Abby Rinerson
Team First
ATLS 4151-001
10/13/19
Assisted by Lucas Garcia, Nick Scott, Brooke Shade and Brian Gomez

For the first team assignment, my group decided to attempt making “rainbow flames” by lighting different chemical powders aflame. We wanted to capture different colored flames as opposed to your typical fire flame. Unfortunately, the materials we gathered did not have the intended effect. We got the materials from King Soopers and they included 20 Mule Team Borax, Nature’s Way Calcium Mag & D, Nature’s Way Potassium, table salt (I’m not sure of this brand) and Kroger’s Isopropyl Alcohol. We were looking for powders that contained calcium carbonate and potassium chloride. Unfortunately, King Soopers did not have the exact materials we were looking for and these materials did not burn as we had hoped. The table salt was the only material that changed the color of the flame as expected. My whole group took turns placing powders in the 10 x 8 inch baking tin we provided and then lighting them on fire. We then stood around the burning subject and took pictures.

We conducted this experiment in the fume hood in the basement of the ITLL lab. We placed the baking tin inside the hood and then rotated placing each material inside and lighting it on fire. After we found that most of our purchased materials did not burn as we had hoped, we found some hand sanitizer and alcohol wipes to burn. The hand sanitizer burned a nice blue color that was more visually appealing than the other materials we provided. The alcohol wipes also allowed for some better pictures. The flame’s flow for the hand sanitizer remained fairly close to the surface, however the flow had a bit more reach for the other materials, such as the alcohol wipes. The alcohol wipe in my image was approximately 3 x 5 inches and naturally rolled in on itself. The flow was created as the alcohol wipe burned on its own. As time went on the flame slowly decreased in intensity. The flow of this burning wipe was relatively low and thus created a fairly smooth, laminar flow as opposed to a turbulent flow that would be created by a high gas flow (Williams). The shutter speed was quick and the flame’s flow was moving quickly for the duration of the burning wipe.

The visualization technique used was the flame created from materials being lit on fire. The lighting in most of the images was emitted solely from the flames created. We turned the lights in the room off so that the flame was the focus. In some pictures we tested putting a phone light under a water bottle which created some soft lighting, tinted the color of the bottle.

For my image, I used a small field of view because I really wanted to focus on the actual flames and the burning object. I was a few feet away from the burning alcohol wipe and I was zoomed in a good amount with a focal length of 97. I used my Canon EF-S18 to get an original image of 6,000 x 4,000 pixels. My final image is 5,710 x 3,807 pixels. My aperture was 5.6,

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shutter speed was 1/1000 and ISO was 6,400. I edited my image in Lightroom and simply adjusted the highlights and shadows to better see the flow of the main flame. I lowered the highlights so the flame's flow was more visible to the human eye. I made the decision to use these settings because I thought it would create the best image that best represents the flow of a flame.

Original Image:

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Final Image:

The image reveals what a flame's flow looks like as it burns an alcohol wipe. I like the crispness of the image and the clarity in the actual flame. I also like how you can see the alcohol wipe burning as well as its previously burned areas. I wish I had a more neutral background that was less distracting the main focus of the image. I believe the fluid physics of the flame are represented quite well visually. I did not fulfill my original intent of providing a rainbow flames image, however I am satisfied with the overall result. I think this idea could be further developed by successfully creating rainbow flames by gathering the correct materials to be burned.

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## Citations

Williams, A. “FLAMES.” *THERMOPEDIA*, www.thermopedia.com/content/766/.