

THE STUDY OF WHICH FACTOR AFFECTS THE PH LEVEL THE MOST

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ABSTRACT

The purpose of this study was to find out which factors affected the pH level in soda the most. pH is the measurement of the *acidity* (acid) or *alkalinity* (base) in a solution. Many sodas were used by measuring the pH at different times once opened and results were recorded. It was determined that Root Beer's pH level changed the most while Mountain Dew's changed the least. The least acidic sodas' pH level changed the most compared to the most acidic sodas' pH level.

INTRODUCTION

pH is the measurement of the *acidity* (acid) or *alkalinity* (base) in a solution. pH stands potential hydrogen. The pH scale measures how acidic or basic a substance is. Acids and bases are two groups of chemical compounds with opposite properties. Acids taste sour while bases taste bitter. Strong acids and bases are dangerous chemicals and can cause chemical burns. When acids and bases are combined with substances like water they dissociate or break up and produce ions. The pH scale ranges from 0-14 and concentrates on how many hydrogen ions are in a solution. Acids are a substance that can lose a hydrogen ion when mixed with water. Bases are a substance that can gain a hydrogen ion when mixed with water. 7 on the pH scale is neutral because it has the same amount of hydrogen ions and hydroxide ions. Substances with a pH less than 7 are considered acidic; the lower the pH the stronger the acid is. Substances with a pH greater than 7 are considered basic; the higher the pH the stronger the base is. pH of the human blood is 7.4; pure, distilled water has a pH of 7 and rainwater has a pH of 5.2.

Carbon dioxide is a colorless gas that has a sharp odor and sour taste. CO₂ is chemical formula for carbon dioxide. Each molecule of carbon dioxide consists of one atom of carbon and two atoms of oxygen. Humans breathe in oxygen and breathe out carbon dioxide. Plants are producers that make their own food; they use carbon dioxide, water and sunlight to make their food through a process called photosynthesis. Carbon dioxide is naturally released from volcanoes and geysers. Carbon dioxide is a greenhouse gas. 0.03 % of the atmosphere is carbon dioxide. Carbon dioxide helps absorb extra heat which keeps the Earth warm. CO₂ turn directly from a gas into a solid. Solid carbon dioxide is dry ice.

In 2012 Laurel M did an experiment to determine if the type of soda, temperature or bubbles blown affected the pH level. Her first experiment was to determine the different pH levels in different sodas. In her first experiment she found out that water was the least acidic and root beer was the second least acidic. The most acidic was coke with a pH of 2.5. Coke was the most acidic because it contained more phosphoric acid compared to the other sodas. Her second experiment was to determine if blowing bubbles into different sodas changed the pH level. In her second experiment she found out that the more bubbles blown in the soda the more acidic it became. Coke's pH level after 50 bubbles blown was a 2.33 while water's pH level after 50 bubbles blown was 5.7. Her third experiment was to see if putting the soda in the microwave changed the pH level. In her third experiment coke she found out that longer the soda was in the microwave the more acidic it became. Her last experiment was to find out if putting the soda in the refrigerator changed the pH level. In her last experiment she found out that putting the soda in the refrigerator did not change the pH level that much.

Carbonated soft drinks are also referred as soda. Soft drinks are carbonated drinks that are non-alcoholic. Soda contains phosphoric acid. The amount of phosphoric acid inside the soda determines its pH level. Soft drinks contain water, carbon dioxide sugar, acids, flavoring and sometimes coloring. The fizz of soft drinks is caused by carbonation- dissolving carbon dioxide in soft drinks. Adding carbon dioxide helps to keep the soda from spoiling. As the pressure is released, carbon dioxide changes into gas, which can be dissolved into liquid.

Carbonation causes bubbles in soda. Carbonation is the process of dissolving carbon dioxide in water. When you blow bubbles in the soda it also creates “fizz”.

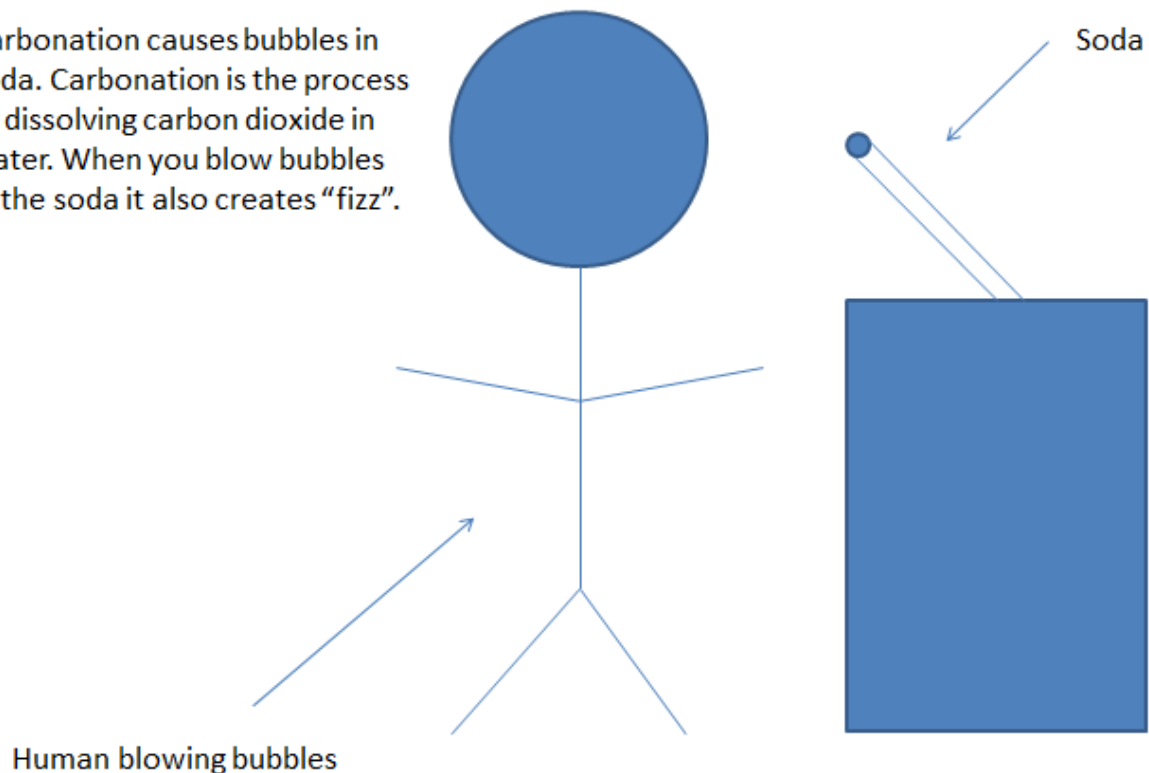


Figure 1: The figure shows what happens when bubbles are blown into soda

MATERIALS AND METHODS

In these experiments, Coke, Sprite, Fanta, Root Beer, Mountain Dew, Pepsi, Water, pH meter, pH strips, beaker, straw and cups were used.

200 ml of Coke was poured into a beaker. A pH meter was put inside the beaker and the pH was measured. A straw was put in and blown through to represent one breath. After each breath the pH level was recorded. Ten breaths were taken for each soda. This experiment was also repeated for Sprite and Water.

100 ml of Coke was poured into a cup. Saliva from a person’s mouth was spat into a cup. A pH strip was put inside the cup with saliva and the pH was measured. 25 ml of Coke was poured into a cup. A cup with 25 ml of coke was poured into a person’s mouth for 2 minutes. After 2 minutes the person swallowed the Coke and spat into a cup. Another pH strip was put inside the cup with saliva and the pH was measured. This experiment was repeated for three more people.

Saliva was spat into a cup. A pH strip was put inside the cup and the pH was measured. 5 ml of Coke was added to the saliva and the pH was measured. Another 5 ml of Coke was added to the saliva and the pH was measured. This experiment was repeated fifteen times.

200 ml of Coke was poured into a beaker. A pH meter was put inside and the pH was measured. After 5 minutes the pH meter was put inside and the pH was measured. This experiment was repeated after 10, 15 and 20 minutes once the Coke was opened. This experiment was done also for Sprite, Fanta, Root Beer, Mountain Dew and Pepsi.

RESULTS AND DISCUSSION

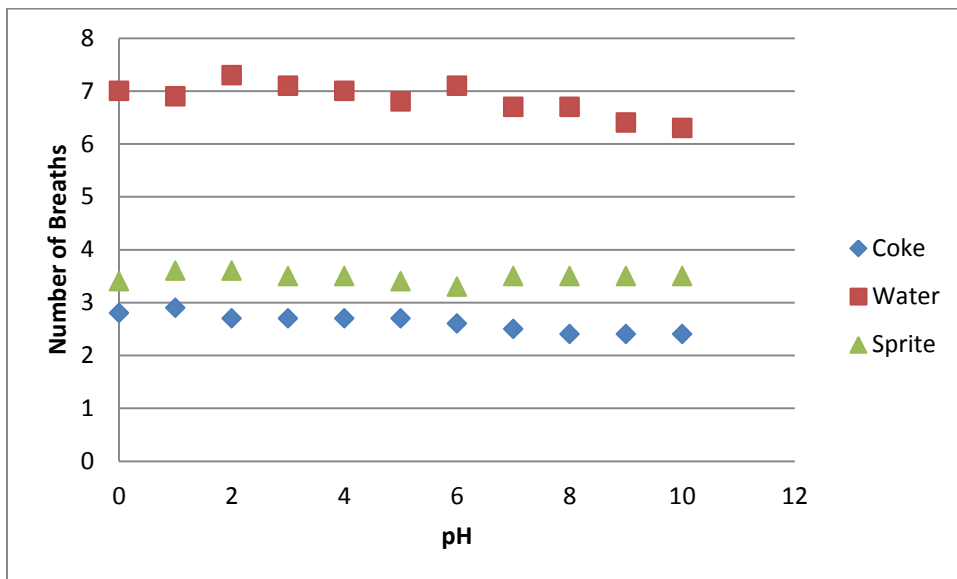


Figure 2: pH of soda after number of breaths.

The pH level of water changed the most after 10 breaths while the pH level of Sprite changed the least in 10 breaths. All the non-manmade liquids' pH level changed a lot compared to the liquids that were manmade. Water was non-manmade while Coke and Sprite were manmade. When non-manmade liquids are mixed with other ingredients their pH level changed. Water was mixed with carbon dioxide when blown through the straw and the pH level changed.

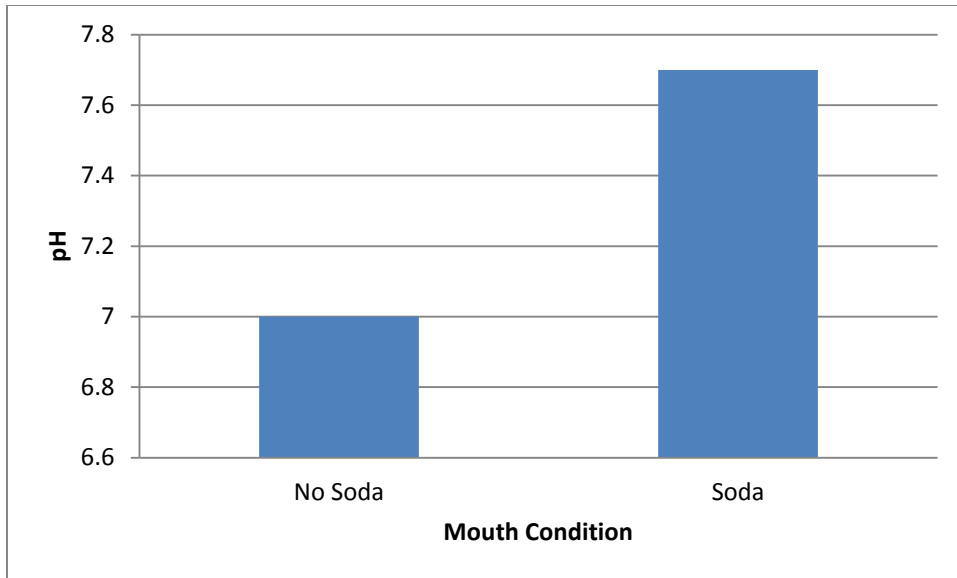


Figure 3: pH of mouth before and after drinking soda

The pH level of saliva before getting mixed with Coke was more neutral than after it got mixed with Coke. The pH level of Coke was very acidic and because of that, it caused the saliva to become more acidic than before.

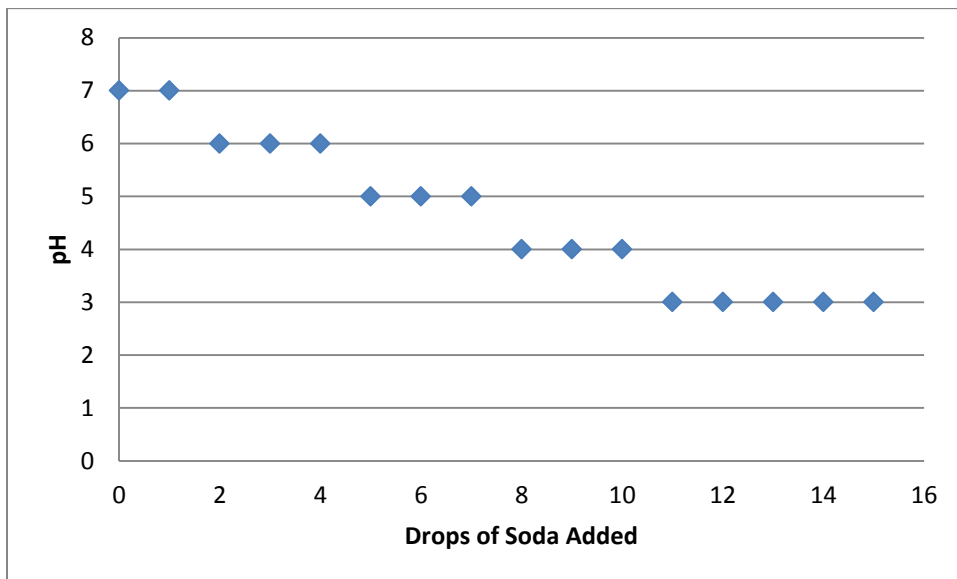


Figure 4: Ph of mouth after drops of soda added

As drops of Coke were added the pH level of saliva became more acidic. The pH level of Coke was very acidic and caused the saliva to become even more acidic.

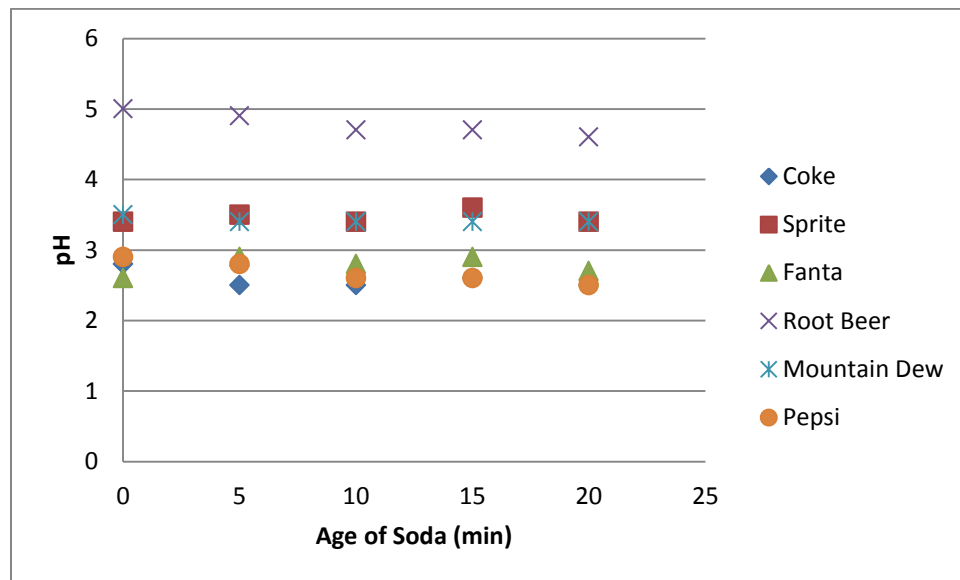


Figure 5: Ph of soda after different minutes

The pH level of Root Beer changed the most in 25 minutes while the pH level of Mountain Dew changed the least in 25 minutes. The pH level of Root Beer was the least acidic which is why the pH level changed the most for that soda.

CONCLUSIONS

Root Beer's pH level changed the most; Pepsi's pH level changed the second most; Coke's pH level changed the third most; Fanta pH level changed the fourth most; Sprite's pH level changes the fifth most and Mountain Dew's pH level changed the least. The age of the soda sort of affected the sodas' pH level but not that much. This study is important to the world because some people like to drink soda but want to also take care of their teeth so, from reading this experiment they will find out to drink more Root Beer and less Mountain Dew. A good follow up to this experiment would be to adding ingredients to the different types of soda and seeing if the pH changes or not.

CITATIONS

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