Get Wet Report

Fall 2019

MCEN 4151-001: Flow Visualization

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I. Introduction:

This is a report for our first assignment for the Flow Visualization course. We were asked to create a decent picture or video using photography skills and editing software to demonstrate a phenomenal related to fluids. So, for this task, I was excited to try capturing the unpredicted flow of flames that is resulted from a fuel undergoing combustion. To accomplish my goal, with the help of my friends, I used papers soaked in torch fuel which is 99% mineral oil as my burning substance and started talking different picture from different angles for the burning piece of paper. Note: mineral oil can be defined as "a clear, odorless liquid and a common ingredient in a variety of cosmetics and personal care products. Mineral oil is made from highly refined, purified and processed petroleum".[2]

II. Experiment Set Up & Camera Settings

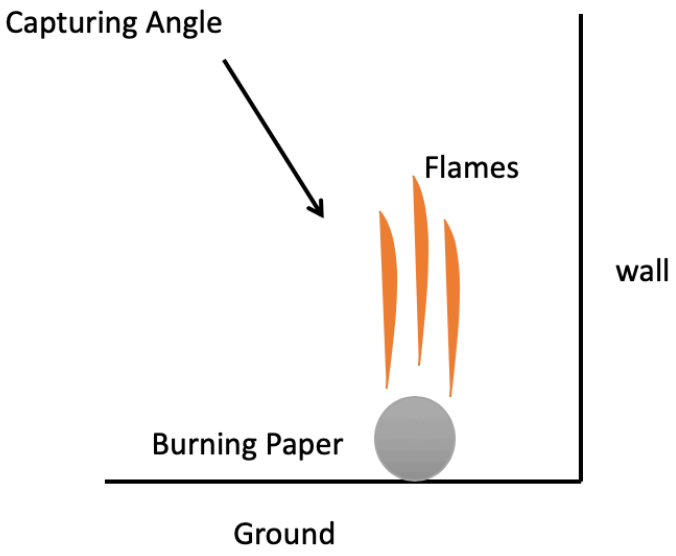

Figure 1. Diagram of the experiment set up

I perfumed my experiment around midnight to create the best scenario for creating flames which ensured that the only light source is the burning paper. The photo was taken with a Canon PowerShot SX530 HS. To capture a clear flow of flames, I used 1/250 speed shutter and f/5 for aperture. As for the focus and ISO, I was not sure about them, so I set them on auto. Also, the distance from the flames was about 6 to 9 inches.

III. Flow Physics

Flames are the heat and light generated from combustion. Combustion can be defined as the chemical reaction that happens between a fuel and an oxidant with the present of sufficient heat. In my experiment, I used a piece of paper as my fuel, and I soaked it with torch fuel to obtain more flames. As I mentioned above in the introduction, the flow of flames is hard to predict. So, I honestly was not aiming for the heart shaped flames, but somehow, I got it. I think it is hard to explain how exactly the flames flowed like a heart. In my opinion, I think due to a gentle wind flowing from the right (notice the different pattern on the right side of the heart), the tip of the flame circled around itself creating a heart with a hole in the middle of it.

IV. Photo Editing

My picture dimensions are 4608×3456 pixels. Originally, the flames' color is orange, and the reflected light from the background is a little dim. So, I changed the color balance using Photoshop software where I changed the flames color to be bluer and more purple as indicated in Fig. 2. I also increased the contrast slightly to show the edges of the flames clearly.

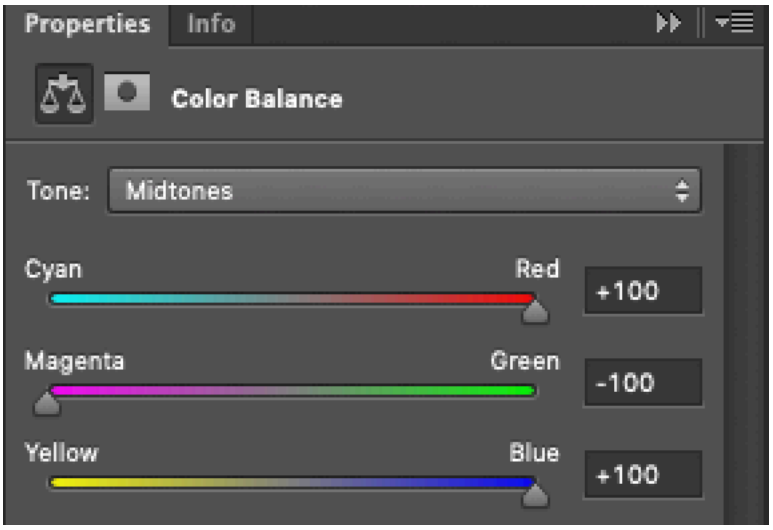

Figure 2. The editing done on the color balance.

Figure 3. Photo before editing.

V. Conclusion

This task was my first time using a professional camera. In this task, I successfully captured a great flow of flames that showed a heart with a hole in the middle. I love how the change in color balance gave the picture a warm mood. In my next flame picture, I hope to develop a way to control the flames flow and create any shape intentionally using flames.

VI. References

1- Kondratiev, V. N. (n.d.). Combustion. Retrieved from https://www.britannica.com/science/combustion.

2- Mineral Oil. (2019, July 16). Retrieved from https://www.chemicalsafetyfacts.org/mineral-oil/.

3- Material Safety Data Sheet for the torch oil: https://www.tikibrand.com/blog/wp-content/uploads/2016/03/SDS-TIKI-Bitefighter-Citronella-and-Cedar-Torch-Fuel-Rev-02.pdf