

## Group Photo 2

While this is a group project, scheduling conflicts did not allow me to meet with my team members and was therefore a solo endeavor. For this project, I explored an interesting phenomenon that I found while surfing YouTube. This “trick” is typically performed with the butt of a cigarette, its box, and the box’s plastic wrapper. The basic idea is to light something flammable and insert it into a loose hole of an enclosed space. The denser smoke falls to the bottom through the lit material while air exits through the hole around the material.

To create a more visually interesting image, a clear 32 oz beer bottle replaced the cigarette box and wrapper. Secondly, instead of using a cigarette, a rolled up piece of plain white paper was used. When the paper was lit, about half of it was consumed before smoke began to flow to the bottom of the bottle. The flow was not consistently laminar and often created large puffs or rings. The smoke flowed downwards at approximately .1 m/s. With a bottle diameter of approximately 10 cm, and using air’s kinematic viscosity of  $15.68 \times 10^{-6} \text{ m}^2/\text{s}$ , the Reynolds number is calculated to be 638. This low Reynolds number coincides with the mostly laminar flow of the smoke.

Obviously for this image, smoke was the utilized visualization technique. It was created by the burning of plain white paper. To observe the smoke as best as possible, a plain black background was used in conjunction with a clear glass bottle. However, even then it was difficult to clearly capture the smoke. Lighting was provided by overhead fluorescent lights and an incandescent lamp that was directed on the bottle from the left side.

To capture this image effectively, it was imperative to get as close as possible to the subject and make use of all available light. The photograph was taken with a Sony Alpha 100 DSLR using a 50mm prime lens. The prime lens was crucial because of its ability to create a F3.5 aperture. The shutter speed was set to 1/50 of a second and the ISO was set to 400. This allowed a crisp exposure without creating a lot of visual noise. The original image was 2592 x 3872 pixels but was cropped to 2285 x 3368 pixels to direct the focus of the audience to the flow. Due to the direct lighting used, and the less than optical quality of the glass bottle, there were quite a few undesirable reflections and imperfections in the image. Therefore, a lot of work was done in Adobe Photoshop to clean up the image.

I really liked this image because it is almost counter-intuitive: smoke almost never travels downwards. Not only did the smoke travel downwards, it managed to stay in a laminar stream which I thought was very cool. I decided to make this photograph a black and white because the image lacked many colors and was composed mostly of black, grey, and orange. Turning the image black and white also helped the smoke stand out from its surroundings and making the overall image more dramatic. Light levels were also modified to darken the glass and allow its edges to blend in to the black background. I thought it gave the image a more mysterious look and made the bottle harder to clearly identify.