

Group Third
Meg Ivy
ARTF 5200

Injecting Oil into Water

Team Three: Audrey Viland, Sam Brown, Dawood Ahmad, Faisal Alsmail
November 29, 2019



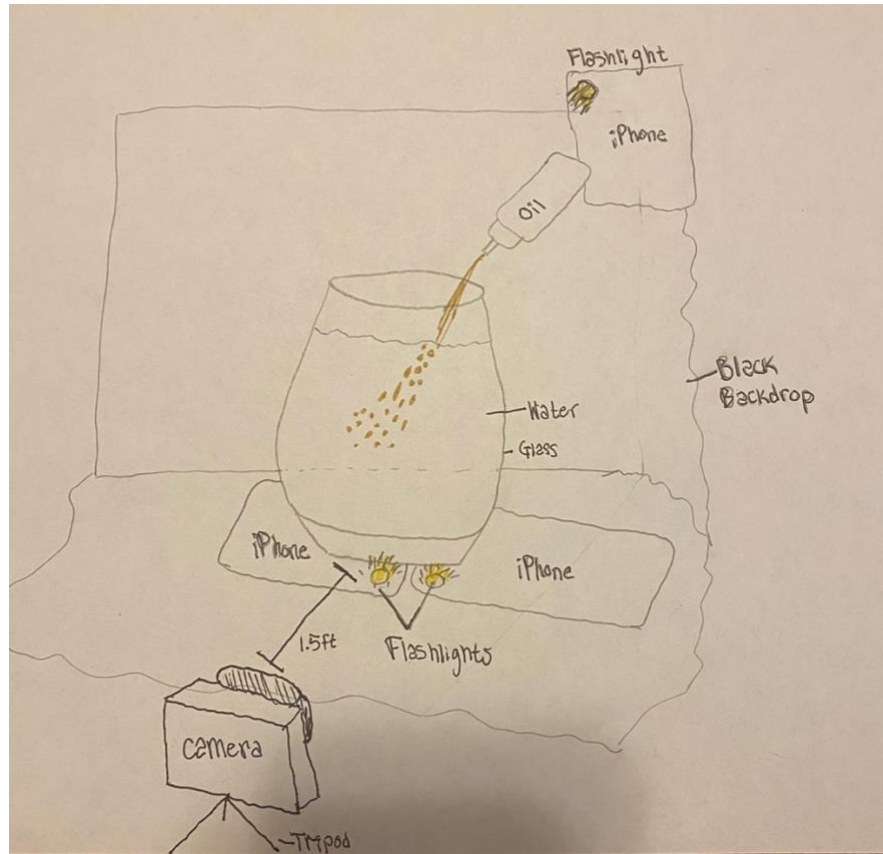
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Introduction

This image is the third group photo. The purpose of this image is to photograph a fluid flow phenomenon, but in an artistic manner that creates an appealing image. The intent was to use a simple flow phenomenon, like injecting oil into water, and focus on the artistic aspects of an image. The phenomenon we intended to capture was a fluid jet in a fluid of opposing polarity.

Flow Apparatus



To create the flow captured, we started by putting tap water into a glass. Next, we injected vegetable oil into the vessel using a bottle with a thin nozzle. The thin nozzle allowed for a higher-pressure system that would create a stronger, more direct jet of oil into the water. There was a stronger jet because the smaller nozzle increases pressure, which will increase the velocity of the oil leaving the nozzle. When the oil is injected into the water, the fluids do not mix because oil is non-polar, and oil is polar as a result of intermolecular forces. What this means is that oil equally distributes electrons as a result of its long hydrocarbon chains. In contrast, water has an unequal distribution of electrons because of the partial negative charge from the very electronegative oxygen atom and the partial positive charge from the lack of electrons in the two hydrogen atoms. As a result, the contrast in polarity between water and oil makes the fluids immiscible with each other. In addition, oil is less dense than water, so when it is injected, buoyancy force pushes the oil bubbles to the surface of the water. In addition, the

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bubbles were more visible because the light from the flashlights above and below the apparatus reflected off the edges of the oil bubbles.

Visualization Technique

The oil we used for our setup was household vegetable oil. The water was basic tap water. When the water was poured in the glass, lots of small air bubbles formed along the edge of the glass. Since the bubbles would cause distraction and block the view of the oil injection, they were wiped from the glass before the oil was injected. A black felt backdrop was used to create a uniform background without distractions. The lighting used for our setup was two iPhone flashlights placed directly below the glass and one iPhone flashlight aimed at the apparatus placed directly behind the bottle injecting the oil. The photo was taken in a classroom with ceiling lights turned off and light from the windows blocked. This was done to prevent glare on the glass that would contaminate the image. A tripod was also used to prevent any movement of the camera that could cause motion blur in the image.

The camera used to capture the image was a Sony ILCE-7RMII with an FE 16-35mm F4 ZA OSS wide-angle lens. The focal length of the image was 24mm, the aperture was f/4, shutter speed was 1/4000 sec, and ISO 102400. The shutter speed was very fast so that motion blur was avoided. However, with such a short exposure time, a very wide aperture and high ISO were needed to have enough light in the image. The depth of field was about 1.5ft and the field of view was about 1ft x 0.5ft.

The original image was 7952 x 5304 pixels. After processing the image was 4249 x 4431 pixels. The largest adjustment to the photo was converting the image to black and white in photoshop. In addition, the contrast was increased, and the glass and surface liquids were erased from the image using a black brush tool. A few of the more prominent bubbles were selected and their highlights, contrast, and exposure were increased.

Conclusion

In conclusion, I feel that I accomplished my goal of a more artistic-based photo instead of the past group photos which were more science-based. I like how clean my photo is, but I wish there was more light used in the photo, such as a flash. Therefore, if I could reproduce this image I would use a flash and more light.