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Image 3

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Diet Coke + Mentos = Rapid Expansion

Arguably one of the most popular recent reactions, the Diet Coke and Mentos phenomenon permeates interest at even the University level. The perplexing and entertaining result of mixing a soda and a candy may give some dentists relief that these sugars are being disposed of in more useful ways than consumption. That being said, there is much to discover about the rapid expansion of fluids while contained in a two liter bottle. By capturing this reaction and the peak of its expansion, we can begin to see the extremely interesting interface between many different combinations of fluid states. This report will delve into the details of capturing such an incredibly simple yet exciting phenomenon, as well as explaining the physics behind it.

Although the lighting used to capture this image may not be considered ideal, the basic set up can be replicated for different styles of photography. Capturing this image at night required an appreciable amount of timing, as the flash needed sufficient recharge time before taking the next image. However, this lead to some interesting results; as the flash reflecting off of the suspended soda produced a gleaming and captivating image. In order to compose such an image, a large light source (in this instance car headlights) and a silver reflective surface were used in combination with a removable flash apparatus. This arrangement is most readily described in Figure 1, where the placement of each item is appropriately labeled and dimensioned.

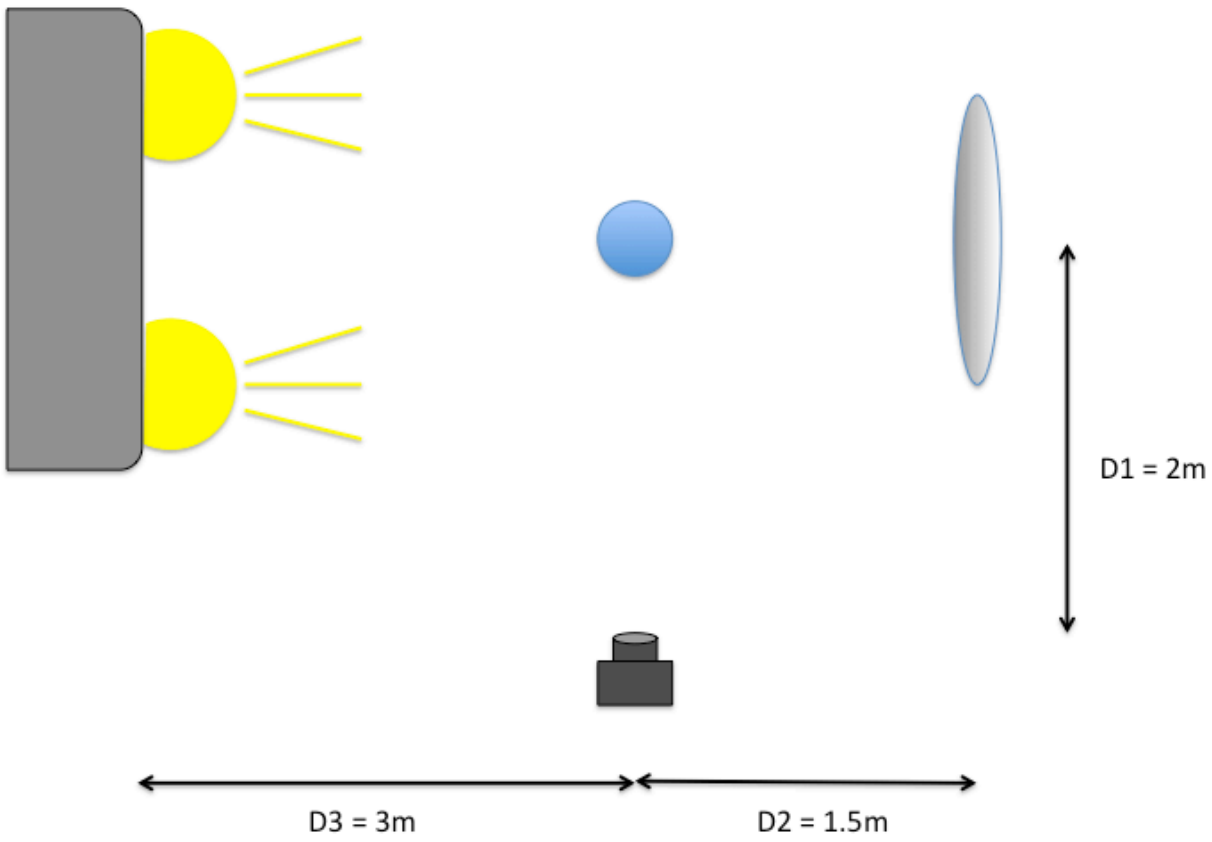

Figure 1: Apparatus Schematic

Initially, the physics behind this reaction mystified many of those intrigued by the visual phenomenon. Some thought the key was the chemical composition of both of the substances involved, while others focused on the physical construction. After all of the soda had settled, it was discovered that the Mentos candy had a special surface texture that was perfect for soda discombobulating. Two especially important physical aspects allow Mentos to be ripe for explosion. These aspects include the size of the dents or “craters” on the surface giving the candy a special texture, and the speed at which it plummets toward the bottom of the soda bottle after release. One may be curios as why the texture of the Mentos effects the soda in such a peculiar way. It is believed that the size of these textured “craters” promote bubble growth by disrupting

polar attractions between water molecules (Coffey). These craters then become perfect bubble forming sites, where the low surface tension of the diet coke excels in rapidly forming bubbles that eventually expel out of the bottle. A reduced surface tension allows for faster bubble formation. This factor is aided by the aspartame in Diet Coke, as well as the gum arabic on the surface of the candy. While the dense sugar morsel plummets downward, it has more opportunities to disrupt water molecule polarities, therefore making it the ideal candy for soda explosion.

As previously stated, this image was captured in dark setting with various lighting methods. Different amounts of Mentos were dropped in to separate bottles of Diet Coke, therefore controlling the explosion height. In this particular picture, three Mentos were dropped into the bottle simultaneously. In less than three seconds, soda began to rush out of the top of the bottle. There was no liquid dye needed, as the Coke produced its own tan colored carbonated substance for photographing.

This image was cropped and edited to remove all distractions that may detract from the viewing experience. The saturation of this image was increased slightly, to increase the range of colors seen in the soda stream. Also, the red and green colors were reduced, which aided in some of the red artifacts that resulted in the night time imaging method. A darkening brush reduced the reflection seen off a window, while an ISO of 640 helped create a vivid image.

This image reveals the mystery of fluid flow while suspended mid air, and will give many viewers the nostalgic feeling of high school when the phenomenon became popular. The foam also looks like it is attempting to escape upwards in the image, with protruding arms forming at the top. The image has a playful feel to it, encouraging

simple, exciting science to proliferate into early educational science courses to help younger students become excited about science and the world around them.

Figure 3 : Original Image

Figure 2: Edited Image

References:

[Coffey, Tonya Shea. "Diet Coke and Mentos: What Is Really behind This Physical Reaction?" *American Journal of Physics* 76.6 (2008): 551. Print.]