

Discussion Questions

Q2
(general area)

It was discovered that the slowest liquid, according to the lowest flow rate, was corn syrup, flowing at 1.06 mL/s. Following, at 8.52 mL/s was Glycerin. Third slowest was Hand soap, flowing at 9.19 mL/s, then table syrup at 10.71 mL/s, followed by oil at 27 mL/s, then Isopropanol being the second fastest at 75.75 mL/s. The last and fastest flow rate was water, flowing at 84.03 mL/s. These flow rates were calculated by using the formula $mL \div s$ (millilitres \div seconds).

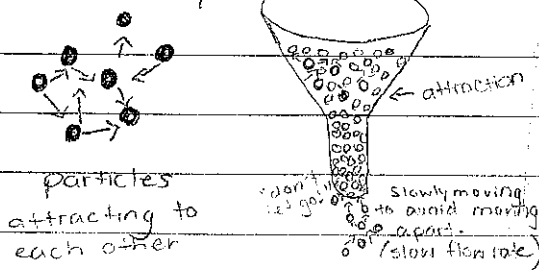
Q3
(general area)

Comparing these flow rates to the class average, one can see there is a drastic difference between the two. For example, the flow rate for water was 84.03 mL/s, the class average was 79.30 mL/s. There is a difference of 4.73 mL/s between the two. For hand soap, the flow rate was 9.19 mL/s, the class average was 2.2 mL/s, a difference of 17.01 mL/s. Many reasons can contribute to the difference, one is the lack of 100% accurate timing, people are unable to stop at the exact right time due to hesitation, starting at the wrong time, or not knowing exactly when to end. Another contribution was the funnel size, some were bigger than others. Also, in fluids such as hand soap, the contents weren't mixed evenly, resulting in different viscosities throughout the bottle, giving off a different flow rate each time. The viscosity change throughout the hand soap changed the flow rate due to the inconsistent flow of particles pushing through the funnel.

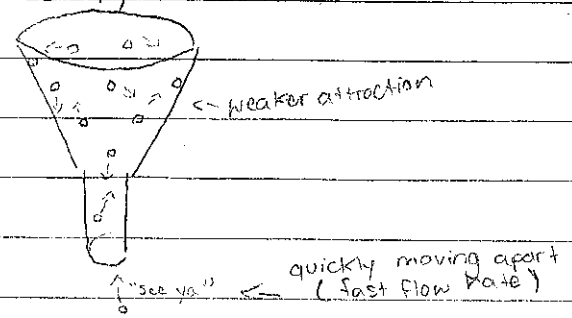
Q7
(general area)

With a thicker viscosity, more particles are in a space, making them pack tighter together. When particles are tighter together, they have more attracting force between them, making them move slower. Particles moving slower means a slower flow rate.

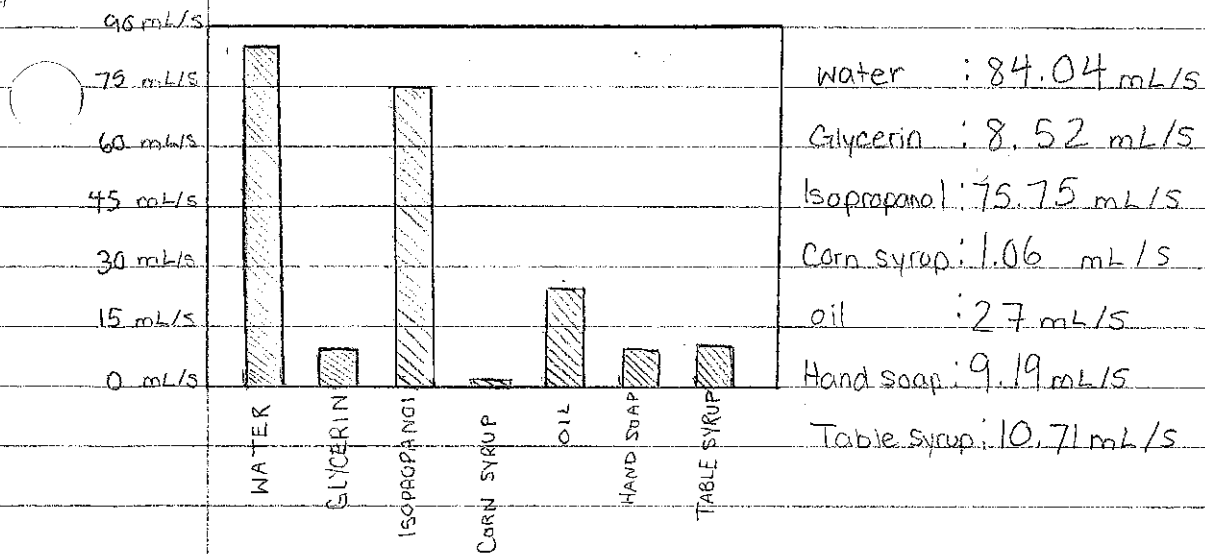
Thick viscosity (corn syrup)



Thin viscosity (water)



Flow Rate Chart



Based off of flow rate results, one can predict that maple syrup would be approximately third on the list, as it is thinner than hand soap, but thicker in viscosity than Isopropanol. Ketchup would most likely be the thickest with the slowest flow rate due to the very thick viscosity. If corn syrup and ketchup were both poured on a table, the ketchup would barely move, but after time, the corn syrup would start to spread. Honey would probably be placed about evenly with corn syrup, due to the fact that corn syrup can be found in processed honey, and they both have the same sugar content, making them both about equal in viscosity, and placing them both in 1st for slowest flow rate. Other fluids with about the same viscosity are fruit smoothies, pudding, soft serve ice cream, and milkshakes. These fluids are so thick that for drinks require a thicker or a straws to drink. Milkshakes for example are served with a thicker straw, sometimes even a cardboard type straw. This is because it increases the flow rate of a fluid when the funnel (or straw) is bigger. Such as the hand soap, which flowed faster in the bigger funnel. The milkshake is then easier to drink, as the flow rate is increased.

Abbey

$$100 \div .97 = 103$$

①	A	water	103 mL/s	
	B	Glycerin	4.9 mL/s	$100 \div 22.32 = 4.9$
	C	Isopropanol	109.2 mL/s	$100 \div 96 = 104.1$
	D	Corn syrup	1.06 mL/s	$100 \div 94 = 1.06$
	E	Oil	27 mL/s	$100 \div 3.75 = 27$
	F	Hand soap	1.6 mL/s	$100 \div 62 = 1.6$
	G	Syrup	5.3 mL/s	$100 \div 18.79 = 5.3$

- ② 1 Corn syrup = 94 seconds
- 2 Hand soap = 62 sec
- 3 Glycerin = 20.32 sec
- 4 Syrup = 18.79 sec
- 5 Oil = 3.75 sec
- 6 Water = 0.97 sec
- 7 Isopropanol = 0.96 sec

③ The flow rate was calculated at 4.9 mL/s for the Glycerin. Although the class average was 5.11 mL/s or 11.9 mL/s. This drastic difference occurs because the funnels are different sizes. The average with the faster flow rate (11.9 mL/s) has a larger funnel/hole which makes it easier for the Glycerin. The slower flow rate had a smaller funnel which has more resistance. The calculated water flow rate is 103 mL/s but the class average is 99 mL/s this was due to error of the timing.

⑤ It is predicted that ketchup would be the slowest with the highest viscosity. It is predicted that honey will be in between 3 (Glycerin) and 4 (syrup) since honey is thicker or has a high viscosity than Syrup.