

Taylor Powers

Flow Visualization

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February 11, 2014

Get Wet Report

As the first project of Flow Visualization, Get Wet allowed me to experiment with materials of my choosing and get to know camera features. I chose to do an experiment that I had done as a child, but to make a few alterations and measure their affects. I wanted to create a visually appealing image where I could also see the interactions of varying molecules mixing, or not mixing.

I began with getting a wide shallow bowl and filled it three quarters with whole milk. I then added food coloring, 3 drops of each color in separate zones of the bowl, making a square with their contact point. Immediately afterwards I squeezed a small amount of dish soap into the milk in a circular motion, as if to make a circle with the soap. This alone created an intense flow as the milk and dye reacted to the soap. Because soap is bipolar, in that it is polar on one end and nonpolar on the other, it weakens the chemical bonds that hold together the fats and proteins in the milk. The polar end of the soap separates the fats, as the nonpolar end attaches to the fat. The food coloring just allows you to see this process occur, and also adds to the visual beauty of the phenomenon.

At this stage of the experiment I decided to add a couple more reactants. I dropped a couple splashes of olive oil into the bowl, which created color pockets that prohibited mixing. Even after the soap, milk, and dye has evenly mixed to create

a brownish green, there were still pockets of oil color left. I also added about a teaspoon of salt after I added the oil. As the salt dissolved, the colors separated creating jagged edges, which then dispersed back to smooth edges after a few seconds. All of the components of this project had a function that was made visible by the color. To light the area for the image, I placed the bowl directly below and between two hanging lights so that there would be no glare from either but still light to capture.

I used a Kodak DSLR, with a somewhat large depth of field as the lens was only about a foot away from the bowl. I had the shutter speed at the fastest, which was 480, as the flow was moving and I wanted a clear image. I set the aperture to 5.6 and the ISO at 400. In Photoshop I only adjusted the contrast and the unsharp mask to enhance the edges and shadows.

I really enjoyed the result of my image. I took about 120 images and it was very difficult to choose an image, they were all so different and showed varying aspects of the reaction. I chose the image I did because it clearly showed not only the flow of the milk and soap and the separating of molecules, but it also captured a few of the oil pockets of color which I thought was one of the neatest aspects of my experimentation, mainly because I was not expecting it. I thought that the fluid physics were clearly shown and very interesting to watch. To further this experiment for maximum results, first off I would consider filming the entire process to capture all reactions and to see the flow actually happening; it was stunning. As far as components adding to the reaction, I would want to change up the shape of the bowl used to see how that affects the flow and also try using a

different base ingredient, like watered down ranch dressing or something of a thicker consistency to see how the soap would maneuver around it.