small sized well plate, these go in order of your data
4. Use a magnifying glass to observe the appearance of the drop, record
5. Place well plate near the fan to evaporate
6. Check well plate after 15 minutes, record observations
7. Check at the end of class. Record observations.
8. Join group for Part B and C

**Part B**

1. Use a magnifying glass to observe each **solid** material. You may also touch each one.
2. Use the conductivity kit to test for conductivity as demonstrated
   1. For solids, simply test each solid in your tray by touching probes to solid; wipe in between each
   2. Record yes or no in the data table (yes- conducted; no-did not conduct)
   3. **For liquids**, return to the buffet and test each solution; wipe probes between each test
   4. Record yes or no in the data table (yes- conducted; no-did not conduct)
3. Record data, keep solids in tray for the rest of your group to see
4. Join group for A and C
5. As a class, you will test the conductivity as a solution (mixture with water)

**Part C**

1. While you wait, use your resources (book, zippy, boxes at buffet) to look up names and formulas of substances
2. Record these in the data table.
3. Use your ion chart to determine the cations and anions in each, if and only if the substance is ionic!

**Comparing Ionic and Molecular Compounds**

**Analysis Paragraph (80 points)**

*-include the following content in a paragraph. The order you discuss information is up to you.*

**--Introductory Sentence**: restate purpose of the lab in your own words and in the **past** tense (3 pts)

Body Statements:

⬜Describe the procedure and observations you made on the different items. (10)

*(example. To test the purpose, we observed the properties of each substance such as…)*

⬜Describe the two types of molecules you were investigating (use notes and chart from start of lab) (15 pts)

⬜Which materials are covalent (molecular) compounds based on your data-link evidence you collected to definitions of this type of compounds? Why (use notes)? (15 pts)

⬜Which materials are ionic compounds based on your data-link evidence you collected to definitions of this type of compounds? Why (use notes)? (15 pts)

⬜What errors occurred during the lab that could have altered the results? Explain. (yes, there are always errors!) (15 pts)

use WE or OUR (1 pt) in the entire paragraph (do not use "I, you, me, my, or names of people")

**End with a conclusion (2 pts)**

spelling and grammar (6 pts)

Paragraph total: 80 pts

Background 10 pts + Hypothesis 10 pts + Data 50 pts = 150 pts

**Grading Rubric - on next page**

Each Question will be graded on the following criteria:

| **Element** | **Sophisticated (3 pts)** | **Emerging (2 pts)** | **Early (1 pt)** | **Missing (0)** |
| --- | --- | --- | --- | --- |
| **Claim**  statement | Makes an accurate and complete claim (statement) in response to the question. | Accurate but incomplete claim | Responds to questions with inaccurate claims. | No claim made that responds to the question. |
| **Evidence**  (data) | The evidence contains all appropriate data from an observation | Evidence contains most of the appropriate data | Evidence contains some of the appropriate data | No evidence from observations are included |
| Interprets all of the data accurately. | Interprets most of the data accurately | Interprets some of the data accurately | Does not interpret any evidence. |
| **Reasoning**  (the how and the why) | Answers how or why the evidence supports the claim with sufficient (enough) relevant scientific information | Answers why or how the evidence supports the claim with insufficient relevant  scientific information | Answers why or how the evidence supports the claim with no relevant scientific information | Does not provide any reasoning |
| Uses all pieces of evidence and relevant scientific vocabulary to explain the relationship between the claim and evidence (how & why) | Uses most pieces of evidence and relevant scientific vocabulary to explain the relationship between the claim and evidence (how & why | Uses some pieces of evidence and relevant scientific vocabulary to explain the relationship between the claim and evidence (how & why | Uses no evidence and relevant scientific vocabulary to explain the relationship between the claim and evidence (how & why |

Overall, the paragraph will be assessed using the following criteria:

| **Element** | **Sophisticated (3 pts)** | **Emerging (2 pts)** | **Early (1 pt)** | **Missing (0)** |
| --- | --- | --- | --- | --- |
| writing | All sentences are complete. | Most are complete | Some are complete | None are complete |
| Writing | Paragraph contains minimal grammatical & spelling errors. | Contains a few errors. | Contains some errors. | Contains many errors. |