**“Testing the Viscosity of Common Liquids”**

**Quick Review:**

**Physical Properties: Density, Viscosity, Shape, Color, Smell, Texture….**

**Chemical Properties: Conductivity, Flammability, Reactivity….**

**Scientific Method: Constant** (stays the same during all experiments) **Control** (to compare results against) **Dependent Variable** (what you measure/your result) **Independent Variable** (what you are testing…the thing you change to get a result)

**Background**: The resistance to flow of a liquid is called viscosity. One example of the importance of a liquid’s viscosity is motor oil in a car engine. The viscosity of motor oil in your family car is very important because it keeps the engine lubricated. It must cling to the moving parts and not run off leaving the parts dry and unlubricated. If the engine is not properly lubricated, it will be damaged eventually. The motor oil must maintain its viscosity in all types of weather from extreme heat in the summer to freezing cold in the winter. The viscosity of a liquid can be determined by comparing the depth of the liquid in centimeters to the time it takes for a bead to travel that depth in seconds. You can use the formula : Speed = depth / time

**Materials**: sealed vials of:

 **Water** **Motor oil** stop watch hot water bath

 **Soap** **Vegetable oil**  ruler ice water bath

**Procedure**: DO NOT OPEN OR DROP THE VIALS!

1. Record the first substance in Table 1
2. Measure the depth of liquid in the vial in cm. The black cap should be at the bottom when you are measuring depth. Remember to measure from the bottom of the meniscus. Record results in your table.
3. Flip the vial upside down, so the cap is now at the top. Time the bead as it flows through the liquid with the stopwatch in seconds. Record results in your table.
4. Once you have measures the time at room temperature, place the vial in the hot water bath as you finish.
5. Calculate the speed of the bead. Record.
6. You should complete each of the 4 substances at room temperature first. You should then work through the 4 substances in the same order, this time after having them sit in the hot water.
7. Wait 2 minutes while all of the vials warm up in the hot water. Then repeat steps 3 thru 5 using the hot vials. Place the vials in the cold water bath as you finish.
8. Wait 2 minutes while all of the vials cool down in the cold water. Then repeat steps 3 thru 5 using the cold water bath.
9. When you have completed the lab, pour out the water in the beakers, place the vials in an empty beaker, put your goggles away, and find your way up front to complete the summary, concluding questions, and graph.

**Viscosity Lab Summary:**

1. Create a hypothesis.
2. Calculate the speed of each of the liquids, at ROOM temperature, HOT temperature, and then COLD temperature.
3. Answer the Concluding Questions.
4. Graph the speed data for each liquid, at each temperature (Bar graph). Include a title, and make sure both of your axis are labeled.

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

 **“Testing the Viscosity of Common Liquids”**

**Hypothesis:**Which liquid (soap, motor oil, water, vegetable oil) will have the greatest viscosity and why?

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**Data Table**:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Room Temperature**  | **Hot Water Bath** | **Cold Water Bath** |
| **Substance** | **Depth****of****Liquid** **(cm)** | **Time****(s)** | **Speed****cm/s** | **Depth****Of** **Liquid****(cm)** | **Time****(s)** | **Speed****cm/s** | **Depth****Of** **Liquid****(cm)** | **Time****(s)**  | **Speed****cm/s** |
| **Motor Oil** |  |  |  |  |  |  |  |  |  |
| **Soap** |  |  |  |  |  |  |  |  |  |
| **Water** |  |  |  |  |  |  |  |  |  |
| **Vegetable Oil** |  |  |  |  |  |  |  |  |  |

**GRAPHING:** Create a Bar Graph to represent the speed data for each liquid, at each temperature. Include a title, and make sure each axis is labeled. Make sure that you have labeled each of your bars on your graph. Your scale should be set up so that the graph covers the entire grid.



**Review Questions:**

1. What is a chemical property?
2. List 3 examples of chemical properties.
3. What is a physical property?
4. List 3 examples of physical properties.
5. Is viscosity a chemical or a physical property?

**Concluding Questions:**

1. In which liquid (and at which temperature) did the bead move the slowest?
2. In which liquid (and at which temperature) did the bead move fastest?
3. Did you prove your hypothesis? Explain why or why not.
4. What effect does temperature play in the viscosity of a liquid?
5. What happens to the particles of a substance when you heat it up?
6. What happens to the particles of a substance when you cool it down?
7. In this experiment, what were the constants? List at least 3 of them.
8. What was the independent variable?
9. What was the dependent variable?
10. Another property of matter is Density. Density=mass/volume. If an object has a mass of 10 grams and a volume of 2 mL, what is it’s density?