

Team Second Report

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Flow Visualization 4151-4200-001

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The video used for this assignment depicts the phenomena of surface tension and viscosity. Using ferrofluid and two glass planes, interesting patterns were able to be created. Although the ferrofluid was not particularly necessary for the experiment, since no magnets were used, its dark color helped create a strong contrast to easily visualize what was happening. This visually appealing effect was created by placing a glass plane down, pouring a small amount of ferrofluid on it, then placing a second glass plane down on top of that. Separating the glass planes from one side, creating an uneven gap, resulted in a repeatable and appealing pattern. The pattern created was for the most part repeatable as long as the glass was removed in the same way. For example, you can lift the top glass plane straight up, starting from one side, from a corner, etc.



*Figure 1: Ferrofluid at max separation of glass plane*

In the video, the effects from surface tension and viscosity were easily observable as the two glass planes were separated. The ferrofluid starts as a glob in between the two glass planes. When the top glass plane is lifted, the glob begins to shape into its branched pattern as seen. Magnets were introduced into the system to see if the magnetic field would change how that pattern would look. However, the magnets had little to no effect over the end result. This is likely due to the small amount of ferrofluid being used and the separation distance of the glass planes being too small to see any dramatic effect. In the end, the ferrofluid's naturally dark color helped in the capture of this interesting result.

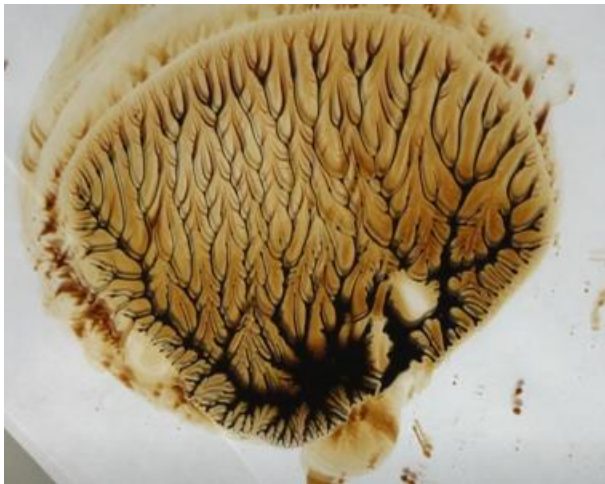
The video was taken on an iPhone 7 camera at 4k with 30 frames per second. It was edited using iMovie and Shotcut. The video has a yellow tint on it and the ferrofluid has a almost black/purple glow for a pop-like aesthetic. The video depicts the phenomena in both real speed and in slow motion for a more dramatic effect.



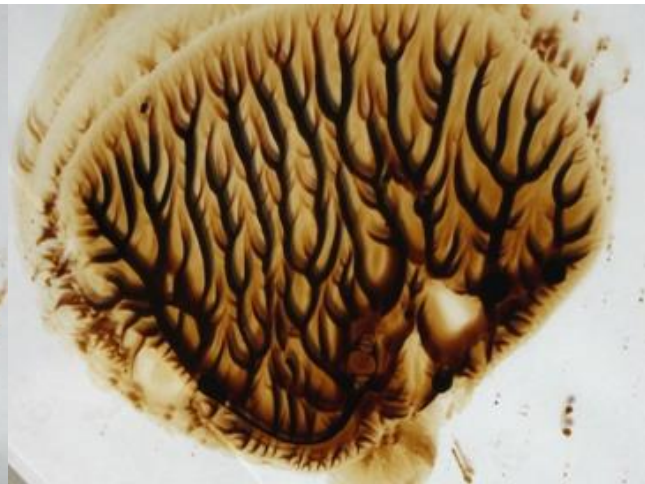
*Figure 2: Ferrofluid between glass with no separation*



*Figure 3: Beginning to separate glass*



*Figure 4: Full effect seen*



*Figure 5: max separation of glass, line in pattern become thicker*

Although the full potential of ferrofluid wasn't utilized in this experiment, this result gave me a lot of insight on how surface tension and viscosity affect a liquid's behavior. My team helped capture this interesting phenomenon when we noticed while trying to perform a different experiment. This is a simple setup that can be easily repeated for anyone else who is interested in trying it for themselves.

Source:

Elert, Glenn. "Viscosity." *Viscosity – The Physics Hypertextbook*. N.p., n.d. Web. 01 May 2018.

Libretexts. "Surface Tension." *Chemistry LibreTexts*. Libretexts, 22 Nov. 2017. Web. 01 May 2018.

"Surface Tension." *Centripetal Force*. N.p., n.d. Web. 1 May 2018.