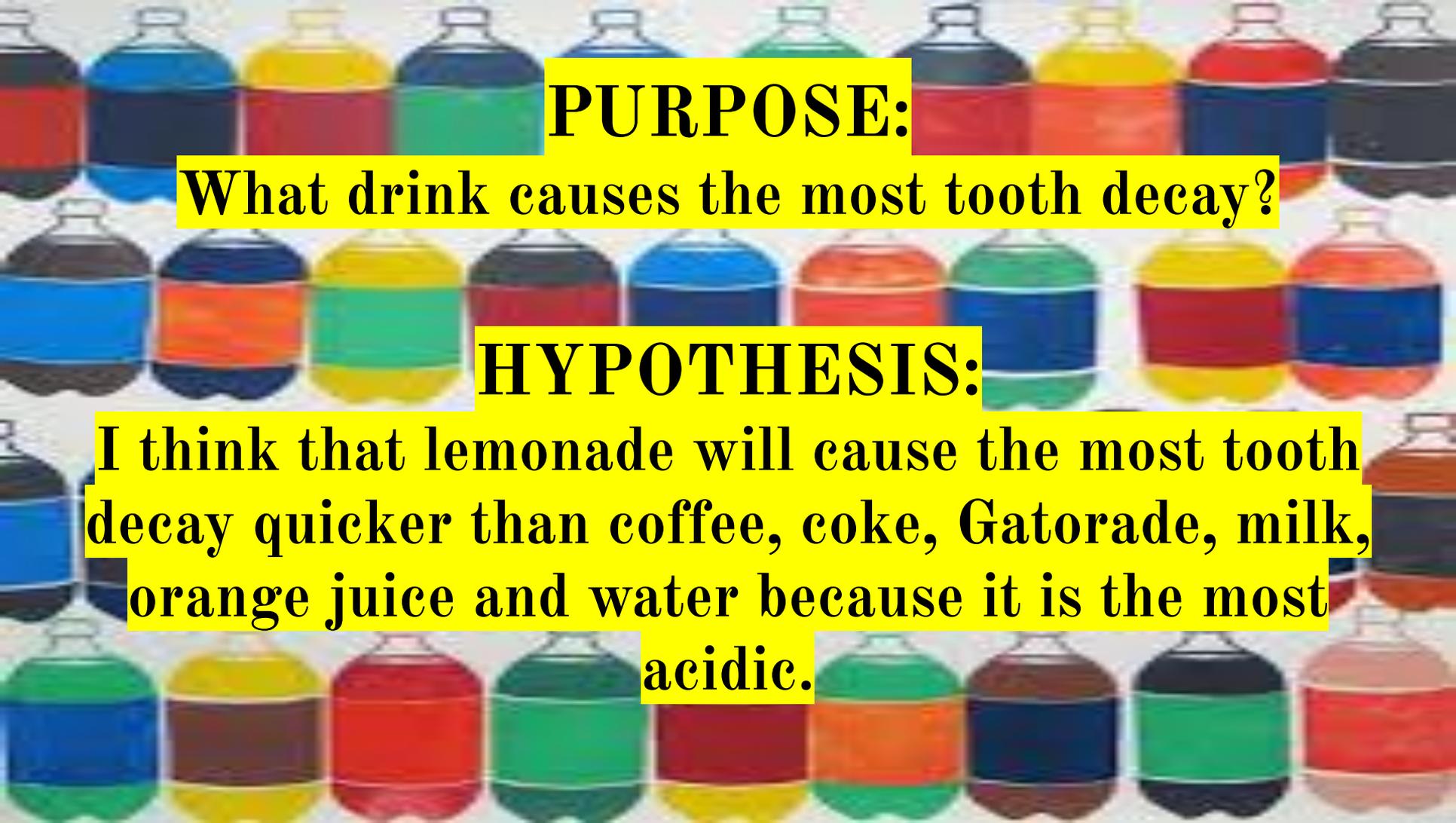


Stop Tooth Decay



A background image showing a grid of many plastic bottles, each containing a different colored liquid. The colors include red, blue, yellow, green, orange, and brown. The bottles are arranged in rows and columns, creating a pattern of colorful liquid containers.

PURPOSE:

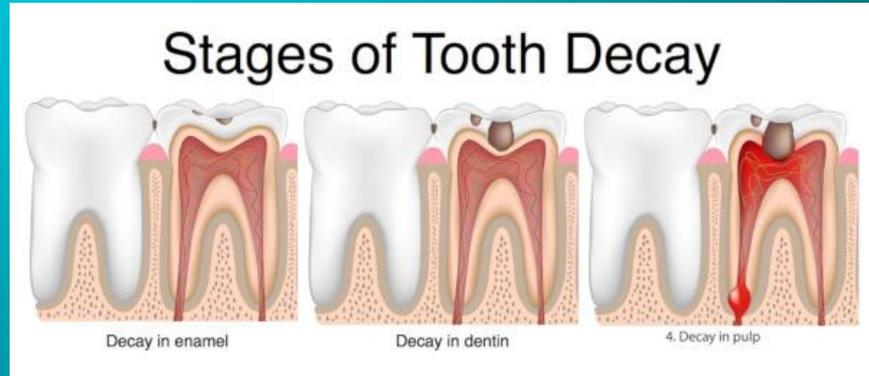
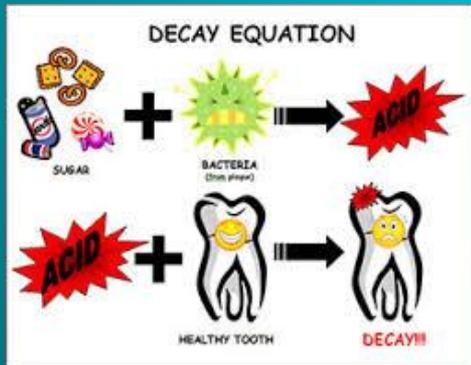
What drink causes the most tooth decay?

HYPOTHESIS:

I think that lemonade will cause the most tooth decay quicker than coffee, coke, Gatorade, milk, orange juice and water because it is the most acidic.

RESEARCH

I am interested in this topic because I want to be a Dentist when I grow up so I want to learn everything I can about what causes cavities and how I can prevent them from happening. During my research I learned that sugary drinks are bad for teeth because the sugar sticks to the teeth and the bacteria in our mouths turns the sugar into acid. Some drinks are made with fruits that are already acidic, like lemonade so it makes the drink even worse. The acid causes the top layer of the tooth enamel to soften and lose some of its minerals. The saliva in the mouth acts like a healing agent and tries to repair the tooth by hardening the enamel again after drinking juices and other sugary drinks, but the process is slow so drinking these drinks often does not allow this process to complete. This is not good because it causes the enamel to continue to decay and the acid begin attacking the other parts of the tooth. This causes cavities, tooth sensitivity and loss of teeth.



MATERIALS

- 8 clear 18 oz plastic cups
- 8 hard boiled white eggs
- 8 ounces of coke
- 8 ounces of milk
- 8 ounces of Gatorade
- 8 ounces of orange juice
- 8 ounces of lemonade
- 8 ounces of coffee
- 8 ounces of water (control agent because the acidity (pH) of water is very close to the resting pH of our body and saliva)
- 8 ounces of vinegar (control agent because vinegar shows the damage that is done to our teeth during an acid attack to the enamel caused by sugars turning into acid in our mouth)



EXPERIMENT

1. Boil the 8 eggs for 12 minutes and let them dry and cool down.
2. Place each dry egg into a separate 18 oz cup.
3. Add 8 oz of each drink into the cups separately until the eggs are fully covered by the drinks. Make sure to label each cup to know what drink is inside.
4. Let the eggs sit in the drinks for 24 hours. Remove the eggs from the cups, inspect and record the changes observed.
5. Place them back in the cups and let them sit for another 24 hours. Remove the eggs from the cups again and inspect and record the changes observed.
6. Repeat step 5 again for one more day. Total days in liquids is 3 days.



PHOTOS



PHOTOS



PHOTOS



ANALYSIS



- The experiment started on Saturday, January 9 at 2:20pm.
- The first observation was made on Sunday, January 10 at 2:20pm, 24 hours after the eggs were added to the drinks.
- The second observation was made on Monday, January 11 at 2:20pm, 48 hours after we started.
- The last observation was made on Tuesday, January 12 at 2:20pm, 72 hours after we started.
- The observations were logged after each observation.
- In my observation, I noticed that almost all eggs had a change except for those in water and milk.
- The shell color of the eggs dipped in coffee, coke and gatorade had changed and the shell was rough but did not disintegrate too much.
- The shell of the egg dipped in orange juice had disintegrated a bit but the egg in lemonade had disintegrated the most

ANALYSIS

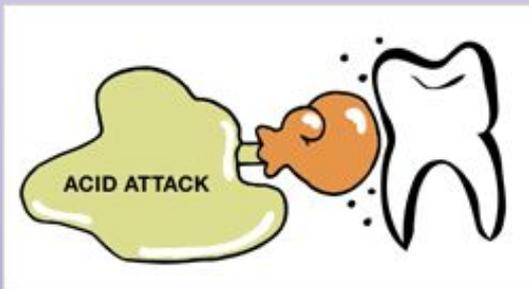
	Coffee	Coke	Gatorade	Lemonade	Milk	Orange Juice	Water	Vinegar
24 Hours	Egg color is light brown and feels the same	Egg color is light brown and feels the same	Egg color is light blue and feels the same	Egg color is the same and the outer layer is coming off/dissolving	Egg color is the same and feels the same	Egg color is light yellow and feels slimy and outer layer is coming off/dissolving	Egg color looks and feels the same	Egg color is the same and the outer layer is coming off/dissolving and is soft
48 Hours	Egg color is medium brown and feels the same	Egg color is medium brown and feels rougher	Egg is darker blue and top layer is coming off/dissolving	Egg color is same and the outer layer is a lot more grainy and continues to come off/dissolve	Egg color is the same and feels the same	Egg color is light yellow and feels slimy and outer layer is coming off/dissolving	Egg color looks and feels the same	Egg color is the same and the outer layer is completely off and egg has expanded
72 Hours	Egg color is brown and egg surface is smooth and the pores are big and visible	Egg color is brown and the egg surface feels rough and has dark brown spots	Egg color is blue and the egg surface is smooth and the outer layer is peeling	Egg color is the same and the outer layer is really rough and coming off, and is visible in the cup	Egg color is the same and the outer layer feels the same	Egg color is yellow and the outer layer is rough and coming off	Egg color looks and feels the same	Egg color is the same and the next layer of the egg is also coming off

CONCLUSION

pH 0	Battery Acid
pH 1	Stomach Acid
pH 2	Lemon Juice, Vinegar
pH 3	Orange Juice, Soda
pH 4	Tomato Juice
pH 5	Black Coffee
pH 6	Saliva, Cow's Milk
pH 7	Pure Water
pH 8	Sea Water, Ph-Neutral
pH 9	Baking Soda
pH 10	Antacids
pH 11	Antacids
pH 12	Soapy water

- Because the egg in lemonade had disintegrated the most after 3 days, this makes my hypothesis correct that lemonade causes the most tooth decay the fastest.
- What is pH?
 - pH stands for the potential of hydrogen and it is the measurement of how acidic or basic a liquid is. The range goes from 0 to 12, with 7 being neutral. pHs of less than 7 indicate acidity, whereas a pH of greater than 7 indicates a base.
- Lemonade is one of the drinks with a lot of sugar. The lemonade I used had 27g of sugar and the pH for lemons is high so this drink is one of the most acidic drinks available.

REAL WORLD CONNECTION



Why is this important?

- Everyone needs to drink less of these drinks because once the tooth enamel is gone, it does not come back.
- You should use toothpaste and mouthwash that is recommended by your dentist and that can help protect your tooth's enamel.
- You should go to the dentist every 6 months to do a check up of your teeth and see if you have any cavities or enamel loss.
- You should rinse your mouth after drinking and eating foods with a lot of sugar to decrease the amount of sugar and acid left behind by the drinks and food.



Rethink your Sugary Drink

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