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Image-Video Report 4
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Image-Video 4 Report: Soap Bubble

This image was taken to explore the properties of bubbles as well as highlighting the natural beauty bubbles have. With this experiment and image, I want to investigate how bubbles are formed and what fluid properties are utilized to maintain its shape and form. Artistically, I want to accentuate the colorful pallet a bubble displays when light is reflected onto it.

For my experiment, I used a bowl and dish soap. I wetted the bowl with water and dish soap that way the bubbles wouldn't pop when it makes contact with the bowl. I also had the assistance of my sister in which she would form the bubbles using her hand and making an 'O' shape with her thumb and index finger. She would wet her hand with the soap water and form the ring and then blow into it to form bubbles before carefully placing it into the bowl. Having my sister's assistance made the image taking more efficient. When creating the bubble individually, I found that the bubbles would pop before I had the chance to capture it but with the additional help, I was able to capture the bubble as soon as it settled into the bowl.

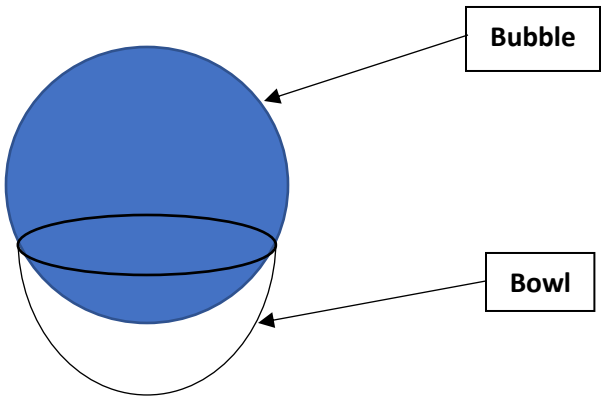

Figure 1: Illustration of the experiment apparatus. Includes the bowl and bubble. Displays the position of the bubble in the bowl.

In this experiment, the main question to be answered is, "how are bubbles formed with soap?" This phenomenon can be answered by investigating the fluid properties of the mixture between water and soap. More specifically, a soap bubble can be described as a spherical layer of soap film that encapsulates air or gas. When a soap bubble is formed, it consists of two layers

of soap molecules with a thin layer of water trapped in between. The soap molecules have a hydrophilic end, meaning that end is attracted to water while the other end is hydrophobic which is described as the opposite. The hydrophobic end of the soap molecules tries to avoid water. As a soap bubble is formed, the hydrophobic end of the soap molecules crowd to the surface and stick out away from the water molecules trapped in between the two soap layers. Due to this, the water molecules separate creating more distance from each other. This decrease in surface tension is ultimately what allows bubbles to form. Another question that may be considered is, "why bubbles are always spherical in shape?" The spherical shape minimized the energy of the soap film. Naturally, a sphere provides the minimal surface area needed to enclose a volume of gas. This also explains why even when bubbles are formed using other geometries, they always end up as spheres. In the image, rainbow-like colors can be observed on the top of the bubble. These colors are created when light waves are reflected from opposite sides of the bubble wall. The different wavelengths of light interfere with each other causing some wavelengths to neutralize each other while others are reinforced. This combination of wavelength interference is what creates the visual colors that bubbles display.

To visualize the phenomena described above, medians of water and dish soap were used. The water used was simply tap water from a kitchen faucet and the dish soap used was generic. The experiment was performed in a controlled environment which more specifically, was my kitchen. The kitchen environment eliminated the possibility of external interference such as wind. Since the experiment was performed during mid-day, natural lighting was sufficient in lighting the subject. The natural light provided from the kitchen windows proved to be adequate.

The image was captured using a Nikon D810 DSLR camera. The lens of choice used was a 50mm f/1.4 prime lens. This lens allows for a shorter focal length while also providing a shallow depth of field. The camera was handheld and the image was taken approximately two feet from the subject. Since the natural light that was used was very bright and strong during the time the image was taken, the need for a tripod to stabilize the camera due to low shutter speeds wasn't necessary. The image was taken with a 1/1250 second shutter speed, An aperture of f/1.4, and an ISO of 200. These settings allowed the image result to be sharp with a shallow depth of field. Additionally, proper exposure of the image was achieved without the need of post-production.

Original Image

Edited Image

For post-production, Adobe Lightroom was used to edit the image. In post-production, the image was cropped to a pixel size of 4784 x 6086. The cropping was done with the intentions of centering the subject more. The contrast of the image was also adjusted to separate the highlights and shadows more and create more depth in the image. The adjustments to the contrast highlight the details in the bubble more and allow the colors on the bubble to stand out more when compared to the dark background. Finally, the color saturation and vibrancy were increased to allow the colors to stick out more. This change give the image more personality and makes the image more interesting.

To me, this image highlights the detail and beauty within a seemingly normal and mundane phenomenon. This simple experiment is one that can be recreated without intention and is seen in everday activities such as washing dishing. Most people tend to overlook bubbles due to it's normalcy and common occurance. However, with this image, the beauty of a bubble can be admired and praised. With this image, I enjoy the amount of detail that was captured in such an ordinary subject. The details in color and highlights were displayed perfectly. On the other hand, I do believe the soap at the base of the bowl were too blown-out and distract from

the main subject. In the future, it should be considered to either clean up the excess soap or lessen its brightness in post-production. Also in future iterations, it may also be interesting to create bubbles with various soaps and explore the differences between each of them. Despite these recommendations for the future, I believe the image was perfect in executing my intentions.

References:

[1] Pepling, Rachel. “SOAP BUBBLES” April 2003.
https://pubsapp.acs.org/cen/whatstuff/stuff/8117sci3.html#:~:text=The%20hydrophobic%20ends%20of%20the,tension%2C%20enabling%20bubbles%20to%20form.

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