**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Changes of State Lab**

***Experiment Questions:***

* What happens to the temperature when an object goes through a change of state?
* At what temperature does water change states of matter?
* What happens to the movement of the molecules as the object changes from solid, to liquid, and finally to gas?

***Materials:***

* 250 ml beaker
* Thermometer
* Ice
* Hot Plate
* Ring stand with clamps
* Stopwatch

***Procedures:***

* 1. Using the 250 ml beaker, get about 175 ml of ice from the cooler. Fill the remaining spaces with water
  2. Try and make sure that you arrange the ice so there are only a few amounts of air pockets.
  3. Set up the equipment as shown in the picture: ***Make sure the thermometer bulb stays completely surrounded by ice. Do not let the thermometer bulb touch any part of the beaker!***
  4. Place a couple more ice chips on top so that the thermometer is completely surrounded by ice.
  5. Let the thermometer sit in the ice for one minute and then measure the temperature of the ice. Record this temperature in the first row of your data table (Time = 0)
  6. Plug in the hot plate and turn on the hot plate to the highest possible setting/temperature.
  7. **Timekeeper:** immediately start the stopwatch. Take the temperature every minute and record it in the data table.
  8. You will also need to write down your observation of what is happening. ***This is very important!*** For example: “All the ice has melted and is now water.”
  9. Continue this process until the water has been boiling for 7 to 8 minutes. This will take about 30 minutes.
  10. Since this process takes a while, make sure you divide up the work so everyone has something to do:
      + Partner 1: Temperature checker
      + Partner 2: Recorder - records the temperature and types in observations
      + Partner 3: Timer/Graph Maker
      + Partner 4: Begin #4 and #5 of the data analysis
  11. When finished, turn off the hot plate, unplug it and call Ms Lysne over to your station so that she can take the beaker off the hot plate for you.  **DO NOT ATTEMPT TO REMOVE THE BEAKER YOURSELF!!**

**Your Lab Station Should Look Like This:**



***Data Table/Results:***

|  |  |  |
| --- | --- | --- |
| **Time (minutes)** | **Temperature (ºC)** | **Observations** |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |
| 15 |  |  |
| 16 |  |  |
| 17 |  |  |
| 18 |  |  |
| 19 |  |  |
| 20 |  |  |
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| 22 |  |  |
| 23 |  |  |
| 24 |  |  |
| 25 |  |  |
| 26 |  |  |
| 27 |  |  |
| 28 |  |  |
| 29 |  |  |
| 30 |  |  |
| 31 |  |  |

* You will now need to create a temperature vs. time graph using a ruler, pencil and graph paper

***Data Analysis:***

1.  Looking at your results, at what temperature did water change its state?  (Hint: there are two different temperatures when this happened)

2. Looking at your graph, what happened to the temperature at the very beginning when the ice began to melt? (look at the overall trend, not at each specific change in temperature)

3. Looking at the graph, what happened to the temperature when the water is boiling?  (look at the overall trend, not at each specific change in temperature)

4.  Draw a picture of what the water molecules look like as a solid, liquid, and gas.

|  |  |  |
| --- | --- | --- |
| **Solid (ice)** | **Liquid** | **Gas (steam)** |
|  |  |  |

5. Draw a picture of what the molecules are doing before they melt and after

|  |  |
| --- | --- |
| **Molecules of water before melting** | **Molecules of Water after melting** |
|  |  |

Conclusion

Answer the hypothesis questions again now that you have completed the lab. Did conducting the lab change your thoughts about any part of the hypothesis?