Tony Vo
Group 3 Project
5/3/10

INTRO

After accidently turning a shampoo bottle over, I noticed that the bubbles rising due to buoyancy have different shapes. The main thing I noticed was that the smaller bubbles were generally spherical; and the larger bubbles were tear shaped. So for this project my intent was to capture this phenomenon by experimenting with several different sized bubbles rising within soap.

EXPERIMENTAL SETUP

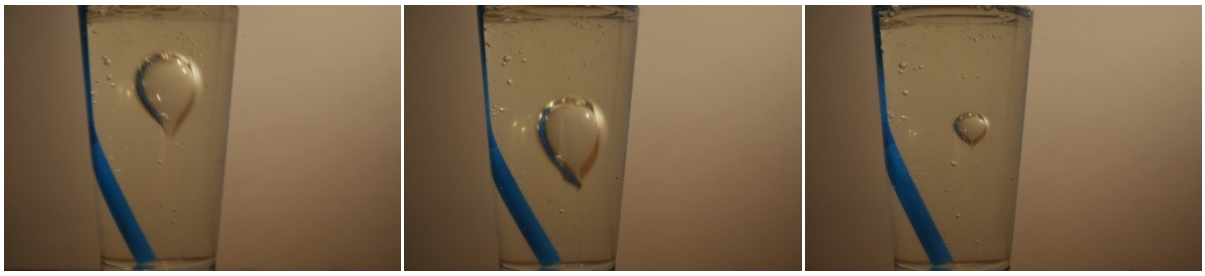
For this setup a tall glass was used. This glass was filled shampoo. Then, a straw was routed to the bottom in which I could bow air into, thus forming the bubbles. The glass is about 3 inches in diameter in the photo.

PHOTOGRAPHY

The camera was about 6 inches away from the glass. There was a 90W lighting source about 1 foot to the left of the glass. The camera was manually focused and the focus was not changed during the shoot. A series of 3 photos were used, all featuring different sized bubbles. Due to the fixed focus the larger bubbles began to lose focus.

These three images were then stitched together via Photoshop with the smaller bubbles to the left and the larger bubbles to the right. Unfortunately this caused some confusion, mainly giving the impression that this was a time sequential picture of the same bubble. But that is not the case; these are three separate pictures of three different sized bubbles. In addition to the composition of the three pictures the contrast was increased along with the brightness. The tones were also adjusted to try and bring out the white background for clarity.

The specific data for the photo are as follows. Nikon D60 camera, f-stop of f/5.3, shutter speed of 1/30, with a ISO of 200, a focal length of 42mm, and no flash. The before and after pictures can be seen below:



Raw pictures

After processing

FLOW DYNAMICS

As you can see there are some smaller bubbles suspended within the soap. Some of these look to be very spherical, while the larger the bubbles are from the straws the more tear drop the shape they take on. I think this is because the smaller the bubble the less buoyancy it has, resulting in a more static or balanced distribution of the forces acting upon it, thus giving a spherical bubble. And the larger bubbles have a larger buoyancy force, thus the force of the bubble on the soap is higher at the top, thus flattening that interface out. This leaves smaller forces at the bottom allowing the fluid to “close in” on the bottom of the bubble forming the shape.

REFERENCES

http://people.rit.edu/andpph/exhibit-bubbles.html