Small-scale Lab: The Behavior of Liquids and Solids

**Purpose**

To explore and explain some behaviors of liquids and solids.

Materials

|  |  |
| --- | --- |
| Petri dish | Rubbing alcohol |
| Water | Graph paper |
| Ice | Calcium chloride |

**Pre-lab Questions**

1. The states of matter we will consider include solid, liquid, and gas. What changes of state are possible (include all 6 from 13.1-13.4)?
2. What generally causes a substance to change state?

**Procedure**

1. For experiment 1, place one drop of water in the petri dish. Replace the cover and place a small piece of ice on top of the cover.
2. After a few minutes observe the interior surface of the petri dish cover and the contents of the dish.
3. Record your observations in the table on the next page.
4. Answer question 1.
5. Clean and dry the petri dish and its cover for the next experiment.
6. Repeat these steps for experiments 2-5 and answer the correlating questions after each one.

|  |  |  |
| --- | --- | --- |
| Experiment | IN the petri dish | On TOP of the petri dish |
| 1 | Drop of water | Ice cube |
| 2 | Drop of water | Drop of water |
| 3 | Drop of rubbing alcohol | Drop of water |
| \*4\* | Drop of water & piece of CaCl2 | ------------------------------------------- |
| 5 | Several pieces of CaCl2 | Ice cube |

\*\*In experiment 4 keep the calcium chloride and water drop about 3 cm apart\*\*

**Data Table**

|  |  |
| --- | --- |
| Experiment | Observations |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

**Analysis Questions:**

1. Explain your observations in experiment 1 in terms of the behavior of liquids.
2. Why is ice not needed for cloud formation in experiment 2?
3. What differences do you observe about the behavior of rubbing alcohol in experiment 3 and the behavior of water in the previous experiments? Explain.
4. What happens to solid calcium chloride in a humid environment?
5. Propose an explanation for no cloud formation in experiment 5.

**Extension**

1. Place a drop of water and a drop of rubbing alcohol about 3 cm apart in a petri dish. Cover the dish and place it on a piece of graph paper. Be careful not to mix the contents. Draw before and after pictures of what each drop looks like below (label each spot as alcohol and water):

Immediately: After ~1 min:

What property of liquids that you know would cause the difference in the two pictures above?

1. Draw a model of what happens when gas particles are cooled. Include a written explanation as well AND a real life example of when you see this happen.
2. Draw a model of what happens when liquid particles are heated up. Include a written explanation as well AND a real life example of when you see this happen.
3. Water freezes and ice melts at 0 degrees Celsius. This means that the melting point and the freezing point of water is the same. Give a real world example to help other Chemistry students understand this principle.
4. Using principles of evaporation explain why it is important our bodies have evolved to sweat.
5. Imagine a scenario where we could replace our “sweat” with acetone. Thinking about our demonstration yesterday (and assuming acetone is harmless), would this be a better “sweating agent” than our current salt water sweat? Explain.