Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Viscosity Experiment #1 Date \_\_\_\_\_\_\_\_\_\_\_\_\_

Problem: Do different fluids have different flow rates?

Hypothesis: *Look at the types of fluids in the chart. In the space below write, in order, the name of the fluids that will have a high flow rate all the way to the one that will have a low flow rate and give reasons why you put them in this order.*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_

High Flow Rate Low Flow Rate

I think that \_\_\_\_\_\_\_\_\_\_\_\_\_\_ will have the highest flow rate because….

I think that \_\_\_\_\_\_\_\_\_\_\_\_\_ will have the lowest flow rate because…..

Materials:

* Ring Stand - Lemon Juice
* Plastic Funnel - Syrup
* Beaker - Water
* Timing Device - Olive Oil
* Paper Towel - Dish Soap
* Syringe

Procedure:

1. Ensure that the ring clamp is attached to the retort stand.
2. Place plastic funnel on top of ring.
3. Put beaker under the ring.
4. Move/adjust the funnel so it is just above the beaker.
5. Use the syringe to draw up \_\_\_\_\_mL of water.
6. Tightly cover the hole in the bottom of the funnel with your finger and push the water into the funnel.
7. Remove your finger and \*IMMEDIATELY\* start timing (in seconds)
8. Time how long it takes for the funnel to be emptied.
9. Repeat the trial with water and record all observations/data into the chart below.
10. In the chart, average out the results (add the two trials and then divide by 2) and record under average.
11. Wipe out/Clean the funnel and beaker.
12. Repeat steps #5-11 using the other fluids and RECORD results.
13. Calculate the flow rate using the formula: Volume (\_\_mL) ÷ Average time (sec)
14. Rank the fluids in this activity from highest (5) to lowest (1) for flow rate.
15. Rank the fluids from highest (5) to lowest (1) viscosity.

Observations:

Flow Rate and Viscosity Ranking

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fluid** | Volume (mL) | Trial #1 | Trial #2 | Average (s) | Flow Rate (Vol÷avg time)  Units=mL/s | Flow Rate Ranking (1=Low, 5=High) | Viscosity (1=Low, 5=High) |
| Water |  |  |  |  |  |  |  |
| Syrup |  |  |  |  |  |  |  |
| Lemon Juice |  |  |  |  |  |  |  |
| Olive Oil |  |  |  |  |  |  |  |
| Dish Soap |  |  |  |  |  |  |  |

Conclusions:

1. Write a conclusion statement. Briefly summarize your hypothesis (which had highest flow rate and which had lowest) and summarize your observations. State whether or not your hypothesis was correct.
2. Use the Particle Theory to explain why some fluids flow more slowly than others, and which some fluids flow faster than others. Use examples from your experiment to support your answer.
3. What is the relationship between flow rate and viscosity?
4. Explain the difference between soft drinks and milkshakes (talk about particles). Based on your observations, explain why a larger straw is used for milkshakes than for soft drinks?