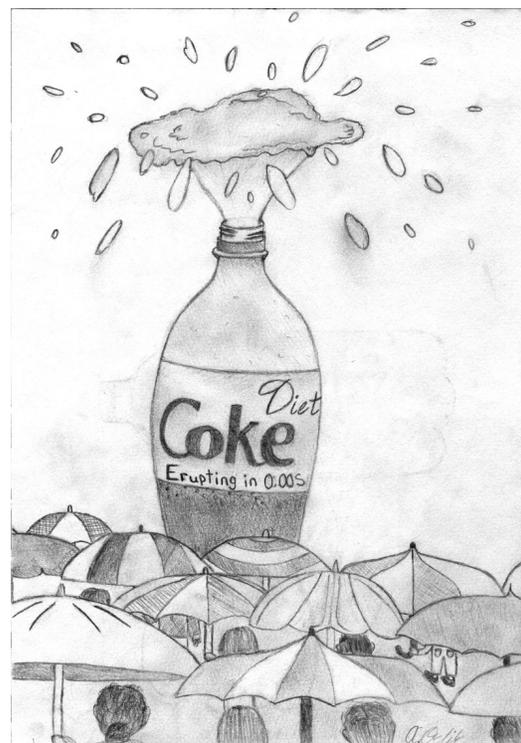


The Diet Coke And Mentos Reaction

Purpose:

The purpose of this experiment is to use gas laws, ingenuity, and a bit of luck to create the biggest soda fountain geyser possible when Diet Coke and Mentos are used in combination.



Waste Disposal:

- 1) Return the 2L bottle with the cap to the teacher. This too will be worth marks.
- 2) Be sure to clean up the collateral mess made outside during the launch.

Special Safety: Be sure all persons are suitably clear of the geyser during launch.

Pre-lab:

- 1) Watch the following video, and be able to answer the following:

<https://www.youtube.com/watch?v=-cN5mCorP5E>

- a) How is the geyser created in a Diet Coke and Mento's experiment?
- b) How can the chemical reaction be shown?
- c) Is what you observe a physical or chemical change? Explain your answer.
- d) What is the chemical equation for carbon dioxide dissolved in water?
- e) Is carbonated water acidic or basic?
- f) What happens to the pH when mentos are added to the carbonated water?

- 2) Watch the following video and be able to answer the following:

<https://www.youtube.com/watch?v=LjbJELjLgZg>

- a) What is nucleation?
- b) What happens at the nucleation site?
- c) What does a Mento look like close up?
- d) What forms at the surface of a Mento (in a very short period of time?)
- e) Why does a fountain or geyser form?
- f) What is the control used in the video? [Do you remember what a control is?]
- g) What does a coloured Mento have in contrast to say a white Mento?
- h) What happens when a coloured Mento is placed in carbonated water?

3) Watch the following video and be able to answer the following:

<https://www.youtube.com/watch?v=dHrRudxIVeA>

- a) How does temperature affect the reaction of carbonated water and mentos?
- b) What is the maximum temperature used in the experiment? Show your answer in both $^{\circ}\text{C}$ and K.

Planning for the experiment:

Logistics:

- 1) Order of launch for each lab group will be chosen randomly.
- 2) Everyone will be required to be outside for all launches.
- 3) The launch will take place at the side of the school outside the classroom.
- 4) No objects are permitted to remain on the top of the Diet Coke bottle before or during the launch.
- 5) The bottle or cap cannot be altered in any way from its original form
- 6) The diet coke bottle must remain on the ground for the launch.
- 7) On launch day, lab groups will receive only 1 bottle of Diet Coke and 1 package of Mentos. No exceptions.
- 8) Lab groups will have 15 minutes to prepare for launch.
- 9) Any components used for the launch day must be homemade (e.g. a device to hold the container in place or a device used to get the Mentos into the Diet Coke bottle.)
- 10) To participate, a group must have its procedure sent in and checked by the teacher. No group is permitted to change its procedure on the day of the launch.
- 11) Students should NOT dress in their finest clothes on launch day.
- 12) While failure is not the desired option, one will learn on launch day that fate and circumstances sometimes cause failures to occur.

Following is needing to be researched and discussed with one's lab group before testing begins. The goal is to get as high a geyser as possible. Suggested areas of intra-group discussion may include:

- 1) Diet Coke - changes to be made.
- 2) Mentos - changes to be made.
- 3) Are there any homemade devices to be made to facilitate the process?
- 4) What is everyone's role on launch day?
- 5) Other?

Materials: Groups shall list ALL equipment and chemicals (consumable goods) needed for the experiment.

Procedure: Groups shall provide a detailed explanation of the procedure each will be following. Be sure to write using third person and in the past verb tense.

ALL GROUPS MUST HAND-IN THEIR MATERIALS AND PROCEDURE AT LEAST ONE DAY BEFORE LAUNCH DAY!

Observations: Groups shall include all observations made before, during, and after the launch.

Results:

Groups shall:

- a) Explain generally how their launch went.
- b) What worked with their launch?
- c) What did not work with their launch, and list known and potential unknown reasons why?
- d) Which group was the best? Explain. [Please do not use your lab group as an example!]
- e) Which group was the least successful? Explain. [Please do not use your lab group as an example!]

Discussion Questions:

1) Watch the following video and be able to answer the questions:

<https://www.youtube.com/watch?v=SWpgRBr85PA>

- a) What happens to air pressure as elevation increases?
- b) Complete the following chart:

Trial #	Elevation In Feet	Volume Of Geyser (mL)	Estimated Air Pressure (kPa)	1/volume [1 Divided By Volume] (1/mL)
1	-40		101.5	
2	6000		70.27	
3	10 700		60.00	

c) Using the information supplied in the chart above, graph the following:

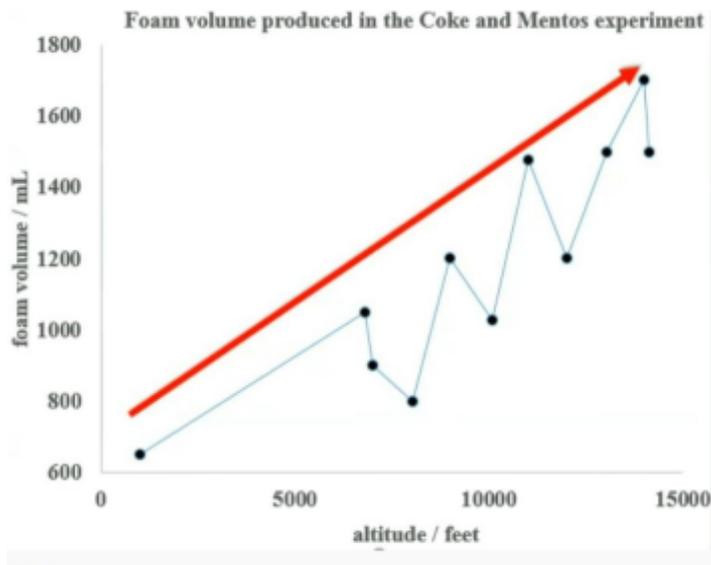
- i) Pressure vs Volume (volume on the horizontal axis)
 - ii) Pressure vs 1/average volume (1/volume on the horizontal axis)
- d)
- i) What relationship is shown between pressure and volume?
 - ii) What relationship is shown between pressure and 1/volume?

Application:

1. Watch the following video and be able to answer the questions:

<https://www.youtube.com/watch?v=NyUW0hXYGnU>

- a) Using the video and the graph shown to the right, identify the overall trend in the volume of the geyser as elevation increased (and air pressure decreased).
- b) Explain what might be the cause of the anomalies (i.e. dips) in data?
- c) If these scientists were to do this experiment again, what changes should they make?



Above and Beyond:

Create a report/document that explains further experiments that perhaps ought to be performed in regard to diet coke and mentos to produce better results. This is an opportunity to demonstrate your intelligence, creativity, and "outside the box" thinking.

IUPAC - Division Diet Coke and Mentos
Membership Card

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2. I thank Avery Orlik for drawing the wonderful picture for this lab. Avery is incredible at both chemistry and art!
3. I thank Matthew Clifford for always editing my work!
4. IUPAC Symbol (from the membership card) Citation: *International Union of Pure and Applied Chemistry (IUPAC)*. International Science Council. (2022, February 25). Retrieved December 27, 2022, from <https://council.science/member/international-union-of-pure-and-applied-chemistry-iupac/>

Videos:

1. Video - Discovery Networks. (2008, July 31). Diet Coke & Mentos | Mythbusters. YouTube. Retrieved December 23, 2022, from <https://www.youtube.com/watch?v=LjbJELjLgZg>(link is external)
2. Video - Tommy Technetium. (2017, May 7). Diet Coke and Mentos at different temperatures. YouTube. Retrieved December 23, 2022, from <https://www.youtube.com/watch?v=dHrRudxIVeA>(link is external)
3. Video - Tommy Technetium. (2018, September 24). Coke and Mentos at 14000 Feet. YouTube. Retrieved December 23, 2022, from <https://www.youtube.com/watch?v=NyUW0hXYGnU>(link is external)
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5. Video - Tommy Technetium. (2020, August 26). The Science of Diet Coke and Mentos. YouTube. Retrieved December 23, 2022, from <https://www.youtube.com/watch?v=-cN5mCorP5E>