

Development of a Mentos Eruption Cannon Cannon with a range of 575 cm



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Summary:

A mentos eruption occurs when mentos react in diet coke causing it to project into the air.¹ There are many other alterations to this experiment that could be done such as changing the type of soda². In this experiment, a 45 degree angle mentos cannon was created. In previous studies, experiments measured vertical height.³ It was found that the number of mentos in diet coke was roughly proportional to the distance it erupted. A general lack of precision may be because of the angle the bottle was at did not allow the mentos to access the bottle as easily causing for a slower eruption. Although shown in the data that the more mentos added the further the distance, the repeated trials show no pattern as to the actual measurements. This may be due to the fact that at this angle the mints enter the bottle too slowly to create a slow eruption. Further studies should focus on how the mentos access the bottle.

Introduction:

With the discovery of combining mentos and diet coke together to create an explosive reaction in 1999, there have been further discoveries throughout the years. To start, on the show Mythbusters, they concluded that the reaction took place because of the potassium benzoate, aspartame, caffeine, and CO₂ gas in the gum. Those chemicals and gases reacted with the gum Arabic and gelatin in the mentos.⁴ Although, through the course of the years many new details to the experiment have been found. For example, Courtney O used a lower diet coke temperature to have an explosion with a higher height.⁵ It was also found by Courtney O that cooling the mentos can cause a doubling in height compared to room temperature mentos.⁶ This experiment here surprisingly has not been done before as it tested the distance the diet coke erupted when increasing the amount of mentos. The hope is to increase the distance the soda reaches as the number of mentos is added. There must be an advantage to this system: easier and more precise to measure horizontal distance; soda does not fall back on itself, therefore more reliable results; the possibility of practical applications.

Experimental Procedure:

The course to achieving this experiment is to have a flat platform and prop it up on something to make it at a 45 degree angle (make sure to be on an open blacktop to be able to see and measure the eruption distance). Put 3 mentos in the geyser tube, then open the cap to the diet coke when ready. Secure the geyser tube on immediately and lean the bottle on its 45 degree platform. Have someone hold the bottle in place as they pull the needle to let the mentos drop into the soda. Hold it in place until it is entirely done erupting, then use a meter stick to measure the distance the soda went on

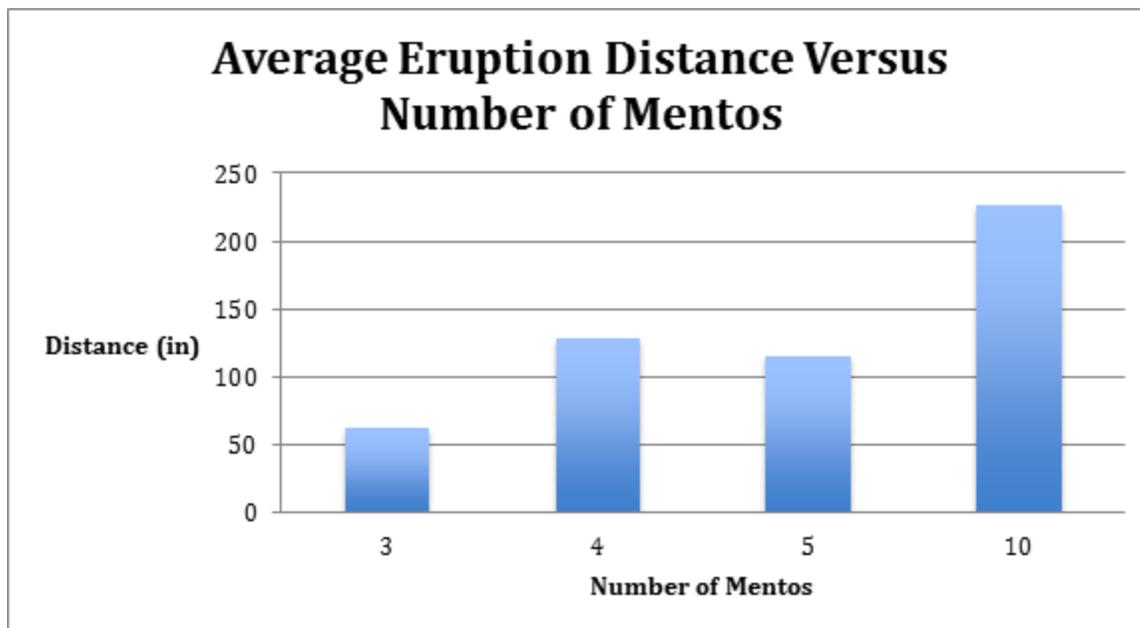
the blacktop. Record the data then repeat the trials twice with 4 and 5 mentos. You may multiply the number of mentos by two, when you are finished with all of your trials, as a comparison so see what the distance would be or if it would be accurate. Remember to use safety goggles when letting the eruption go off.



Results:

Trials	No. of Mentos	Distance (cm)	Average Distance (cm)
1	3	140.97	159.385(for 1 and 2)
2	3	177.8	
3	4	298.45	324.485(for 3 and 4)
4	4	198.12	
5	5	373.38	292.1(for 5 and 6)
6	5	210.82	

7	10	575.31	575.31
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*The table refers to the data in centimeters while the chart measures in inches.

Conclusion:

In this experiment, there was found that the number of mentos that were put into the soda was roughly proportional to the eruption distance of the mentos cannon overall length the diet coke reached. This may have occurred because of the angle in which the soda was at, basic malfunction in the experiment, or human error. Other groups measuring the amount of mentos on coke eruption lead us to believe there was an error. In experiments that tested the effect mentos had on height, proved that the more mentos caused the height to be greater.⁷ This discovery of the mentos distance was very important because most predictions would state that measuring the distance while at a 45 degree angle would go farther than measuring the height.⁸ This would be assumed because a bottle being at an angle would give it more projection outwards having a greater measurement while measuring height is propelling the soda upward and against gravity. The importance of this experiment is shown in the data. In the Results section above, the graph fluctuates even though the number of mentos stays at a steady increase. The table clearly states that 3 mentos to 4 mentos increases from 62.75 inches to 127.75 inches, then placing 5 mentos in caused an average drop to 115 inches. There could have been some molecular level issues in the experiment causing this. Mentos and diet coke almost have a guaranteed reaction because of the ingredients within both; which when mixed together, cause a large eruption.⁹

Realistically, by adding more mentos greater lengths should have been reached, but it led to the results not being what was predicted. Although according to this data there is no correlation between the amount of mentos and the distance it erupts, this is the first time measuring distance. This experiment should be done again to test this theory. Although, when re-enacted there should be more focus on the angle the bottle is at. The data could have fluctuated because of having the platform at too low of an angle. This did not allow the mentos to drop into the soda quick enough causing for a slow eruption. For further research on this, groups could try different angles or have a definite idea of how they plan to set up the diet coke at a specific angle for the eruption. Future papers should add in this original data because, although it is strange, the data is a focus passage on to what was first done and what was changed to improve each time.

Endnotes

1. **Solid mentos create eruptions five times higher compared to crushed mentos. Diana C and Sarah G, *The Guilford Journal of Chemistry*, volume 4 (2010).**
2. **The effect of soda type on the height of mentos eruptions. Ethan S and Zack B, *The Guilford Journal of Chemistry*, volume 1 (2007).**
3. **High surface area increases a coke mentos eruption height. Grace I and Amanda M, *The Guilford Journal of Chemistry*, volume 5 (2011).**
4. **Regular Mentos Shoot Higher Than Fully Sanded Mentos Antonio P & Chris R, *The Guilford Journal of Chemistry*, volume 7 (2013).**
5. **The colder the temperature of coke, the higher a mentos eruption. Courtney O, *The Guilford Journal of Chemistry*, volume 5 (2011).**
6. **A review of cold Mentos doubles the height of the reaction, Henry W. *The Guilford Journal of Chemistry*, volume 7, (2013).**
7. **How the amount of of mentos affects the height of the mentos eruption. Matt F and Alex M, *The Guilford Journal of Chemistry*, volume 2 (2008).**
8. **How the amount of of mentos affects the height of the mentos eruption. Matt F and Alex M, *The Guilford Journal of Chemistry*, volume 2 (2008).**
9. **Diet Coke and Mentos: What is really behind this physical reaction? Coffey, T.S., *American Journal of Physics*, Volume 76, pp. 551-557 (2008).**