**Moving Colors Lab**

Purpose/Question: **How does heat affect the motion of molecules?**

Background Information (prior to hypothesis): Room Temperature Demo

Observe two (2) drops of food coloring in room temperature water. Use any colored pencil to sketch what you see when the food coloring was initially dropped in the first box.

After 2 minutes, sketch what you see in the second box. After 5 minutes, sketch what you see in the third box.

|  |  |  |  |
| --- | --- | --- | --- |
| **Room Temperature Test** | Initial Drop | After 2 minutes | After 5 minutes |
|  |  |  |

Write any qualitative observations here: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Hypothesis***

(Hint; use If \_\_\_\_\_\_ then\_\_\_\_ statement.): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Procedure: In your group, one person will get 150 ml of hot water from the teacher and a different person will get 150 ml of cold water from the teacher. *BE CAREFUL RETURNING TO YOUR SEAT!*

**Cold Water Test**

1. Place the sheet of white computer paper on your table and then place the cups of water on top of it.
2. The teacher will place two drops of food coloring into the cup of cold water.
3. Draw what you initially see happen in the first box. **WHEN THE TEACHER TELLS YOU,** after 2 minutes, sketch what you see in the second box. **WHEN THE TEACHER TELLS YOU** after 5 minutes, sketch what you see in the third box.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cold Temperature Test** | Initial Drop | After 2 minutes | After 5 minutes | Qualitative Observations |
|  |  |  |  |

**Hot Water Test**

1. The teacher will place two drops of food coloring into the cup of hot water.
2. Draw what you initially see happen in the first box. **WHEN THE TEACHER TELLS YOU,** after 2 minutes, sketch what you see in the second box. **WHEN THE TEACHER TELLS YOU** after 5 minutes, sketch what you see in the third box.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hot Temperature Test** | Initial Drop | After 2 minutes | After 5 minutes | Qualitative Observations |
|  |  |  |  |

**Answer the following questions in your notebook.**

Data Analysis/Conclusion: Write the answers to each of the following questions on the bottom of this sheet.

1. Through which cup of water did the food coloring spread the fastest? Why?
2. Which one did it spread the slowest? Why?
3. Which cup seemed to have the most motion energy within the moleclues? Explain your reasoning.
4. Compare your data results to your hypothesis. Was your hypothesis supported or not supported? Why or why not?

Extension:

1. Equilibrium occurs when a system is in balance and no change is observed. Describe when you saw equilibrium occur during this lab.
2. Where did the heat energy come from that warmed the cold water?
3. Where did the heat energy from the hot water go as the water cooled (while it was sitting at your table)?

**Answer the following questions in your notebook.**

Data Analysis/Conclusion: Write the answers to each of the following questions on the bottom of this sheet.

1. Through which cup of water did the food coloring spread the fastest? Why?
2. Which one did it spread the slowest? Why?
3. Which cup seemed to have the most motion energy within the molecules? Explain your reasoning.
4. Compare your data results to your hypothesis. Was your hypothesis supported or not supported? Why or why not?

Extension:

1. Equilibrium occurs when a system is in balance and no change is observed. Describe when you saw equilibrium occur during this lab.
2. Where did the heat energy come from that warmed the cold water?
3. Where did the heat energy from the hot water go as the water cooled (while it was sitting at your table)?

**Answer the following questions in your notebook.**

Data Analysis/Conclusion: Write the answers to each of the following questions on the bottom of this sheet.

1. Through which cup of water did the food coloring spread the fastest? Why?
2. Which one did it spread the slowest? Why?
3. Which cup seemed to have the most motion energy within the molecules? Explain your reasoning.
4. Compare your data results to your hypothesis. Was your hypothesis supported or not supported? Why or why not?

Extension:

1. Equilibrium occurs when a system is in balance and no change is observed. Describe when you saw equilibrium occur during this lab.
2. Where did the heat energy come from that warmed the cold water?
3. Where did the heat energy from the hot water go as the water cooled (while it was sitting at your table)?