Lab 1: Ice Lab and its phase change

Introduction:

Everything is made up of matter. It has shape, volume and mass. All one hundred and nine elements have three states and provide the world with daily activities. An element at a solid state has particles that are very close together and vibrate. A solid state has a set shape, mass and volume and this gives it a tough shape. The second state of an element is a liquid and it also has a set volume and mass. In this state the particles vibrate and rotate in a limited space. However, like the solid they do not have a rigid shape, liquids are shaped liked the object in which they are poured. The last state of the elements is a gas. Particles of gas are very free and can vibrate, rotate, move rapidly, and the shape of gas is not known. These three states are very amusing when one experiments and looks at the changes from one phase to another. In addition, when one state changes from solid to liquid, the particles move more rapidly and the energy is more increased. This causes solid to change to a liquid form or state. The temperature remains constant as the phase changes. As more energy is increased or heat is delivered to the particles it causes the liquid to change its shape to gas. This is known as the process of phase change. When you are going from liquid to solid, the energy of the particles decreases and there is less movement within the particles. Finally, in this lab the phase changes from solid to liquid will be observed.

Hypothesis:

I will hypothesize that "Yes," their will be the same temperature as the phase changes from solid to liquid. The potential energy stays the same and nothing else is contributed.

Materials:

- Crushed ice
- 3 Ice cubes

- Thermometer
- 1000 ml beaker
- 1 250ml graduated cylinder.
- 1 Mortar and pestle
- Stopwatch
- Cork
- Electronic Scale
- Hot Plate
- Plastic Bag
- 1 Stand for plastic beaker

Procedures:

First Procedure

I. Obtain a 250ml graduated cylinder, thermometer and stopwatch and bring to the testing area.
II. Acquire ice and place it in the mortar and pestle. Crush ice with the pestle until the ice is broken into very tiny pieces.
III. Use the electronic scale and weigh the 250ml graduated cylinder and after obtaining the weight add ice. (About 102.6g of ice).
IV. In the graduated cylinder put in the thermometer and record the temperature of the ice after every 10 seconds.
V. The room temperature should be around (18.2°C).
VI. Dispose of water and return lab equipment in the proper place.

Second Procedure

I. Obtain stopwatch, thermometer and cork. Take one plastic stand and 250ml of graduated cylinder.

II. Get ice and put it in the mortar and pestle. Using the pestle crush the ice until the ice is broken into very tiny pieces.

III. Use the electronic scale and weigh the 250ml graduated cylinder and after obtaining the weight add ice. (About 102.6g of ice)

IV. In the graduated cylinder put in the thermometer and record the temperature of the ice after every 10 seconds.

V. The room temperature should be around (18.2°C).

VI. Place the thermometer in the beaker filled with water after getting rid of the ice.

VII. Now record the temperature of the water every 10 seconds. This should be done for about 17 minutes.

VIII. Dispose of water and return lab equipment in the proper place.

Variables:

Time in an independent variable.

Time (Minutes)	Temperature (°C)	Temperature 2(°C)	Temperature3 (°C)
1	18	19	18.5

Temperature is dependent variable.

Observations:

Tables:

Erroneous

Procedure with 3 ice cubes

1. Mass- 101.7grams, Solid to Liquid. With Ice.

2	19	20.5	20.5
3	22	21.5	23
4	27	28	29.5
5	33.5	34	34.5
6	37	38.5	39.5
7	43	46	47.5
8	59	53	56.5
9	57	61	59.5
10	63.5	64.5	65
11	69	70	70.5
12	72	77	79
13	80.5	84	83.5
14	86	92	90
15	91.5	93	93
16	94	94.3	94

Time (Seconds)	Table 1 *(°C)*	Table 2 *(°C)*	Table 3 *(°C)*
0.5	0	0	0
15	0	0	0.5
25	0.5	0	0.5
35	0	0	0
45	0	0.5	0
55	0.5	0.5	0.5
65	0.5	0.5	0.5
75	1	0.5	0.5
85	1	0.5	1
95	1.5	1.5	1
105	0.5	1.5	1.5
115	0.5	1	1
125	1	1	1

2. Mass – 102.9grams, Solid to Liquid. Without Ice.

Time (Seconds)	Table1 *(°C)*	Table 2 *(°C)*	Table 3 *(°C)*
0.5	0	0	0
15	0	0	0
25	0	0	0
35	0.5	0	0

45	0	0.5	0
55	0	0	0
65	0	0.5	0
75	0	0.5	0.5
85	0	0.5	0
95	0.5	0.5	0
105	0.5	1	1
115	1	1.5	1.5
125	1.5	2	1.5
135	2.2	3	2.5
145	2.8	3.5	3.7
155	3.5	4	4
165	4	4.5	4.5
17	4.5	5	5.2

Discussion:

Looking at the results of the phase change one can see that it takes many tries to come with a solution and prove something. The first procedure couldn't create the same temperature as the phase changed from solid to liquid. There were many factors that prevented this form happening. The environmental variables, the heat and energy contributed with the irregular temperature. The first procedure didn't quite work to show that the temperature remains the same as the phase changes. In contrast, the second procedure was successful to show that this theory that temperature does remain constant. The graphs also show that the temperature remains constant as the phases change. After completing many experiments the results always showed that the temperature always remained at zero degrees Celsius but twice it varied to 0.4 degrees Celsius. Furthermore, the data was also unavailable below zero degrees. The

temperature for water to melt is less than zero degrees Celsius. At this stage the one can see that it is evident that the graph would show a less curve because no plateau will be present. This can be related to the increase in kinetic energy does not effect the phase change but converts to the potential energy. This is simply noted that kinetic energy does not play a big role when the phase changes. So this answers our question that, "Why does the temperature remain the same while the phase changes," well this is due to kinetic energy helps increase the potential energy and this keeps the temperature constant. In conclusion, some experimental errors were made but in the end I tried my utterly best to prove my point.

Conclusion:

Analyzing the data and the graphs it is proved that "Yes," when the water begins to change from solid to liquid, the temperature does remain constant while the phase changes. This also represents that during the plateau, the solid and liquid phases are all present during the similar period of time and this is all due to kinetic energy converting into potential energy and making this happen. Lastly, this lab clearly shows and proves that the temperature remains the same while the phases change and become the final product.