

**Team Second**

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**Contribution Credits:**

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**Figure 1:** Final result of team second

## Introduction

For the second team assignment, we decided to experiment on dry ice and visualize the smoke that comes out of it. We had different results each trial. For each trial, we have added water on a glass and each time we put a different food dye. The last trial was more unique because we just used one flashlight from an iPhone and no other external light.

## Experimental Setup

The picture was taken at Abdullah's apartment. Setting up the experiment, we just put a glass filled with water (and added about 4 drops of orange food dye) on top of a phone. The flashlight of the phone was turned on which can be seen at the bottom of the picture. For the background, we just used a navy-blue pillowcase which worked well and gave us a black background. Approximately the size of the glass is 3 inch in diameter and 5.5 inches high.



**Figure 2:** A picture of the setup

## **Physics**

Dry Ice is the solid form of carbon dioxide  $\text{CO}_2$ . What is unique about dry ice is that it has sublimation. Sublimation means that heating up the solid would make it transform to the gas phase without going through the liquid phase. A block of dry ice has a surface temperature of  $-109.3$  degrees Fahrenheit. That means exposing the dry ice to room temperature would cause it to turn into gas. We actually put water on the glass to make the reaction faster and have even more smoke to capture. The temperature of the water can be approximated to be  $67$  degrees Fahrenheit.

## **Techniques**

The camera that was used in taking the picture is a Canon rebel SL2. It is noticeable that I took the picture in a vertical position which I think gave the picture more appreciation. The picture mode on the camera was AV. The shutter speed was  $1/800$  which I think is needed for such experiment. Additionally, I used manual focusing to capture the flow more easily. The F number is  $f/5$  and the ISO value is 12800 which I needed to capture such a colorful flow in a dark room where there is only one flashlight. The focal length is 34mm and the dimensions of the original picture are 4000 x 6000 pixels. The field of view is approximately 5x10 inches. And the distance between the glass and the camera is between 2 to 4 inches. Lastly, there was no editing done on the picture. It is basically the original picture from the camera. I did not think there was any cropping or editing needed since I got a fairly black background.

## **Conclusion**

To conclude, the purpose of this experiment is to capture a beautiful smoky picture. The purpose was fully met. The food dye was a very good touch because we can see the smoke has reflected on different colors. Using the flashlight with no other external light was only done on the last setup which gave the best result from the shooting set. It was hard to get a pure laminar flow, but I think my result is showing good combination of flows.

## **References:**

How does dry ice work?

<https://science.howstuffworks.com/innovation/science-questions/question264.htm>