***Water and Heat Lab***  Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Question: How does heat travel in water of different temperatures?

Variables:

Independent Variable :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Controlled Variables:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Procedure:

1. Measure 100 ML of ice cold water in the first beaker, 100 ML of room temperature water in a second beaker, and 100 ML of hot water in a third beaker.
2. Using a thermometer, measure the temperature of each cup of water and record the data in the “Temperature” table.
3. After taking the temperature, put *one drop* of food coloring in each cup. **It is important that you do not touch the cup or thermometer as it will change the experiment!**
4. Draw a picture of the initial movement of the food coloring when it entered the beaker. Put this picture in the first drawing box.
5. Continue to record the temperature of the three cups of water every five minutes and make a drawing of how the food coloring looks. Do this until twenty-five minutes are up.

Data: Temperature in ̊C (Quantitative Data) and Food Coloring Drawings (Qualitative Data)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Beginning | 5 minutes | 10 minutes | 15 minutes | 20 minutes | 25 minutes |
| Ice Cold  Water | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C |
| Room Temperature Water | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C |
| Very Warm Water | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C | \_\_\_\_\_ ̊C |

Conclusion Questions:

1. How long did it take for the food coloring to spread evenly throughout each of the cups of water?
2. Through which cup of water did the food coloring spread most quickly? Why do you think this happened?
3. Through which cup of water did the food coloring spread the most slowly? Why do you think this happened?
4. Which cup of water seemed to have the most energy? Explain your reason.
5. At which point did the temperature in each cup reach *equilibrium*, or stop changing? Why did this happen?
6. Where did the heat energy from the hot water go as the temperature dropped?
7. What happens to the temperature of the cold water that is below room temperature? Where does the heat energy come from that causes this change in temperature?
8. Write a conclusion that compares your results to your hypothesis (ie does your data

support or refute your hypothesis). Were there any errors that affected your results?

Would you make changes to the procedure if you were to repeat the lab? What did you

learn about how heat affects molecules?

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