UNIVERSITY OF COLORADO BOULDER

GET WET REPORT

MCEN 5151-001

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9/22/2018

This purpose of this report is to provide a thorough explanation of the first assignment (Get Wet). The intent of this experiment is to observe the behavior of a solvent (soap) on non-mixing fluids (oil and water). Oil and water will never mix as they are not compactible. Water molecules repel oil molecules and vice versa. Introducing a solvent will act as a middle molecule which will connect water and oil molecules. The purpose of this experiment is to evaluate a regular house soap effect on oil and water.

Oil and water do not mix due to the fact that water molecules are more attracted to each other than to oil molecules. Water molecules are considered polar while oil molecules are non-polar. The addition of a solvent "Soap" provides molecules which has the feature of being attracted to both water and oil. The solvent molecule will be attached to water molecule at one end and to oil molecule at the other end creating a water and oil mixture. The solvent molecules are polar in one side (which connects to a water molecule) and non-polar on the other side (which connects to an oil molecule).

In this project, I filled half a glass with water and added 10 mL of olive oil in top. Then, I waited for 15 min for the segregation of oil and water to fully happen. After that, I added 5 mL of regular hand soap to the right side of the glass which allowed the oil and water to mix. In the picture I took, we can see that at the right side the oil is no longer visible which indicates that it mixed with water. The skitch below demonstrate the idea I was trying to achieve. In the skitch, we can see the initial stage where oil is in top of water (glass on the left). After the addition of soap, the oil molecules are emulsified in the water are no longer visible (glass on right).

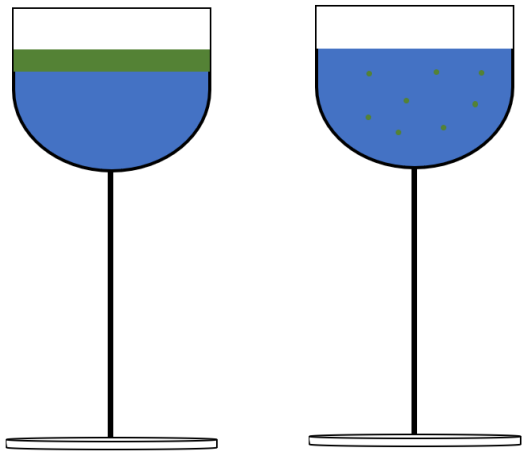

Figure 1: Water (blue), Olive Oil (Green)

For this experiment, no dye was needed as water and oil are easily distinguished. Also, flash on camera was not used as reflections on the glass was an issue. Instead, a desk lamp was used to provide extra lighting for this experiment.

To take the picture, I used a NIKON D7100 digital camera. The focal length was 38 mm on the camera and it took the image in 4800 pixels width and 2696 pixels height. the camera was set 20 cm away from the object. This picture was taken using the following specs: Exposure time: 1/100 sec, ISO speed: 1250, Aperture: 4.2.

Below are the images of this experiment.

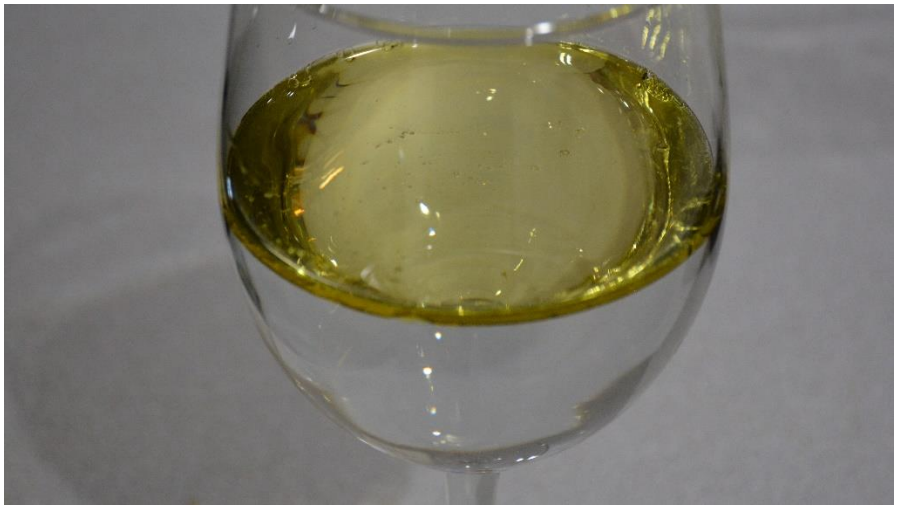

Figure 2: Water & Oil Before Soap Addition

Figure 3: Water & Oil After Soap Addition

Windows Photo application was used to crop the images and enhance the colors. Below are the images after manipulations.

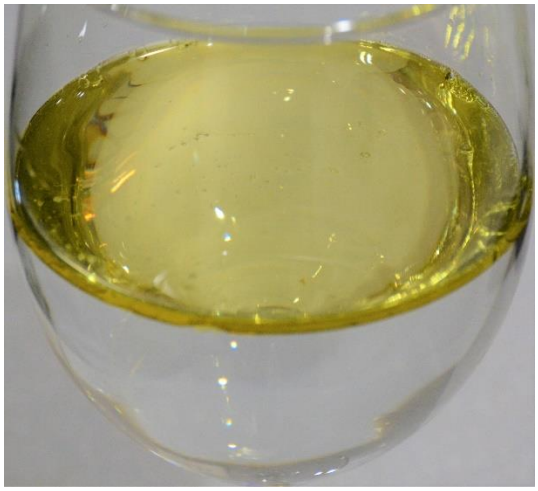

Figure 4:Water & Oil before Soap Addition V.2

Figure 5: Water & Oil After Soap Addition V.2

The images reveal how soap work to clean our hands where it able water and oil to mix. In the pictures above, it is clearly shown that the physics has been proven and applied.