

# Group Second Image Report

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Film 4200  
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15 May 2014



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## INTRODUCTION:

This image was inspired by opposites and irony; the purpose of this project was to represent two drastically different fluid phenomena coexisting simultaneously in one cohesive, artistic image. Being such a cold snack, I felt that ice cream epitomizes the conquering of heat in a fun, whimsical way. Conversely, fire symbolizes pure heat and the absence of relief. Therefore, by combining the two “elements” into a single photo, I had hoped to create a powerful, yet lighthearted piece of art. Yet, perhaps the most unique part of the photo is how the flow of the fire directly instigates the separate flow of the melting ice cream; these two fluid visualizations both contrast and influence each other, for the hotter the flame, the more the ice cream melts, yet as the flame nears the cold, wet ice cream, it extinguishes. This image serves as a makeup assignment for the Second Team Image Project. Aside from the safety assistance of a single partner, this assignment was completed alone.

## EXPERIMENT:

To set up, I lined the stovetop and wall with a non-flammable black sheet. The stove’s vent hood was turned on as a precautionary measure. The ice cream was scooped (using a standard-sized scoop) and placed in the center of a 9-inch diameter glass pie dish, with a small (one-inch diameter) blot of whipped cream and a maraschino cherry placed near it. In order to ensure maximum flammability, the cone was first drenched in the sink by isopropyl alcohol, and then was placed at a slight angle on top of the ice cream scoop in the dish. When I was ready to shoot, my partner lit the cone with a match, then stood to the side with a fire extinguisher on hand. (Note: be sure to wear fire-

resistant gloves or use a long-nosed lighter while lighting the cone, as it ignites very quickly and flares up.)

The flame of the burning alcohol-soaked cone reached approximately six inches high at its tallest. Unlike the consistent size of a candle flame, this flame flickered and danced between six and two inches above the tip of the cone, growing shorter and shorter as the alcohol burned off. This variability in flame behavior is due to the large surface area of the cone, which simultaneously allows the potential for large bursts of flame, but also limits the steady resupply of oxygen to the reaction. On the surface of the cone, the flame burned blue and shifted to orange and yellow as it grew with height. This happened because when hydrocarbon fuels (such as isopropyl alcohol) burn at an ideal ratio of oxygen to fuel, the flame turns a dull blue. As the flame moves away from the fuel source, it changes in color to orange and yellow to indicate the uneven ratio of oxygen to fuel and the cooling off of the particles as they disperse back into the air<sup>1</sup>. Therefore, the fire burned blue near the base of the cone, as this is where the direct source of fuel was. As it grew higher, the tip of the flame no longer had an ideal supply of alcohol and burned red as a result of the increased levels of oxygen, then tapered off as the particles of the reaction cooled and were released back into the air.

In contrast to the high energy, rapid flow of the fire, the melting ice cream demonstrated a slow, uniform phase change. When placed on a plate at room temperature, the frozen ice cream (which was approximately 0-10° Fahrenheit) absorbed energy from its warmer surroundings. This initiated a phase change, causing the ice cream to slowly melt. Since conduction is the fastest method of heat transfer, the ice cream directly touching the plate melted the quickest, causing a small puddle to form below the seemingly in-tact scoop. Due to the high viscosity of the melted ice cream, the puddle spread slowly over the plate, while its surface tension restricted the puddle to form defined edges. Despite the ice cream's increase in temperature, the substance was still too cold and too low in energy for combustion to occur. Therefore, when the edge of the flame met the ice cream, the flame did not spread. As a result, I was able to capture a seemingly controlled, beautifully curled flame upon the cone, on top of a spherical sculpted ice cream scoop with a small ice cream puddle underneath.

## **PHOTOGRAPHIC TECHNIQUE:**

To take this photo, I used a Nikon D800 DSLR camera with an AF-S NIKKOR 50mm 1:1.8 G lens. In order to reduce film grain, the ISO was set to 125. The scene was lit with fluorescent overhead bulbs both behind and to the upper right of the subject. (It is important to note that while the black background sheet absorbs a lot of the light, using too much light will interfere with the visibility of the flame in the photo. However, some—preferably indirect—lighting is necessary to reveal the other elements of the photo, such as the ice cream and cherry.) Since the lighting was low, I set my aperture to f-1.8 in order to properly expose the ice cream. However, since the flame was quick and bright, I used a shutter speed of 1/100<sup>th</sup> of a second to balance the exposure between the light fire and dark ice cream. The camera was held approximately two feet away from the subject, which, under the given circumstances, only provided for a shallow depth of field of about two inches.

In Photoshop, I rotated the picture slightly to straighten it, since I could not frame it perfectly without a tripod. I also increased the contrast just a few points to completely black out the background. In order to remove the dish and completely isolate the subject in space, I used a soft-edged brush to color over the visible glass without creating an obvious, harsh line. The image was then cropped for better framing.

## **CONCLUSION:**

In conclusion, I am very pleased with my image; it completely captured the essence of irony that I was hoping to achieve, all the while demonstrating beautiful fluid flows. I do wish that I had framed the image better, so that the tip of the flame was not cropped out, but considering the inconsistency in flame size and movement, and my limitation on resources, I feel that this image was still ultimately successful. I particularly like the color palette and the contrast between the minty green of the ice cream and the red-ish orange of the flame; I think that the opposite colors of the substances work well to further distinguish the differences in the flows. Overall, I believe that this image was a successful attempt at combining science and art, and I look forward to discovering what more I can do in the future to incorporate more intense fluid dynamics into visually stunning displays.

## **WORKS CITED:**

- <sup>1</sup> Piccirillo, Claea. "The Colors of Fire and Flames: Why is Fire Orange?." *DecodedScience.com*. Decoded Science, 19 Dec. 2013. Web. 15 May 2014. <<http://www.decodedscience.com/colors-fire-flames/40609>>.