THANKS

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In the switched packaging, we got the Great Value package and the Pepperidge Farm package and we switched the cookies so that we could see if whether people would choose the cheap cookies but we are actually putting the expensive cookies inside of the expensive brand. The purpose of this was to test out if people would choose cookies that tasted better or if they just choose what they perceived to be better. The results were what we expected. For the switched packaging our results were that four of the participants choose the cheap cookies and six of the participants choose the expensive cookies.

For the original packaging three of the participants chose the cheap cookies and seven of the participants chose the expensive cookies. When we told people which were the packaging they said well I think the expensive cookies are better. People sometimes only want expensive things so that’s why in their mind they are going to say I will like this.

**Conclusion**

In conclusion, the Great Value cookies were the ones that were dry without any flavor instead of the moist ones, but they chose the Great Value cookies because they were in the expensive packaging. By doing this experiment we proved that the brain is tricking us by choosing how things look and their value instead of what they taste like.

**Acknowledgments**

Ms. Journell
Mr. Lockard
Mrs. Morgan
Everyone who is involved in UBMS
Preface

The Upward Bound Math Science Center is federally funded and hosted by Wichita State University (WSU) in Wichita, Kansas. With the support of WSU and the cooperation of schools throughout Kansas, the program is designed to serve seventy-four disadvantaged high school students who have the potential to be the first in their family to attend college and earn a four year degree, preferably in a science or mathematics field.

The curriculum of the “Galaxy Experience” is developed to provide students with the opportunity for academic enrichment in a college setting. While living on campus for six weeks, students attend a variety of classes located on the WSU campus, specifically designed to expand their knowledge and stimulate their interests. Classes simulate actual college courses that address topics that are not usually taught at their high schools. Some of the courses offered in 2016 included: Biology, Chemistry, Environmental Science, Economics, Physics, Anatomy & Physiology, Engineering, Forensic Science, Calculus, Arabic, Public Speaking and many more. Moreover, each student’s academic enrichment is supplemented with cultural awareness activities, field trips, academic and career counseling, guest speakers, and tutoring. UBMS students also have access to Wichita State University’s computer, chemistry, physics, and biological sciences labs, Ablah Library, and the Heskett Center for physical fitness activities.

The crowning achievement of the students’ experience each summer is their production and presentation of research projects. The projects are a culmination of what each team has investigated, researched, experimented and/or discovered during the six-week summer session. This journal serves as a record and a celebration of the hard work and commitment put forth by the students of the 2016 summer experience. Each project was presented at the annual UBMS Research Symposium, and the written report is printed in this journal in its original form, therefore allowing the talent and achievement of our students to genuinely shine through.

TRIO UBMS Purpose Statement

“The purpose of the Upward Bound Math Science Center, the “Galaxy Experience,” is to stimulate and advance interest in mathematics, science, and computer technology, challenge students to perform to the best of their ability, provide a unique residential, academic, exploratory, hands-on experience, and encourage high school students to realistically consider the attainment of a post-secondary degree in mathematics or the sciences.”

The Cookie Brand Experiment

By: Megan Lara Alvarado, Luis D. Ramirez Jr., Martha Vizcarra
Mentor: Ms. Heather Journell

Abstract

Our experiment consists of 3 parts: Taste of the cookies, original box and switched packaging. The taste of the cookie involves offering participants cookies without telling them what brand they were but instead, we just ask them which one tasted better.

Question

Does the brand of a cookie affect how it tastes or is it just our brain tricking us?

Variables & Hypothesis

Independent variable - Switched packaging
Dependent variable - Response of participants
Hypothesis - If we have two types of cookies one cheaper than the other and we switch them from their original packaging, Then people will choose the expensive ones even though they might not taste the best.

Materials

Great Value Chocolate Chip Cookies
Paper Plates
Pepperidge Cookies
Aquafina Water
Ziploc Bags

Experimental Procedures

First, we did the taste of the cookie so we basically blind folded the participants but not really because we just didn’t show the packages the cookies came in. We then asked which cookie tasted better, many participants choose the expensive cookies and they said it had better flavor and wasn’t so chewy as the cheap cookies. In this first test we had a result of only one participant who chose the cheap cookies and nine of the participants chose the expensive ones even though they might not taste the best.
from the results, the data shows that Evian, something that is bought in stores and is more costly than Dasani or Nestlé because it is a spring water, is of the worst quality and of less quality than something that you can get for free, tap water.

Acknowledgements

My group and I would like to recognize Ms. Morgan and Mr. Lockard for giving us this opportunity and for providing most of the supplies that we needed to be able to conduct the research. We would also like to thank the Chemistry Department of WSU for giving us the space where we could conduct the research and really make the research possible and Ms. Journell for guiding us through our research and ensuring that our work was of the best quality.

References


TRIO UBMS Center Vision Statement:
We are a nationally recognized, intentionally-minded college access program that prepares students for purposeful lives and meaningful careers. We are a leader in empowering students to conscientiously impact the world in which they live.

TRIO UBMS Center Mission Statement:
It is the mission of the TRIO Upward Bound Math Science Center to:
- Educate students with the propensity for study in STEM areas for post-secondary
- Stimulate and sustain interest in STEM careers, and
- Motivate low-income and potential first-generation college students to realistically consider the attainment of a post-secondary degree.

TRIO UBMS Center Guiding Principles:
The following list of Principles (CD-DIP) were developed and adopted by the 2010 participants.

- Conscientious - I make informed decisions, and I accept responsibility for the decisions I make.
- Dedicated - I strive for excellence in all aspects of my life.
- Discerning - I use my imagination, creativity, and my cognitive skills to set and achieve my goals.
- Intentional - I use my given talents and skills to better my life and the lives of others.
- Purposeful - I continually pursue personal success and development.

TRIO UBMS Center Guiding Principles (Staff):
UBMS staff members shall work to uphold and model the following principles:

- Staff will be conscientious with students and service provision, understanding that their work can be life-changing for students when done well.
- Staff will dedicate themselves to the concepts of continuous improvement and constant evolution.
- Staff will strive to be discerning when evaluating student behaviors and academic abilities, believing that every child can learn if we take the time to teach them.
- Staff will plan and implement program services with intention, focused on getting end results and meeting student needs.
- Staff will commit to helping each UBMS student and alumni find their ultimate purpose, including, but not limited, to vocation.
Results

It appeared that the many different types of distillation and purification are used for a reason as a result of the purity that is in the water that we drink daily. The drinking water limits on pH are 6.5-8.5, and from the results gathered, Aquafina averaged a 6.5, which is the bare minimum that is needed to be drinking water, Dasani and Distilled water averaged a 6.7 on the pH scale, Nestlé got a 6.8, Evian got a solid 7.5, and Tap water got a 7.9 on the scale as an average. That shows that Aquafina was borderline on the scale with a 6.5 and that Nestlé was the closest to what is typically recommended, which is a 7 on the pH scale. The next quality that was tested was Total Alkalinity. All of the bottled water, except Evian came out to a solid mean of 40 as an Alkalinity level, not that far from the recommended level of 0 as an Alkalinity. Tap water had the next highest Total Alkalinity, which is nothing to worry about compared to the Total Alkalinity average of 240, which means that Evian has a bigger probability of damage to the tissues and organs and can cause problems in your immune system. And onto our last tested water quality, Total Hardness. All but Evian and Tap water had Total Hardness levels of 200, which is far above the recommended level of drinking, which is 200. That means that Evian and Tap water have a higher likelihood of inducing hypermagnesemia, cardiovascular disease, and atopic dermatitis in children.

Discussion

One of the prevalent results is that despite where the source of water is from, what really matters is what is done to the water and the processes that the water goes through to be purified and to pass the drinking standards of the EPA. An example of this is Evian, where the website says that "it gets its exceptional quality from the purity of its source. Protected under a fortress of geological layers built up by glaciers 30,000 years ago, it slowly travels through a natural glacial sand filter... samples are taken at over 20 different points between the protected catchment point and the on-site bottling plant to ensure consistent bottling quality, from the spring to you.” What that makes me think before looking at the results is that it would be amazing and the taste is amazing, but after the results and looking at what other waters with better quality say, like “collected from a local river” or “from a “ municipal water supply”, I can see that where the water comes from isn’t what matters. And
the differing quality that was being tested. The dependent variable was the varying results that were obtained from the experiments. The control variable was the distilled water so I could compare all of my results to since distilled water is the purest water that there supposedly is. I also was able to control the number of waters used, the types of waters used, and the temperature that the water was at and how to change the temperature if it wasn’t conforming to the rest. The hypothesis for the experiment was, “if Nestle pure water, Dasani, Aquafina, tap water, and distilled water are tested for total alkalinity, total hardness, and pH, then bottled water will be of superior quality than the quality of tap water.”

Background Research

The background research that I obtained before starting the experiment was looking at where each water came from and what types of purification the water went through. I obtained these from the specific websites of the brands and for distilled water and tap water; I looked at references to look at what was commonly said. I also looked at what some other studies did when they ran some similar experiments and research, but didn’t really come up with anything that emulated what my research was looking for.

Materials List

The materials that were used for the experiment were the bottled waters of Aquafina, Dasani, Nestle Pure Life, and Evian, which were used for testing. We also got Distilled water and tap water to be used as the control for the experiment and so we could compare any of the results to. We put the water in Styrofoam cups and measured the temperature of the water before and after the testing to ensure that temperature did not affect any bacteria growth or anything else that could affect the results for the experiment and we last used the testing strips, which were our method of being able to extrapolate the results from the water.

Method

The water was obtained in a 1 liter water bottle and the distilled water was obtained in a gallon container. The tap water was gathered from a water fountain that was found on campus. We let all of the waters sit on a wooden desk in Styrofoam cups or in their containers so the temperature of the water could match the temperature of the room it was in. We ensured that the water was closed or unopened if it was bottled water and for the tap water, we covered it to ensure that no micro bacteria or air particles would contaminate the water that would be tested. In the testing, the tests were conducted one at
What is the Immaculateness of Bottled H2O?

By: Andy Lau, Brayan Manzano-Legarda, Alexander Solis
Mentor: Ms. Heather Journell

Abstract

This paper explores and defines the quality of different water types which range from distilled water, to bottled water, to tap water. The experiment looks at the brands of Aquafina, which is pure water, Dasani, which is purified water enhanced with minerals, and Evian, natural spring water, distilled water, and tap water from a fountain. Some of the questions that influenced this research and the topic itself are “Is bottled water really better than tap water?”, “What goes into bottled water that makes it different, if at all, than tap water?”, and “Why are there different types of bottled water and what makes them better/different?” So throughout the experiment, we found that water is just water and that nothing special was really evident in our results, whether it be the minerals that were added or if any specific filters were used, but one problem that we encountered in our experiment is that a lot of the results seemed to be exactly the same, so there wasn’t really a large variance in our results with the exception of two types of water. Another problem that we encountered was that when we got the tap water, it, along with some other waters, were a lot colder than the room temperature, so we let the waters sit until they became room temperature, which they eventually did. So hopefully, our research will be able to add to other experiments that have been conducted and really be able to answer whether bottled water is better than tap water.

Question

The question that my group had was whether the bottled water that many people all over the world buy all of the time is really worth it and if it is of better quality than the normal tap water that we get from fountains and faucets, and if the quality of bottled water was worse or close to the quality of tap water, then an alternative could be just drinking tap water, which is much cheaper than having to buy bottled water.

Variables and Hypothesis

I had three main groups of variables, which were independent variable, dependent variable, and the control for the experiment. The independent variable for the experiment was the different type of water being tested and
We waited for two days in order to be able to see the bacteria in the petri dish and collect the data we need.

**Result**

Of course we found out that dirt leads to having the most amount of bacteria which covered the whole dish. The sanitizer had a few spots of bacteria on the dish which were small but had many. But the Ivory soap only had one small spot of bacteria, less than the other 5 which surprised us since it says that it kills 99.44% of bacteria. The anti-bacteria also had few dots, not as close to the water results. The petri that had water was mostly covered in small dots and three big dots that were close to each other. We try to put this in a graph by the percentage it has of covering the petri dish with bacteria.

**Conclusion**

So I guess our hypothesis was wrong to say that the sanitizer would be the most successful to kill the most amount of the bacteria but it was able to get really close. But we all knew that the dirt wouldn’t be at the top nor halfway, so we at least made one assumption right. We were able to eliminate the bacteria in the petri dish by burning them in a really hot furnace after we observed and took pictures of our experiment. In order, the petri dish that had the highest amount of bacteria was dirt then water, sanitizer, anti-biotics and finally Ivory. In conclusion, we should have at least antibiotics or Ivory soap to really clean your hands in a cheap way, which can be good for a person who is germophobic or a mother.

**Acknowledgment**

Thank you to Ms. Kaphle our mentor for helping us get the petri dish and correcting us in our mistakes. Thanks to the Hubbard Hall of biology for letting us borrow one of your rooms for our research program. Thank our participants for cooperating and volunteering to the project. We also like to thank Mr. Lockard and Mrs. Morgan for helping us in the program.

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**Hot is the Coolest: Mpemba Effect**

*By: Naydelin Barrera-Trejo, Laura Malagon-Palacios, Luis S. Ramirez, Brenna Storlie*

*Mentor: Mr. Philip Pettis*

**Abstract**

The Mpemba Effect is an unexplained phenomenon of science. Although, the fact that hot water can sometimes freeze faster than cold has been known for many centuries, scientists still find this phenomenon counterintuitive and surprising (Monwhea, 1998). To this day, there is no well-agreed explanation for how this effect occurs, due to the fact that it is not consistent.

**Research Question**

Does the Mpemba effect happen in other liquids that have different elements?

**Hypothesis**

If we have hot temperature liquids, cool temperature liquids, and room temperature liquids, then the hot liquids will freeze faster no matter the different elements each of them have.

**Variables**

Independent- The different liquids (milk, juice, coke, water)
Dependent- the temperatures
Control- freezer, starting temperature

**Introduction/Background**

The Mpemba Effect was discovered a long time ago when a Physics professor and a student named Erasto Mpemba in the physics class tested hot and cold water by freezing them in the freezer. This test actually resulted in what was already an unexplained fact for many people. To this day, there is still no well-agreed explanation of the why Mpemba Effect occurs. What is left to figure out is if this effect can be applied to other liquids and substances and under different temperatures. The purpose of our project is to see whether the Mpemba effect can be observed if we apply the same experiment with different liquids, considering they all have different properties. Our research will test our hypothesis, and from our results we will be able to reject or accept the null hypothesis. In addition, this will help us determine if this process is related to Darwin's law of cooling.

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**Quality of Different Hand Wash**

*By: Roy Flores, Brian Garcia Sandoval, Inri Medina*

*Mentor: Ms. Pranita Kaphle*

**Introduction**

Many ads claim that their products are able to kill bacteria when you wash your hands. But are they telling the truth, since no one can really know for sure. So we tried to find the top four products that people use to wash their hands because ads or people suggest that it works. But we also wanted to know how we know if the agar would react to having a large amount of bacteria. So in our experiment we try to find out what type of material/products can eliminate the most amount of bacteria on our hands.

**Question**

Are ad products actually telling the truth? Which product or material really kills the most amount of bacteria?

**Hypothesis**

If we apply water, dirt, Ivory, Germ-X and antibiotics then we believe that Germ-X will kill the most amount of bacteria because they state that it kills 99.99% bacteria.

**Materials**

We have 5 material/products dirt, water, antibiotics, sanitizer, Ivory to see which of the five is actually truth. We made a hypothesis that out of the five materials, we believe that the sanitizer will be able to kill most of the bacteria because there are a lot of claim that sanitizer kills 99.99% bacterium. We were able to have 5 volunteers from different grades to test the amount of bacteria they had on their hands. We used agar, petri dish with a lid, cotton swabs and parafilm in order to collect our data. We used dirt, water, antibiotics, sanitizer, and Ivory to put on our hands to see which one of these can kill most bacteria on our hands. But before we put them on hands we collected the bacteria we had on our hands to see the difference after we put on the material. We used the cotton swabs to collect the bacteria on our hands and rub it on the agar. Agar is a gel that got frozen in a petri dish that can show bacteria but has to be in a clean area in order to get our data correct. Before we put them away, we seal it tight with a parafilm which is like tape so it won't fall out or get any air.
Data Analysis

The first day of carrying out the experiment all of the treatments went well except for participant D, who used the mixture of lemon juice and baking soda. Participant D's gums bleed, there was no pain. As the days went on the only real change in tooth color was in participant A, who used Crest Noticeably White Whitening Strips.

Conclusion

Our hypothesis was correct. The only participant that got good result (whiter) was participant A. The subject's teeth went from a 13 to a 7. The other participants stayed at their original tooth shade. The experiment went well, but for future references I would definitely have the treatments applied for more than just 7 days and we would also control each of the subjects' diets, because both of those elements could have altered the results.

Acknowledgement

Thanks to Mrs. Morgan, Mr. Lockard, the Chemistry Lab, and Ms. Journell.

Bibliography


Materials

- Styrofoam Cups
- Microwave
- Freezer
- Thermometer
- Coke
- Water
- Milk
- Apple Juice

Experimental Procedures

First we will measure the temperature for all the liquids to see their room temperature and collect the data. For the cold liquids (skim milk, coke, water, apple juice) we are going to pour 150 milliliters of each liquid in four different foam cups, then we are going to place the cups in the refrigerator and check them every 5 minutes to see if they all have reached 15°C. Once the liquids have reached 15°C we will immediately carry them to the freezer and check the temperature every 30 minutes to see what liquids have reached the 0°C mark and how much time the liquids took to freeze. For the room temperature liquids we will already have their room temperature measurements, so all we have to do is place them in the freezer and check them again every 30 minutes to see what liquids have reached the 0°C mark. Now, for the hot liquid temperatures we will place 150 of each liquid in the microwave for 30 seconds or less so it can reach 60°C. Once they reach the hot temperature we will immediately place them in the freezer with the thermometer and check every 30 minutes, as well, just to see what liquid froze the fastest.

Data Analysis

Once the data was recorded, the results showed that in the trials for water and coke, hot water and hot coke froze the fastest. On the other hand, when experimenting with the milk and the apple juice, the results showed that cold milk and cold apple juice froze the fastest. The liquids froze nearly at the same time; it only took about one and a half hour for the 4 different liquids to freeze. When doing the experiment with both water and coke, there was a weird change in the temperatures with the cold and hot liquids. At first cold liquids were freezing the fastest, but when they were about to reach the freezing point the hot temperature ones froze. In other words the Mpemba Effect only happened with 2 of the liquids tested, unlike with the apple juice and the milk, which were the ones where the cold milk and cold juice froze first.
In conclusion, the Mpemba Effect is a rare phenomenon. Part of the hypothesis stated was proven right and part was proven wrong; only half of the tested hot liquids froze the fastest. The different elements each liquid has does not affect the Mpemba effect.

Acknowledgments

Mr. Dave
Mr. Pettis
Mr. Lockard
Mrs. Morgan
UBMS staff

Bibliography


Materials

Activated Charcoal
Baking Soda
Water
Lemon Juice
Colgate Optic White Toothpaste
Crest Noticeably White Whitening Strips
Cotton Swabs
Oral-B Toothbrushes
Cups

Procedures

Prepare the products, by getting out the Crest White Strips, Colgate Optic White Toothpaste, and mixture of two tablespoons of baking soda and a few drops of lemon juice (until the mixture is a paste), the activated charcoal water mixture (paste), and get out the Colgate Cavity Protection Toothpaste. All four participants will rinse their mouth with water.

Participant A will apply the Crest White Strips on their teeth and leave the strips on for 30 minutes.

Participant B will use the Colgate Optic White Toothpaste by brushing their teeth for 2 minutes. Using the Oral-B toothbrush.

Participant C will be using the Activated Charcoal mixture by brushing their teeth with an Oral B toothbrush and leaving it on for 4 minutes.

Participant D will be using the baking soda and lemon mixture by applying it on their teeth with a cotton swab and leaving it on their teeth for 2 minutes. Participant E will be brushing their teeth with the Colgate Cavity Protection Toothpaste.

After participants are done using their products they will rinse their mouth with water. (Participant C and D will brush their teeth after they apply the products and then do step 4)

For 5 days follow steps 1-4 and collect data
Do Teeth Whiteners Actually Work?

By: Janet Delgado, Erika Velazquez, Michael Ann Yates  
Mentor: Ms. Heather Journell

Abstract

In this project we experimented with teeth whitening products to see if teeth whitening products really work. This experiment is relevant because a healthy smile can be a great asset, and it makes sense to give your teeth the best care and appearance possible.

Question

Do teeth whitening products really work, if so which ones?

Hypothesis and Variables

If five people treat their teeth for one week using either Colgate Optic White toothpaste, Crest White Strips, Colgate Cavity Protection toothpaste, or a mixture of lemon juice and baking soda, or activated charcoal tablets, then the person that used the Crest White Strips will see the teeth turned a whiter shade. The independent variables are the different types of whitening products we used. The dependent variable is the result each subject gets after the use of the products. The control variable is the subject that used the regular non-whitening toothpaste.

Background Research

The history of teeth whitening, or cleaning teeth, can be traced back to ancient times. The practice of teeth whitening began around 4,000 years ago with the ancient Egyptians, who created a whitening paste using ground pumice stone mixed in wine vinegar. White teeth were a mark of beauty and a sign of wealth. Ancient Romans whitened their teeth using urine. The ammonia in the urine was the bleaching agent. The effects of fluoride were discovered in the early Nineteenth Century, when dentists realized that patients exposed to the chemical in food and water had cavity free teeth. However, it was also discovered that too much fluoride can stain teeth. In addition, whitening teeth looks pretty but if your teeth are too white it could be a sign of unhealthy teeth. Teeth whitening can break down enamel over time and cause gum and tooth sensitivity.

Elevator Experiment

By: Oases Carrington, Tatyana Hopkins, Anautica Bodney  
Mentor: Mr. Philip Pettis

Introduction

The purpose of this study was to find out how males and females react to the same and or different genders while in a small environment. During this study we used an elevator located in Lindquist to test if gender mattered. Social norms are a huge thing in the social life but they go unnoticed often. By conducting this experiment we will be able to figure out why males and females act differently to the same or opposite sex. It's important so we can understand when we are making someone uncomfortable by being too close. No one wants to be that creep in the elevator.

Literature Review

Gender roles is a set of societal norms with different types of behaviors which are generally considered acceptable not appropriate for a person based on their actual or perceived sexuality. The roles of genders are never universal, but with a single country, and they are always historically and culturally contingent. It is stated that more women are known to be feminine and male are to be masculine. The gender role theories expresses environmental conditions and socialization of different norms, beliefs, and behaviors as a male or female. Girls are more physically advanced at birth, meanwhile boys are mature muscular development but are more vulnerable to diseases at the end hereditary anomalies. According to Gender and Sociology, the socialization that are learned starts a birth, and that are taught that they have an assigned gender role. The roles in the 1900’s were very different than today’s, people were to live up to a certain standards that were well known to be harsh and demanding.

Hypothesis

HYP1 Females  
Would have a more uncomfortable reaction to the male instead of the female.  
HYP 2 Males  
Would a more uncomfortable reaction to a male than a female
Method

This experiment will follow seven steps with both the male and female confederates on 5 men and women each. The confederate will enter the elevator with Mr. Pettis, Tatyana (the observer) the confederate (Oases or Anautica), and a person (non-researcher) entering an elevator. Mr. Pettis, will also pretend to be an ordinary nonparticipant riding the elevator (This is to ensure safety of students). They will stand away from the individual, then getting closer to them. Then they (the confederate) will engage (or attempt to engage) in a conversation with the individual entering the elevator (non-researcher).

The objective is to examine what reactions develop from the individuals and to see if men and women react differently to different stimuli. During this time Tatyana will make observations of behaviors. While during the experiment Tatyana will stand by the elevator door pretending to be preoccupied on her cell phone and not paying attention. As the individual leaves (nonparticipant) leaves the elevator Tatyana will then ask them how they felt while riding the elevator. The questions will evaluate how the individual felt going in and coming out of the elevator. The questions are for data purposes and to let them know it was an experiment. We will then ask the person entering the elevator if it is ok for their responses and reactions to be included in the data analysis, with nonidentification information other than gender.

Assessments and Measures

Before performing this experiment we researched studies like ours and researched gender roles to better understand why gender has certain traits and how they could be changed. We came up with a plan to make entering the elevator normal so it didn’t look suspicious and influence the data results. By making a questionnaire to follow up experiment we were able to hear what they had to say and any comments that they didn’t make in the elevator. Independent variable would be the Gender both testee and conductor. Dependent variable is the testees reaction.

Results and Analysis

For Oasis’s testees, the three main answers for the males were unnoticed, fine, and uncomfortable. Forty percent of the male testes for Oases were uncomfortable with him being in their personal space and another forty percent were fine with it. The remaining twenty percent of the male testes barely even noticed him. The female testees were either uncomfortable or fine.

Experimental Procedures

First we Collected control samples from our 4 subjects. Then we put the samples in a sterile container. Then we had them try each of the products with swishing regular water in between each one. We put their spit in a sterile container. Next we used cotton swabs and dipped them in the spit and rubbed them on the nutrient agar plates. Next we put them in the incubator for 48 hours at 37 degrees Celsius. After 48 hours we took them out of the incubator and observed them. Lastly, we made a tri-fold.

Data Analysis

Although none of the products removed all of the bacteria, from what we observed Crest killed the most bacteria. Listerine came in second, baking soda was third and the one that killed the least was the salt & water killed the least amount.

Conclusion

In conclusion, our hypothesis was wrong, we were able to find that Listerine did not kill the most oral bacteria but that Crest did. Also, even though Listerine has a very strong taste that can cause a burning sensation, so it feels like it’s working but that’s not always the case.

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Mrs. Monk-Morgan, (mentor), Biology Department, Mr. Lockard, All TC’s, Human test subjects, and lastly our UBMS family,

Bibliography

Quality of Different Mouthwash

By: Angel Bailey, Eneva Brown, Taylor Kelley
Mentor: Ms. Pranita Kaphle

Abstract

We were testing a theory that came to mind, weather home remedies or Actual products would work for oral bacteria. Our experiment took us roughly 4 days all together. We were very surprised on our results.

Question

Have you ever wondered which home remedy or mouthwash is best to control for oral bacteria?

Variables and Hypothesis

Our independent variable was the types of mouth rinses, the dependent variable is the amount of bacteria, and the control was the trial with no rinse. We predicted that the Listerine Antiseptic Mouthwash would be best control for oral bacteria.

Background Research

While looking up home remedies and products baking soda and salt water were the first to show up in the search for home remedies and for store bought products the top two that showed up were Listerine and Non-Alcoholic Crest. So, we decided to test the theory.

Materials List

Listerine
Non Alcohol Crest
Water
Baking Soda
Sea Salt
Nutrient Agar Plates
Sterile Cotton Mouth Swabs

Conclusion

In conclusion, the first hypothesis was supported by the data due to the female’s’ reaction towards the male conductor. However the second hypothesis was not supported because the male testes barely noticed the male conductor. The female noticed the male conductor as expected but the males did not or were fine with it by surprise.

Acknowledgment

We would like to thank and acknowledgment Ms. Morgan, Mr. Petties, Mr. Lockard, and our participants.

References

Sweltering Rubber Bands

By: Tiffany Bass, Gloria Medina, Mai Her, Tiahna Padilla
Mentor: Mr. Phani Vuka

Abstract

The rubber band car has a very strong influence towards the mechanical industry. In this research paper, we are experimenting the different type of rubber bands for the uses of car. We have three different types of cars and three cars of each type. We will be only calculating the distance of each car of trials of 10, 15, and 20 rotations. Setting the environment for the experiment will be a great setback. We first did the first and second trials on a desk, but the desk have a bump, which kind of caused a factor in the data. Though in the end, we did collect extraordinary data and was able to come to a conclusion with the rubber band car. It cannot, or at least for now, replace electricity, corn oil, or fossil fuel for the source of modern cars.

Introduction/Background

A rubber band car is a machine that has two wheels and is powered by the use of a rubber band. Essentially how it works is that the rubber band is attached and anchored to the objects that are being used as the wheels. It is then wound up and released. This relates directly to why have such diverse selections of how cars are powered in today’s world. Cars or trucks are mainly powered by gasoline or diesel. However, we have car that are powered by electricity, biodiesel, ethanol and scientists are currently working on a hydrogen-powered car. These different types of power are being developed due to lack of resource, these developments were created by starting simple for instance the power a rubber band exerts.

Practical Uses

Simple models such as these can help you determine different parts that could be used in the future. We would be able to tell if the measurement of the material helps with movement.

Research Question

As the thickness of the rubber band varies, will the distance of the car vary?
In conclusion, the carbon filtered water was the safest and healthiest water to drink because it had a good pH level and little to no chlorine. Our hypothesis was correct because the carbon filter does purify water the best to drink water safely and healthy. The green colored bar is the before, and the blue bar is the after. During the experiment, the carbon filter got rid of all the chlorine, and cyanuric acid. Chlorine is good, but it has its limitations because it best works for water that is stored that can build bacteria, viruses, and protozoans. The cyanuric acid helps from chlorine to not be lost, so if there is not chlorine then the cyanuric acid is not needed. Purifying the different types of water made its pH level to neutralize. When water has a level of around 7 then it is drinkable. Alkalinity had a similar number to the rest of the types of water and this means that it is harder for the water to change pH levels. The hardness in the water is good and the carbon filter didn't give as much of it as the purification tablets. As we said, hardness is good but if we go back to the chlorine graph for the purification tablets, then we can see that it has too much chlorine in it. Chlorine is disinfectant to kill, and it isn't needed when you put water through your filter. The filter already does the job to kill the bacteria, and viruses in the water. Purification tablets would be more helpful in situations when people go out hunting, camping, or in emergency situations. This information proves that the carbon filter does make the safest and healthiest water.

**Hypothesis**

If the thickness of the rubber band varies, then it'll affect the velocity and distance.

**Variables**

Independent Variable: Distance Travel  
Dependent Variable: Rubber Bands  
Control Variable: Materials (such as cups, lids, pony beads, etc.)

**Materials**

- Rubber bands
- Hair ties
- Bungee cord
- 18 Coffee cups and lids
- One roll of Duct tape
- 6 pairs of Chopsticks
- Nine Paperclip
- Nine Pony bead
- Nine Washer
- One Pencil
- One Ruler

**Methods and Procedures**

1. Gather the necessary materials.  
2. Use a pencil to trace a circle on the bottom of each paper cup. Use the coin for a template.  
3. Stab the bottom of the cups with a pencil to make holes.  
4. Put the bottoms of the cup together so the holes align. Use the duct tape to secure the cups together at the bases.  
5. Using a pencil, poke holes in the center of the plastic cup lids. Then with a pair of scissors, cut the hole to a bigger size.  
6. Connect 3 rubber bands together.  
7. Insert your rubber band chain through the holes in the bottom of the cups.  
8. Feed each end of the rubber band chain through the hole in each lid.  
9. Attach the lids to the cups.  
10. On one side, attach a paper clip to the rubber band so it cannot fall back into the cup.
11. On the other side, insert the rubber band through the middle of the washer.
12. After the washer, thread the rubber band through a pony bead. There will be a little loop coming out of the pony bead.
13. Thread a chopstick through the rubber band loop coming out of the pony bead.
14. Twist it up 10, 15, and 20 for each trial.
15. Set it on the desk or floor and let it move.

Data and Analysis

We rotate a certain amount of rotations for each trial and record their distance. With each different type of rubber band, we did receive contrasting distances. In the beginning, we hypothesize that the rubber band cars will travel the furthest and the bungee cords will do the least amount of displacements. As we were halfway through trial 2, our conjecture begins to alter as a result of Hair Tie 1 reaching 315cm. Then, we believe that the fabric of the hair tie was acting as a kinetic friction allowing it to travel further. For the most part, using rubber bands as an alternative for fossil fuel is not worthwhile.

If we were to do it again, would we do it?

If we were to redo this experiment we would make sure to calculate time. The reason for this is so that we would be able to calculate velocity. We would have removed the fabric from the hair ties because that could have affected the data, and the distance that it could move. We would have less human error by allowing for maybe sometime of technology to take measurement, spin the car, etc. Lastly, we would have chosen different bands. The bungee cord bands were not sufficient. They barely moved the car and they were extremely thin. We would have calculated the velocity of each velocity and done more trials for the cars. We would also like to have more different type of rubber bands and more time. A lot of experiments are time consuming and takes a lot of team effort. If we have the choice to do this again, we would not do it together.

Conclusion

For rubber band to futuristically replace fossil fuel for cars would be sensational. However, we were only able to do a small amount of the mechanical and industrial engineering world. A lot of the time, the car did not move at all and was very frustrating. If a rubber band car was to be like this on the highway, it will be an extremely unfortunate situation. For now, rubber band cars cannot replace fossil fuel powered cars. In our research, rubber
Charts 1 and 2

Charts 3 and 4

band cars are a fantastic idea if the hair ties were not wearing a fabric coat. The fabric could've acted as a kinetic friction that allowed the hair tie cars to move further than any other cars. Thus we have to doubt the idea of using rubber bands to replace other car-powered sources because when fabric rub against each other, fire might ignite. All in all, a car running on elastic energy would be incredible, but for now, an elastic car is still not a thing.

Acknowledgements

We will like to thank the following for our success:
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Bibliography

Water Wheel Power Generation

By: Pedro Dominguez, Dylan Harmon, Christopher Solis, Cameron Morgan
Mentor: Mr. Phani Vuka

Saving the polar bears!

Background

Water wheels use a current to spin and generate energy. The wheel is a cylinder rolled on its side and has buckets or wood to capture water. The wheel uses the weight of the water to spin like all wheels, a water wheel spins on an axle that is connected to gears or other power generating source.

Introduction

Currently in the United States almost ninety percent of the electricity used is non-renewable. This is a very non-conservative action considering that once these resources are used up the only option is to go one hundred percent renewable which would be a very big change. If there are other ways to create energy, such as using wind, air, water, solar, heat, then why not implement those in the process of creating electricity? This research is meant to look at how using water to produce energy could be a procedure that may be implemented more in the everyday process of creating electricity.

Abstract

Within this paper we will discuss how the diameter of a water wheel affects its ability to generate water. To do so we created a homemade mini water wheel using household items and tested the amount of electricity it generated.

Question

How the diameter of a water wheel affects the power generated.

Variables and Hypothesis

Ind: The diameter of the wheel
Dep: The power generated
Control: The housing and sink used

Data Analysis

Experimental Procedure

To start the experiment, build a homemade filter by using an empty half liter bottle and cutting one fourth of the bottom. Next, attach 4 coffee filters at the top of the water bottle and tie them around it with a rubber band. Make sure it is as tight as possible. Make sure you clean everything before making the homemade filter. Then, add your cleaned pebbles first, then coarse sand and on top of that fine sand. You should have a hole on one side of the homemade filter and on that side just place 4 new coffee filters every time you use a different type of water. Make sure you clean everything before making the homemade filter. When purifying with the carbon, and homemade filter use 250 milliliters. For the purification tablets use 1 liter of water. Use 1 liter of water for the purification tablets because that is the required amount of water needed for the tablets to work.

Next, we measure all of the dependent variables. We need a pretrial before starting to be able to compare our results with what the purifying methods did. Next, we poured water on the carbon and homemade filter and just waited for the filter to purify all of the water. For the purification tablets, all we had to do is place the tablet inside a container that had one liter of water in it and close the container loose. The container with the tablets in it had to be in a dark room with a room temperature for the tablets to be able to work. Once the water had been purified, then we would record all of the dependent variables again. We would repeat this process for the three different types of water.
filter will purify water the best to drink water safely and healthy.

Background Research

We researched to figure out how we were going to determine water as pure. It turns out pure H2O is not good for you. H2O has no nutritional value and has no taste. There are actually other nutrients in the water that give it its taste and make it consumable. We have also done some research on the variables we tested for each water. We found the definitions of chlorine, pH levels in water, alkalinity, hardness, cyanuric acid. The information will give us ideas on what we measured in the water and what to look out for in the safest consumable water. Chlorine is a disinfectant that is added to public water supplies to kill disease-causing pathogens such as bacteria, viruses, and protozoans. Chlorine is best used for public water supplies because the water is stored and when it is stored it cause bacteria to build up. Pools have a lot of chlorine because many people are swimming in the water contaminating the water constantly. Chlorine helps to remove the unwanted bacteria from the water and keep it clean. Cyanuric Acid is a chemical to prevent chlorine loss. The more Cyanuric Acid that is in water, the less possibility for Chlorine to be lost. The pH level in water is a measure of how acidic or basic water is. The pH levels go from 1 to 14. PH levels under 7 indicate the water to be acidic; levels over 7 are basic. Alkalinity is the capability to neutralize acid. It is also an expression of buffering capacity. Buffer is a solution to which an acid can be added without changing the pH level. So if a liquid has a good ph level you want it to have more alkalinity so it doesn’t change or move from that. Hardness is the amount of dissolved Calcium and Magnesium. Both, Magnesium and Calcium are good for you.

Materials List

- Drinking Water Test Strips
- Measuring Cup (250 ml)
- Pool Water (1.5 liters)
- Rainwater (1.5 liters)
- Tap Water (1.5 liters)
- Empty One Liter Bottle
- Carbon Filter
- Cotton Balls
- Coffee Filter
- Fine Sand
- Coarse Sand
- Pebbles

Procedures

A. Prepare the Disks

The generator we are building has two basic parts-the rotor and the stator. The stator is the part that remains stationary and has coils of wire to collect electricity. The rotor is the part that moves. It is equipped with powerful magnets that will induce a current of electricity into the coils.

1. Glue the template sheet to the cardboard with white glue. Be sure to spread a thin layer of glue evenly over the entire back of the template.
2. When the glue has dried, use the utility knife to cut the rotor and stator disks from the cardboard sheet. Carefully trim the edges. Also, be careful not to damage the tabletop with the utility knife. Work on a piece of scrap wood or a cutting board.
3. Using an awl or sharp nail, punch a small hole through the rotor disk at its exact center, as shown. Using the utility knife, make a larger (1 cm) hole at the center of the stator disk.

B. The Stator

1. Prepare a jig for winding your coils by cutting a 3 cm by 16cm piece of cardboard, folding it in half and securing with a small piece of electrical tape.
2. Cut 8 short (4 cm) strips of electrical tape and set these aside.
3. Leaving a lead of about 10 cm, start winding the first coil on the jig. Wrap the wire neatly onto the jig, forming a tight coil. Use 200 wraps or turns.
4. Carefully slip the coil off the jig and secure it using two pieces of the electrical tape you set aside in step 2 above.
5. Using a small patch of emery cloth or sand paper, remove the enamel insulation from the ends of each lead, exposing about 1 cm of bare wire. Be sure the wire is completely bare!
6. Repeat steps 1 through 5 to make three more coils.
7. Lay the coils loosely on the disk in the position shown by the template. Arrange the coils so their windings alternate between clockwise and counterclockwise, as shown on the template. THIS IS VERY IMPORTANT! Arrange and connect the coils so that an electron would follow the path shown by the arrows, starting with the counterclockwise coil on the left hand side.
8. When you are sure you have them arranged correctly, connect the coils by twisting the bared ends together, covering the connections with small pieces of electrical tape.
9. Check your connections: Set your multimeter for measuring electrical resistance (ohms). If your connections are good, there should be little resistance to the movement of electrons, and the meter should produce a reading of about 10 ohms or less. To check this, touch or connect the probes to the two free ends of the wires from the coils. If the coils are not properly
connected, the reading will be a very large number, or infinity.

10. Once you are confident the coils are properly positioned and connected, glue them to the stator disk. Lift each coil up a little and apply a large blob of glue to the template where the coil touches. Let the glue solidify before gluing the next coil.

11. With the utility knife, cut 4 slits through the cardboard between the magnets as shown on the template. These slits will be used to fasten the stator to the plastic container later.

C. The Rotor

1. Obtain 4 magnets. Using the magnetic compass, determine the polarity of each face, and mark the south pole of two magnets and the north pole of the remaining two using a felt pen.

2. Warm up your hot glue gun, and prepare to attach the magnets to the rotor disk. The magnets must be arranged so that their polarity alternates (i.e. N-S-N-S). Their position and polarity are indicated on the template.

3. Squeeze a small (1cm) blob of hot glue on the spot where the first magnet will go. Quickly press a magnet with its washer onto the blob, as shown below. Allow the glue to solidify before moving onto the next magnet.

4. Repeat this for the remaining 3 magnets, making sure to alternate north and south poles as you go.

D. The Shaft

1. Cut the dowel down to 20cm in length.

2. Using a pencil sharpener put a point on each end of the wooden dowel (it is not necessary to make a sharp point-blunt will do).

E. The Turbine

1. Drill a 1/4" (6mm) hole through the CENTER of the large cork, or use a cork borer to make the hole.

2. Center the wide end of the cork on the marking guide on the template page, and mark the cork with a pen or pencil.

3. Place the cork wide-end down on a cutting board. Use the utility knife to cut shallow slits into the cork where the spoons will be inserted. USE CAUTION!

4. Obtain 8 plastic spoons. Using the wire cutters, cut the spoon handles leaving a 1 cm stem on the bowl of the spoon.

5. Be sure the glue gun is warmed up and that you have a glue stick or two handy.

6. Insert the first spoon into the cork, using the turbine template as a guide. Push the stem of the spoon into the cork to a depth of about 1 cm.

7. Repeat step 6 with the remaining 7 spoons. Adjust the angle and depth of the spoons so they are evenly spaced and all project from the cork at the same angle.

By: Edgar Madrid, David Nevarez, Bo Tolbert
Mentor: Mr. Phu "David" Lam

Abstract

This experiment tested different types of purification methods and compared the results in order to find out the most effective one. We tested a Brita carbon filter, purification tablets, and a homemade filter. We measured the chlorine levels, levels of alkalinity, hardness, and cyanuric acid before and after we purified the water. We purified three types of water: tap water, pool water, and rainwater. After comparing the data we saw that the carbon filter made the safest and healthiest water. Not to mention the fastest and tastiest water.

Question

What water purifier would work best to drink water safely and healthy?

Purpose

We are a group with a curious mind and we wanted to experiment what purifier would work best to drink water safely and healthy. The only three liquids David drinks are water, milk, and juice. David does not drink soft drinks because it doesn't give him the best feeling in his stomach, and he is also an athlete. Every time David goes out, he orders water. He wanted to experience and find out what purifier he could use at home that will make his water safe and healthy. For Edgar, he's an athlete and he was curious on what purifier he can use before his games. He wanted the safest and cleanest water he could get right on the date. For Bo, he cares about human safety. Bo is a person that really cares about the health of people and water is something people drink every day. He was interested on what water had after purifying it and if it actually worked.

Variables and Hypothesis

For this experiment, we will be experimenting which purification method would make water safer and healthier. Our variables would be: The methods of purification and the types of water (Independent Variable), Chlorine, pH levels, Levels of Alkalinity, Hardness, and Cyanuric Acid (Dependent Variable), and the amount of water for each experiment (constants).

Our hypothesis for this experiment is: If we purify 3 different types of water with purification tablets, carbon filter, and a homemade filter then the carbon
8. When you are satisfied with your turbine, add some hot glue to each spoon to secure it on the cork.

F. The Housing
1. Obtain the plastic container and tear off any labels that might be attached to the sides. Using scissors or a utility knife, cut part of the bottom off, as shown in the photo below.
2. Using a ruler, find the center of the side as accurately as you can. Mark this point with the permanent marker. Repeat for the other side.
3. At the mark on each side of the container, drill a 1/4” (6mm) hole through the plastic.
4. Lay the stator with its attached coils on the side of the container so that its center hole is over the hole in the container. Push the nail (or awl) through each slit on the stator disk to mark the locations of these slits on the side of the plastic container.
5. Using the utility knife, make 4 small slits on the side of the container, corresponding with those on the stator disk.
6. Using the brass fold-over tabs, securely mount the stator disk to the side of the plastic container. Bend the tabs flat on the inside of the container, as shown.

G. Final Assembly
1. With scissors, cut the vinyl tubing into two small lengths, each 1 cm long.
2. Slide the shaft into the plastic container through the hole in the stator. Inside the container, slide one piece of tubing onto the shaft.
3. Position the turbine inside the container so the spoons face the neck of the bottle.
4. Push the shaft through the turbine’s cork. Work the cork and the tubing down the shaft so the shaft comes out the other side of the container and projects by about 4 cm.
5. Adjust the position of the turbine so the spoons line up with the neck of the container.
6. Adjust the position of the tubing so that it comes close to but does not touch the inside of the container.
7. Slide the second section of tubing over the end of the shaft as shown. The two pieces of tubing will help to keep all parts of the turbine positioned correctly when it spins. Spin the shaft to be sure it turns without binding, and that the turbine does not strike the inside of the container as it spins.
8. Slide the rotor disk onto the shaft. Position it so that the magnets come within 2 or 3 millimetres of the coils. Spin the shaft to be sure the magnets do not strike the coils.
9. Check the rotor disk to see that it spins true. Turn the shaft slowly and note any wobble. Adjust the angle of the disk on the shaft as necessary.

10. When the rotor disk spins without wobbling, fix it in position with hot glue applied to the point where the shaft passes through the reinforcing disks.

H. Testing

If all has gone well with your construction, this turbine should be able to produce significant amounts of electricity, depending on the speed of the water striking the spoons.

1. Place the neck of the plastic container under a faucet and turn on the water. The rotor should spin quickly!

2. Connect your micro-hydro turbine to a multi-meter and set the dial to read volts of alternating current. Measure the voltage generated by the operating turbine.

Materials

- Paper Templates: Micro-hydro template (74K) and Printing Instructions
- 4L plastic jug (rectangular style, from vinegar, windshield washer fluid, or similar-see illustration)
- 10 plastic spoons
- 1 large cork (3.5 to 5 cm)
- Enameled magnet wire, 24 gage (approx. 100 m)
- Foamcore or heavyweight corrugated cardboard (approximately 22 cm by 30 cm)
- 6 mm (1/4 inch) wooden dowel (20 cm long)
- 4 ceramic or rare earth magnets (18mm or larger)
- Clear vinyl tubing (6 cm long, 1/4” inside diameter)
- 4 brass paper fasteners

Tools

- Electric Drill, with 1/4” Drill Bit
- Scissors
- Electrical Tape
- Ruler
- 10 cm (3.5 inch) Nail or Awl
- Hot Glue Gun, with 3 Glue Sticks
- White Glue
- Utility Knife
- Pencil Sharpener

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Conclusion

The purpose of this experiment is to determine if folding 5 types of paper airplanes make a difference when it flies. Our hypothesis stated “If we fold different types of paper airplanes then the number of folds will affect how far it will fly because the more folds it has will make it heavier.” Our hypothesis was right because the higher amount of folds the plane has the better it flew with the exception of the basic bird. The plane with the 2nd least amount of folds is the shorter basic and that flew 355.41cm and the plane with the most folds flew a longer distance of 806.19. So the plane with the most folds flew longer and the plane with the second least folds flew shorter. We would use a launcher for the planes because using a person to launch it is flawed and inaccurate. We learned that the weight of the plane mattered more than the number of folds the plane had.

Acknowledgements

Mr. Lam – Our mentor
Janitors – The People who cleaned up after us
TCs – Taking away our phones and keeping us on track
Mr. Lockard – Doing our experiment with us

Work Cited


Permanent Felt Tip Marker
Magnetic Compass
Wire Cutters
Gloves
Safety Glasses

Conclusion

When creating energy through different methods it is important to remember the properties that come with it. For instance when working with mechanical energy (energy produced by movement) it’s important to remember Newton’s second law. In Newton’s second law it states that torque is a twisting force that can cause rotation. Since the water wheel is a wheel rotating due to the current of the water, the bigger the diameter of the wheel is, the more torque is created, which means the more power is created. Due to this knowledge it is applicable to say that the bigger the water wheel system is and the faster the current of the water is then the more energy can be produce. This type of water system can be found in rare areas in the order of creating electricity. But what if water wheels were set up locally at resident’s houses to collect energy when it rained hard? Or instead of only when it rained, putting water wheels up at houses by the river to allow water to pass underneath the wheel and turn to wheel to produce electricity. There are many applications of water in the form of producing electricity. The only question is whether society will decide to be more conservative or not.
Abstract

We see fruit everyday of our lives. We eat it, we cook with it, and we dispose of it but no one thinks passed what’s on the surface. If you take a closer look you will find a battery, an organic battery that can charge anything when used efficiently and correctly. Fruits have innate acidic qualities that allow them to act as such and carry current, thus, producing electricity. Only specific acidic levels can do this, however, and that is what this experiment sets out to prove. A higher acidic level should produce a higher voltage. This voltage can be used in so many different ways and eventually power this world.

Question

Is fruit that is more acidic, contain more voltage than those fruits that are less acidic?

Fruit Powered Lights

Electricity is a word that society uses every day. It may be in a different form such as power, energy, or even juice. Regardless of what word we make use of we are all referring to the same notion each and every time, the flow of electrons from one place to another. This flow, or current, is found in everything we employ and everywhere we go from wall outlets as well as power banks but where does it come from? This energy comes from power plants that harvest sunlight, manipulates wind and water currents or, most frequently, burns fossil fuels. Nevertheless, power plants are not the only place in which current can be found. These establishments have only been created to mimic what is already occurring in nature. Through nature electricity takes the form of life and gives even the smallest of organisms its benefits. In spite of knowing this, humans tend to not think of the smaller things, the more acidic things, and the fruitier things. Fruit itself can conduct electricity identical to none other due to their high acidic levels. So much electricity, in fact, that they can power a light bulb. Not every fruit can conduct on such a high frequency, however, which calls for the levels of acidity into judgment. A fruit that is more acidic will conduct more electricity than a fruit that is less acidic.

Experimental Procedure

Throw a paper airplane in a wide, open space.
Have a partner see where the plane landed
Have someone else measure the distance in centimeters and collect data
Repeat steps 1-3 for all airplanes

Purpose

The purpose of this experiment is to determine if folding 5 types of paper airplanes make a difference when it flies.

Background Research

Paper airplanes have been traced back to China where they first made paper airplanes and kites out of papyrus paper around 2000 years ago. Later in the 1700's they used paper hot air balloons. When the Wright brothers where developing the first plane they used paper airplanes to help try to build a plane. Aero articles in their time also published articles with paper airplanes to demonstrate air dynamics. With our research we searched how to make various types of paper airplanes. Most of the paper airplanes were from a website call Fold N’ Fly and they varied in difficulties from easy to expert. All of the planes come with steps that usually have steps, which might correlate with the number of folds of the plane.

After test flying the five planes that we wanted to test and get data for, we wrote down their names and waited for approval to do the experiment. When we got the approval, we then got a paper to write the data down. The data was to be in inches and measured by tiles because they were 1 foot by 1 foot. A person at a start point threw the planes with people at the end to see were the plane landed. We collected the data in an empty hallway and then went back to write it in a computer program.

Data Analysis

As we performed the experiment and measured the distance the planes flew, we took note that the planes that were more nose-heavy flew farther than the planes that were not as nose-heavy. The planes with the most folds flew further than the planes with fewer folds, with the exception of the basic bird, which flew second furthest, and the zip dart, which flew the shortest distance.
Fold and Fly

By: Taylor Hayes, Jovanna Joyce, Cristian Marquez, Frederico “Sebastian” Renteria
Mentor: Mr. Phu “David” Lam

Question
Does the amount of folds on a paper airplane affect the way it will fly?

Abstract
The topic we as a group decided on was paper airplanes. Even more specifically, we decided to experiment and research if paper airplanes fly farther if they are folded more or less. The amount of folds might affect the planes ability to fly and its shape is also a factor in a plane’s ability to fly. We tested five types of airplanes to see if the paper airplane that was made with the most folds traveled the farthest distance.

Hypothesis
If we fold different types of paper airplanes then the number of folds will affect how far it will fly because the more folds it has will make it heavier.

Variables
Independent variables:
1. The type of airplane
2. The number of folds it takes.
Dependent variables:
1. The distance the airplanes fly as we throw it.
Control variables:
1. The paper we used to make the airplanes (copy paper)
2. Position & strength of the throw.

Materials
Measuring tape
Copy paper

Background
When observing a battery a person may notice that each and every one of them contain a copper and zinc component. The copper within the battery is positively charged whereas the zinc is negatively charged. This positive and negative relationship shared between the copper and zinc allows for the zinc to emit electrons that are attracted to the copper, creating a current. This process happens only once, however. As the electrons leave the zinc they do not return unless they are provided with electrolytes. When electrolytes are provided, it results in a path that allows the electron to return to the zinc from the copper creating a loop or a closed path (Perez-Suarez, Lyng, Zarske, Carlson, & Yowell, 2005). This is what a battery is, a closed path that is constantly pushing electrons in a loop. It, however, requires resistance if it is to be used as a circuit.

Resistance comes from any appliance whether it be minute or prodigious. It is meant to “prevent or slow an electrical current or charge from moving” (Perez-Suarez, Lyng, Zarske, Carlson, & Yowell, 2005). When a form of resistance is incorporated to a loop it becomes a circuit and the current can be processed into light, heat, or sound. When someone looks at a fruit they perceive it as a source of nourishment, even so within that delicious sustenance a battery can be found that works the same way as any other battery. A resistance can be added to any fruit.

Methods and Procedures
Within this experiment a copper and zinc component must be added to the fruit owing to the fact that these elements are not in affluence within the fruit, furthermore, they must be separated so that a circuit can be made. The copper and zinc will be presented in the form of a penny and a nail. Two copper wires will also be needed for the experiment as well as a voltmeter, two insulated wires with alligator clips at the end, and the following fruit: a pineapple, a grapefruit, an orange, a tomato, a peach, a lime, a kiwi, and a lemon. These fruit were chosen because of their pH or acidic levels. Before any testing can be done a prediction should be made whether the fruit can or cannot power a light bulb.

When starting the experiment one end of a copper wire should be wrapped around the penny. After that another wire’s end should also be wrapped around the zinc nail. Once both are wrapped with a wire they should be inserted on opposite sides of the fruit with the unwrapped ends jutting outwards away from the fruit. The penny and nail should be inserted in such a
way that they will not touch outside or inside the fruit. After it is infallible that
the penny and nail are not touching the end of the copper wire attached to the
penny and nail should be clipped to the end of an insulated wire respectively.
Once all these procedures are finished a circuit will be made and observations
can be taken. These observations will serve to prove previous made
predictions true or false. After observations the same should be carried out for
the remaining fruit until there is no more fruit to observe.

**Results**

<table>
<thead>
<tr>
<th>Fruit</th>
<th>pH</th>
<th>Prediction</th>
<th>Voltage Needed</th>
<th>Voltage Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pineapple</td>
<td>3.2-4.0</td>
<td>Will light</td>
<td>2.1V</td>
<td>3.04V</td>
</tr>
<tr>
<td>Grapefruit</td>
<td>3.0-3.75</td>
<td>Will not light</td>
<td>2.1V</td>
<td>3.32V</td>
</tr>
<tr>
<td>Orange</td>
<td>3.10-4.10</td>
<td>Will light</td>
<td>2.1V</td>
<td>3.50V</td>
</tr>
<tr>
<td>Tomato</td>
<td>4.30-4.90</td>
<td>Will not light</td>
<td>2.1V</td>
<td>1.05V</td>
</tr>
<tr>
<td>Peach</td>
<td>3.40-4.10</td>
<td>Will not light</td>
<td>2.1V</td>
<td>0.40V</td>
</tr>
<tr>
<td>Lime</td>
<td>2.00-2.35</td>
<td>Will light</td>
<td>2.1V</td>
<td>2.55V</td>
</tr>
<tr>
<td>Kiwi</td>
<td>3.10-3.39</td>
<td>Will light</td>
<td>2.1V</td>
<td>0.5V</td>
</tr>
<tr>
<td>Lemon</td>
<td>2.0</td>
<td>Will light</td>
<td>2.1V</td>
<td>1.86V</td>
</tr>
</tbody>
</table>

**Data Analysis**

At first glance at the results it is clear that not all the fruit was applicable.
During the experiment many complication were faced regarding the fruit such
as non-refrigerated storage and burning. Non-refrigeration resulted in the
fruit gaining mold and aging, which reduces each fruit’s acidic potency. Some
fruit decomposed so much that they were barely able to conduct electricity
thus skewing certain fruit’s results in the experiment. In addition to this,
leaving the penny and nail inside the lemon overnight resulted in the lemon
burning due to the acid within it corroding the nail. Besides these two factors
the experiment went as planned.

When looking at the data collected many of the prediction regarding to the
light being lit by the fruit 3:2 of the predictions were true; the strongest being
the orange and the weakest being the kiwi. Out of the fruit that were predicted

**Acknowledgements**

Mrs. Morgan
Mr. Lockard
Mr. Lam
Mr. Manikandan
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Janitorial staff

**Works cited**

Taste."
July 16.
their sense of smell to detect what food it is. Foods without a harsh smell are easier to recognize because in that case people are reliant on their taste buds instead of smell. In this case, when trying to detect food you not only have to rely on your taste buds and sense of smell, but it also has to do with the type of food you’re eating.

Materials List

We used a blindfold, a nose plug, spoons, banana baby food, apple baby food, green bean baby food, and water.

Experimental Procedure

In this experiment we had a lot of steps to make sure the experiment would end in accurate or correct information. First before each experiment we would ask each participant questions about himself or herself for example what they have eaten in the last 24 hours and if they had anxiety. Then we would blindfold them and plug their nose. Before feeding them we would have them drink a few sips of water. Then we would feed them and get their answers. Between each different baby food we would also have them take a drink of water to get the taste out there mouth.

Data Analysis

In this experiment we had a chart over the research that we had did, and the experiment. In this we had an outcome of 4:3, males getting four correct guess and girls three right guess. Though it seems like not a big difference, we looked back through the research. We found that though the males had the more correct, we found something even more interesting. While the females described the taste as a feeling, the males used words in texture.

Conclusion

Through this we concluded that because of these results, that since the girls have a better sense of smell that they did not know how to predict the taste without the sense. We also found that most of the men in the experiment got almost everything correctly dealing with the fact that their sense of smell doesn’t change. Unlike the woman in our experiment, their sense of smell differs every now and then because Woman, have a stronger sense of smell than men do. This means that it could help them or change the result dramatically.

to not light the light bulb 2:1 were proven correct; the strongest being the grapefruit and the weakest being the peach.

When overviewing the most and least acidic fruit overall the orange is the most with 3.50V and the kiwi is the least with 0.5V. This proves the hypothesis that the more acidic a fruit is the more electricity it will conduct wrong. Although, the hypothesis was proven false more was learned through this experiment. Instead of conductivity being based on how acidic a fruit is it is more so based on a pH range from two at the least to four at most. Anything more acid or less acidic from this range is harder to pull out electricity from. This makes pineapples, grapefruit, oranges, and limes the prime fruit for using as a battery.

Conclusion

Although complications posed a threat to the experiment it did go as planned. Fruit can be used to power lights and most opportunely fruits ranging in a pH level of two to four. This is highly important for the future. Not only can we use fruit as alternative fuel sources but fruit based technology could also be made to siphon the electricity produced by fruit more efficiently and effectively, thus, making our lives easier and adding to the already scarce supply of electricity we have at our disposal. Hopefully in the future phones, cars, televisions, and even more can be powered by the electricity produced by fruit waste and lesson the strain on the limited resources we have today.

Acknowledgments

- Mrs. Morgan
- Mr. Lockard
- Mr. Lam
- Mr. Vuka
- The Chemistry Department
- Upward Bound Math Science

References


Batteries are Electrifying

By: Jonathan Perez, Devonta Jones, Miguel Marin, Conner Ratliff
Mentor: Mr. Phu “David” Lam

Abstract

This project is to measure the amount of voltage produced by three different voltages for three different batteries. The batteries are a store bought battery, a soda battery, and a lemon battery, the voltage produced for each was measured in three different trials. The hypothesis was that the store bought batteries would produce the most voltage. After the trials the hypothesis was supported.

Question

Will store bought batteries work better than lemon and soda batteries?

Variables & Hypothesis

The Controlled Variable was the placement of the voltmeter and what the other materials were. The dependent variable is the amount of voltage produced by the independent variable. The Independent Variable were the items used in the experiment such as the lemon, soda, and the store bought battery. Store bought battery will create more voltage and power then the homemade lemon and soda batteries. This hypothesis was chosen because factory made battery seemed like they would better create volts the batteries made from home remedies. The hypothesis was correct and the battery outperformed the natural lemon and soda batteries. This most likely happened because the store bought batteries are factory produced industrial grade while the lemon and soda batteries were designed to create high voltage.

Background

In the 1800, Volta invented the first true battery, which came to be known as the voltaic pile. The voltaic pile consisted of pairs of copper and zinc discs piled on top of each other, separated by a layer of cloth or cardboard soaked in brine. Today’s Batteries have three major components Anode, negative, Cathode, positive, and Electrolytes. The Chemical reactions cause of buildup of electrons in the Anode causing a discharge in the cathode.

Do You Taste With Your Tongue or Your Nose?

By: Elizabeth “Gabby” Feist, Amari Lowe, Mariana Ocon
Mentor: Mr. Vetrivel Manikandan

Abstract

In this experiment we will be going over the sense of smell and taste. We will be trying to figure out whether your taste buds work with your sense of smell in order to taste a certain food. We will show you diagrams, explaining how it works, and why this is important. We believe that if people have their nose plugged while tasting a certain food, then they won’t be able to tell what they’re eating.

Question

Do you taste with your tongue or your nose?

Variables and Hypothesis

Independent variable – Nose being plugged & the blindfold
Dependent variables – The taste
Control variables – The texture of the baby food
Hypothesis – We believe that if people have their nose plugged while tasting a certain food, then they won’t be able to tell what they’re eating.

Background Research

Is it true that you really need your nose in order to taste the different flavors of food? Let’s find out! Researchers say that woman have a better sense of smell than men. This is because studies found that female brains have almost 50% more olfactory cells. Researchers have solved the mystery of why women have a better sense of smell than men - and say it is all down to their brain. Since women actually have a better sense of smell than men, it might have changed our result. As a result of this fact, woman might have a harder time predicting taste without smell because they’re so reliant on their sense of smell, because it could either better or worsen their results. This is why men have a better time predicting taste without smell because they’re reliant on their bad sense of smell. This means they have a better time predicting what they’re tasting without smell because their smell detector doesn’t change as much as woman’s does. “Many flavors are recognized through the sense of smell”. Most foods that have a stronger odor are harder to detect because people rely on

Materials
1x Lemon
1x 12 oz bottle of soda (Mountain Dew)
Copper wire
Zinc Strip
Volt Meter
Paper clip
Box cutter
Racker AA Battery

Procedures
Setup lemon using the copper and the paperclip- The box cutter was used to remove the plastic coating on the paperclip, the paperclip was stretched out to be able to be placed inside of the lemon, then copper was coiled and then placed inside the lemon.
Pour soda into plastic cup
Cut soda can into strips and place them in the soda - Using the box cutter the can was cut into strips to be used as a secondary conductor then it was placed hanging over the edge enough for the strip to be sitting in the soda and hanging out to be measured.
Put piece of zinc inside the cup - Bending the zinc strip to hang over the plastic cup the same as the strip of the can.
Connect the wires from the voltage meter to each of the batteries
Measure the voltage of each battery
Record the different voltages

Data & Analysis
The battery reached 1.61 volts in all 3 trials, the Lemon varied very little, the soda varied a lot such as if both metals touched (zinc and aluminum) the voltage increased or it could have been the fact that the metal wouldn’t stay still so we had to hold it. The lemon did not produce the expected amount of voltage. Two metal paper clips in different locations. The results remained the same after more trials the next day so this data was not included. As a result the store bought batteries created a higher voltage because it is designed to do so, the lemon created a good amount of voltage while the soda battery did not have a stable amount of voltage.
Conclusion

The final result shows that the store bought battery did better than the lemon battery and the soda battery. The reason is probably because store bought batteries are specifically made to create voltage for long periods of time while lemons and soda are not made for that rather they are made for consumption. The results were still shocking nonetheless, the lemon created a high voltage of .9 V which is larger than the soda battery. The hypothesis presented at the beginning was proven to be correct by a large margin, but it didn’t stop the lemon from producing a good amount of voltage.

Acknowledgements

Thank you to Mrs. Morgan for allowing us to do this research project, Mr. Lockard for finding and supplying us with the materials, the Chemistry department for allowing us to use their lab and certain items that are not easy to find. Also a thank you to Mr. Lam for being our mentor in this project.

Sources


Conclusion

Our hypothesis was to see how different factors affect people's hearing. According to the data that we had collected, there is no relationship between the volume and losing the ability to hear hertz at a certain level. There was also no correlation between the amount of hours spent listening to music and hearing impairment. However, people who tend to listen to music on earbuds have better hearing than people who used headphones or speakers. This causes our hypothesis to become inconclusive. We test a younger group of people rather than an equal age group. What we could’ve done differently to improve our results was to get a consistent amount of people per category we tested and just have a bigger test population.

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We would like to express our gratitude to the following
Our Director - Ms. Monk-Morgan
Assistant Director - Mr. Lockard
Our Mentor - Mr. Manikandan
The WSU Chemistry Department

Works Cited


“NoiseInduced Hearing Loss (NIHL) in Great Britain.” Health and Safety Executive. HSE, Sun. 10 July 2016.


Fligor, Brian. “Acceptable Strategies for Prevention of Noise and Music allow people to hear a higher amount of hertz. Using only speakers or just the device itself had the lowest amount of hertz that were detected.
to carry out a conversation. Being outside may tempt you to turn up your music but that is the wrong thing to do, putting your volume up especially at full volume can cause serious damage. Putting your device at full volume erases those hair cells even faster. Having your device under 50-60% is the best range to have music, videos, or podcasts at. Distance is also a very important factor, if at a concert stand (or sit) 10 or more feet away from any speakers, limit the time you spend around loud noise, avoid people shouting in your ears, and avoid too much alcohol. When drinking too much it makes you unaware of how harmful the loud noises you are around can be.

**Material List**

- Basic Hearing Tests
  - [http://www.echalk.co.uk/Science/biology/hearing/](http://www.echalk.co.uk/Science/biology/hearing/)
  - [HowOldIsYourHearing/resource.html](https://www.youtube.com/watch?v=h5l4Rt4Ol7M)
- Headphones (Beats by Dr. Dre)
- Volunteers
- Survey

**Experimental Procedure**

1. Have volunteers (at least more than 10)
2. Have them take a survey with questions relating to the hypothesis
3. Give each individual 2 hearing test measured in hertz
4. Give instructions on how each test is to be taken.
5. Write down the amount of hertz that they are able to hear or at which they stop hearing.

**Data Analysis**

The results that we gathered had been proven inconclusive, due to the lack of participants. There were three factors we defined as crucial: amount of music listened to, volume at which the music was played, and method of sound transmission (headphones, earbuds, and speakers). For the first factor we found no consistency in our data relating to the amount of music listened to. In fact, when people listened to sixteen hours of music a week they had the same results as those who listened to music for more than 20 hours a week. For our second factor we found that the individuals who listened to music for half of the allowed volume had tested better when it came to both of the tests. People who listened to music more than half of the volume that is allowed had very close results to the lower half. Lastly, our research had shown that earbuds...
The Truth Hertz

By: Alonna Acevedo, Selene Gallegos, Malee Her, Elyssa Ziad
Mentor: Mr. Vetrivel Manikandan

Abstract

In our experiment we analyzed the amount of hertz a person could hear based on their age, sex, device, volume, and the amount of time they listen to music in a week. They listened to tests one started at high frequencies and decreased, the other started at low frequencies and increased. We averaged the two tests and got many results. To conduct the test we used two basic hearing tests, beats headphones, volunteers from the age range of 13 to 42, and they took a survey before they took the test that asked questions like age, gender, device, and etc.

Question

How many hertz can a person hear when they have different backgrounds?

Variables and Hypothesis

Our stated that if people have different backgrounds with who they are and how they listen to music/sounds, then the people who listen to music/sounds at different volumes will be able to hear lower frequencies.

Independent Variable(s) age, gender, amount of music/sounds listened to, volume of music/sounds listened to, device used, earbuds/headphones/speakers or nothing.

Dependent Variable(s) the result of the hearing tests (the amount of hertz you could hear in decibels).

Constant Variable(s) the headphones used to administer the hearing test, the two hearing tests, and the questions asked in the survey.

Background Research

In our research we found that the type of genre you listen to does not affect your hearing. Your brain processes different genres in different ways which makes it irrelevant, the volume is what causes hearing impairment. The device in which you listen to music/sounds does not matter because apple and android phones have the same volume levels, and for anything else like speakers or radios still the volume is what matters, not what is used to listen. Studies show that women are more sensitive to sound than men, enabling them to hear more than men. It is easier for women to hear high frequencies, while men can hear lower frequencies and it’s easier for them to detect where the sound is coming from. The average human hearing range is between 20 and 20,000Hz but as you get older that steadily declines. Teenagers can typically hear higher frequencies than older people.

Our ears are very sensitive, especially the cochlea which contains multiple hair cells.

Now, these hair cells are very tiny and can be damaged very easily. The inner ear has nerve endings that change sound into signals that are then sent to the brain. The brain then registers them as sounds. These tiny hair cells are damaged by loud noises, damage can be done within an instant. Once hair cells have been damaged they do not have the ability to regenerate.

NIHL, noise induced hearing loss, is the repeated exposure to loud noises that causes damage to the ears. NIHL can cause impairment in an instant or over time, and this is all relative to the noise that you have heard. Instant is an example of hearing an explosion and overtime is listening to the same noise repeatedly over time. This is not always permanent, it has been known to be only temporary, and it also can affect one ear or both of them at the same time. When it comes down to NIHL age is not a factor, noise is noise and ears are sensitive to people of all ages.

Approximately 26-69 million of Americans have hearing loss due to loud exposure of noise at work and other locations, and 16% of teenagers (12-19) have also been reported to have some hearing loss. One experiment that had been done was conducted to detect hearing loss, hearing loss was detected in 62% of the participants with a history of noise exposure. The scientists had used an ultra-high frequency audiometry this tool helped them identify initial hearing loss. They stated that, “standard guidelines for monitoring hearing loss due to noise exposure do not exist”. The experiment held two groups, one group had a history of noise exposure (group A20 members), and the second group were considered the normal subjects with no history of hearing loss, or noise exposure (group B50 members). Their conclusion was that NIHL can be detected by using only high frequency audiometry in 62.6% of cases, and that 74% of the cases can be detected by using high frequency audiometry at an early stage.

To protect oneself from having their hearing impaired, especially when listening to music, it is best to listen to music with earphones that are made of foam, silicon, or custom fit ones. When listening to music set the volume in a quiet place and leave it at that volume, lower the volume to where you are able