Abstract: Science and Engineering Fair of Houston

1143

The Big Fat Truth

Sally Chesser
Conroe ISD /Irons Junior High

Category

Chemistry

I really enjoy eating cookies, and I wanted to find out if different fats affected a cookie's height, width, and mass. My hypothesis was that changing the fats in a cookie recipe would significantly impact a cookies height, width and mass. So I devised a plan to confirm if changing the fats would, in fact, significantly impact these measures. First, I chose the chocolate chip recipe from the package of chocolate chips. I used the same recipe for all 9 of the batches. Next, I gathered all the ingredients that the recipe called for, including the three different fats. The three different fats that I used were butter, shortening, and margarine. Then, I made 9 batches of cookies, all separately, with me switching the fat I used every 3 cookie batches. I set aside three cookies at random from each batch and used these to measure and compare against the other batches. Then I measured each cookie for their height, mass, and width, and put all of the information into a graph. I had a lot data so I separated all of it into three different graphs, so that each trial has one graph. After reviewing all of the data, I discovered that my hypothesis proved to be correct because of the fact that all of the bars on the graphs were very different from each other, along with all of the original measurements. I also discovered that the cookies were effected qualitatively, as the butter cookies were flatter and more crumbly, the shortening cookies were softer and taller, and the margarine cookies were more something in between the other two. In conclusion, I discovered that, as cookies are significantly impacted by the kind of fat you use, if you want to make a particular kind of cookie, you need to choose the correct kind of fat.

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Abstract: Science and Engineering Fair of Houston

1144

Extracting DNA: Why Onions Win Over Other Produce

Devika Appannagari
Clear Creek ISD /Westbrook Intermediate School

Category

Chemistry

For this project I will extract the DNA of a strawberry, kiwi, and an onion. This project is important because first DNA is a particularly important topic in biology, DNA extraction is also important in general, like how it is used for many distinct reasons like research, health and forensic. I decided to extract DNA from onions, strawberries, and kiwis after I did research on them. I will extract the DNA by using various materials, ones that is very crucial is the ethanol and the detergent as it will help me extract the DNA. When I finished researching, I concluded with an expected outcome of the onion being the best produce to use for this extraction. There is societal impact from my research that I concluded, it was that doing this experiment can help learners understand more about biology and isolating DNA. That is because the procedure in which I will be extracting it, is like extracting DNA from other produce alike to strawberries, onions, and kiwis. In conclusion the onion with be the best to use for extracting DNA.

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Abstract: Science and Engineering Fair of Houston

1145

What is the Best Way To Purify Water?

Naomi Molina
Carla Garcia
Jenny Nguyen
SST - Champions College Prep - MS

Category

Chemistry

There are people all over the world who do not have the luxury of having, or buying clean water, and due to this, many people get ill, or sick. So the purpose of this experiment was to figure out what is the best way to purify water. We want clean and healthy water for everybody which is the reason why we are conducting this project. For each method used, tap water was used. Where in which the water was put in the purificating kits, separately. From the data shown in the image, boiling has the lowest Ph level while Solar purification has the highest Ph level. The reverse osmosis method and the distillation method seemed to work the second best, leaving behind a clear water that is drinkable. Then, finally, the cloth filter method did decent work, leaving no visible particles or dust. Based on our results of the analysis on the experiment that we have conducted, we can conclude that boiling water is by far the most efficient and easy way of cleaning water that can give us a healthy water force. The career connection we can make is with a water resource engineer, an engineer that focuses on improving and managing a water systems sustainability. They create and make sure that there will be a water supply available, creating water management plans, to preserve water for a period of time.

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Abstract: Science and Engineering Fair of Houston

1146

Soapy surface tension

Keagan Sanders
Weis Middle School

Category

Chemistry

Have you ever marveled at the sight of soap bubbles dancing gracefully in the air, shimmering with a rainbow of colors? It's not just child's playâ€”it's a captivating glimpse into the fascinating science of surface tension. Soap, an everyday household item, transforms ordinary water into a playground for tiny forces that hold the universe together. In this exploration, we'll uncover the secrets behind soapy surface tension, revealing how molecules interact to create the mesmerizing patterns and behaviors we see. Whether you're a curious student, an aspiring scientist, or simply someone who loves a good bubble bath, get ready to dive into the sudsy science that's bubbling beneath the surface!

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Abstract: Science and Engineering Fair of Houston

1147

Computational Simulations of Antibody Binding to VAPB Receptors for Targeted Therapy in Medulloblastoma

Diya Rajkumar
TAYS Junior High - MS

Category

Chemistry

Medulloblastoma is an aggressive form of brain cancer that occurs in the cerebellum and affects mainly children. The VAPB receptor is present on the surface of the medulloblastoma cancer cell and, therefore, can be used to identify the cancer cells from the normal cells. Antibodies are particular proteins that are Y-shaped and produced by the immune system in reaction to antigens. Their response to antigens is because of their strong affinity for receptors. I hypothesize that these antibodies can bind to the VAPB receptor, thereby inhibiting VAPB activity, subsequently leading to the destruction of the cancer cell. In this research, I have performed computational simulations to identify antibodies that bind strongly to the VAPB receptor. First, I used AlphaFold 3 to get the 3D structure of the VAPB receptor. In the next step, ScanNet was used to get the binding site of the VAPB receptor. Then, the antibodies were docked on VAPB using the HDOCK 2.0 software. Then, the binding energy calculations were performed using the PRODIGY software to understand the strength of interactions. The energy calculations depicted that antibody 1fl5 binds the strongest and was selected as the most appropriate candidate. Therefore, anticancer drugs can be linked to the selected antibody. When the antibody binds to the cancer receptor, the drug is directed to the cancer cell, resulting in the cancer cell's apoptosis. This will allow for a non-invasive, radiation-free, pain-free, and safe method for targeted therapy in medulloblastoma.

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Abstract: Science and Engineering Fair of Houston

1148

Temperature Rise

Kyle Mochoge
Clear Creek ISD /Brookside Intermediate School

Category

Chemistry

The experiment aimed to investigate how different amount of calcium chloride affected the max temperature the water reached. It was hypothesized that the more calcium chloride added to water would heat up the water more. Different amounts of calcium chloride were added to 225ml of water (50g, 100g, 150g, 200g,). The temperature that was measured was the max temperature the water hit before cooling down. The results show that 200g of calcium chloride was substantially hotter than the 50,100g, and 150g trials, proving the hypothesis. These findings show the importance of calcium chloride mixed with water as it can warm people up and create safe water and food to eat.

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Abstract: Science and Engineering Fair of Houston

1149

Step Into The Wonderland Of Shades

Victoria Vasquez
Clear Creek ISD /Seabrook Intermediate School

Category

Chemistry

What is the effect of using dye and textile combinations on color hue? While experimenting, a chemical reaction was observed among color dyes and types of fabrics sing dye fixatives. If combinations of dyes and textiles are compared, then cotton material will have a color hue that mostly matches the Royal Blue hue. In this procedure dyes were mixed with dye fixatives in equal amounts into buckets covalent eonde ons process was examined daily and observed the chemical reactions and after data collection the results demonstrated neither textile matched the royal blue hue. Only 1 textile dyed a darker blue than the royal blue. The experiment showed cotton and linen held the same hue. Rayon retained the bluest dye and was the darkest hue of the textiles. In conclusion, the chemical reaction noted when a covalent bond is formed of color and fabrics on multiple textiles revealed that the hypothesis was incorrect. Therefore, no textiles tested in this experiment matched the control color.

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Abstract: Science and Engineering Fair of Houston

1150

Can old coffee be new coffee

LIam Gonzalez
Houston ISD /BCM Academy at James D Ryan - MS

Category

Chemistry

Abstract The increasing disposal of aged coffee beans by coffee companies and consumers results in significant waste of resources, with approximately 23 million beans discarded annually. This project aims to explore the potential of blending old and new coffee beans to reduce waste while maintaining the taste and caffeine content of freshly brewed coffee. A mixed-methods research design was utilized, involving sensory evaluation and taste tests conducted over three weeks with a focus on a Lite Roast coffee. The results indicated that while aged beans exhibited diminished aroma and flavor over time, blending them with fresh beans produced a more favorable taste profile compared to aged beans alone. The findings suggest that a proper blend of old and new beans can yield a satisfactory coffee experience which supports the hypothesis. This research has implications for coffee roasters and consumers, highlighting a sustainable practice that can mitigate waste while maintaining coffee quality. Keywords: Coffee beans, Aged beans, Waste reduction, Blending, Sensory evaluation, Sustainability.

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Abstract: Science and Engineering Fair of Houston

1151

Nature's Battery

Paige Sicard
Fort Bend ISD /Lake Olympia Middle School

Category

Chemistry

In a fruit battery experiment, different fruits like lemon, lime, orange, potato, and banana are used to generate electricity through a chemical reaction. Each fruit has citric acid, which acts as an electrolyte. The setup involves inserting two different metals (typically a copper and a zinc electrode) into each fruit. When the metals are connected by a wire, a small electric current is produced due to the acid's interaction with the metals, causing a flow of electrons. The experiment demonstrates how fruits can function as natural conductors and produce enough power to light a small LED or power a simple device. The efficiency of the battery varies depending on the fruit's acidity and the materials used.

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Abstract: Science and Engineering Fair of Houston

1152

What Makes Ice Melt Fastest

Wyatt Anthony
Central Middle School

Category

Chemistry

The goal of this experiment was to investigate the factors that influence the rate at which ice melts. Ice cubes were exposed to salt, sugar and sand to determine if it affect the time it took to melt. The time that it took each ice cube to melt was recorded and the results were analyzed to identify the most significant factors influencing the rate of melting.

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Abstract: Science and Engineering Fair of Houston

1153

Crime Scene Chemistry

Maryam Fatema Mukhi
AL-HADI SCHOOL OF ACCELERATIVE LEARNING

Category

Chemistry

In my science fair experiment, I investigated which solution best covers blood under UV light (black light). Using ultraviolet light allows for a practical and quick inspection of potential bloodstains. While this is not a definitive blood test, it is an effective hypothetical test that can often help avoid unnecessary collections of stains that may look like blood but originate from different sources. I tested the efficacy of various cleaners on a wood slab by using blood that I made from glycerin, contact lens solution, and powdered red food coloring. I applied the fake blood on different sections of the wood slab and then cleaned each section with its assigned cleaner using hydrogen peroxide, an all-purpose cleaner, detergent, and bleach. The hypothesis was that bleach would clean the blood the best under UV light as it contains sodium hypochlorite which is known to oxidize and disinfect. After cleaning, I investigated how each cleaner performed by observing the results under UV light and recording the brightness levels. Finally, I saw which cleaner left the most remains under the UV. To conclude, the Experiment's data supported the hypothesis as bleach contains sodium hypochlorite which is known to oxidize and disinfect. My reason for this experiment is to learn more about black light and UV radiation and the impact they can have on the world. "Blacklight technology aids forensic investigations, environmental monitoring, medical diagnostics, educational tools, pest management, art engagement, security measures, and entertainment, contributing positively to various fields and promoting safety and sustainability."

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Abstract: Science and Engineering Fair of Houston

1154

Battle of the Stain: Who will reign Supreme?

Hunter Felker
SST - Champions College Prep - HS

Category

Chemistry

To determine the most effective cleaning agent for tackling stubborn stains on t-shirts, I compared various cleaning products on stained shirts. The purpose of this experiment is to allow others to know what cleaning agent is best at removing stains from t-shirts. I first collected the cleaning products and the white stained shirts, then one by one, I put the stained shirts in with their correct product and ran them in the washing machine. The most important result I found was that Tide removed the stain well except in the darker areas and that the Bleach struggled with removing the grass stains. In conclusion, I found that the best cleaning agent for removing stains from a t-shirt is Tide because, unlike Bleach, Tide doesn't remove the color from colored clothes.

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Abstract: Science and Engineering Fair of Houston

1155

Dasani body have any clean water?

George Larrabee
Ian Sexton
Spring Branch ISD

Category

Chemistry

In this project we went to several cities in Texas and tested them for hardness, chlorine, lead, carbonate, and cyanuric acid. We managed to obtain the water samples from several aquifers including Trinity, Edwards, and Gulf Coast. We collected them in sterilized mason jars, which made sure that there were no impurities in our testing. We also washed our hands and made sure not to handle the test strips more than needed. After we put all of our data into graphs in milligrams per liter, except for pH.

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Abstract: Science and Engineering Fair of Houston

1156

Scent Battle

Viviana Rocha
Houston ISD /BCM Biotech Academy at Rusk - MS

Category

Chemistry

The goal of this experiment was to compare the effectiveness of deodorants containing alcohol and aluminum against those without these ingredients in controlling odor. I hypothesized that regular deodorants with alcohol and aluminum would perform better in neutralizing odor due to alcohol's quick-drying and antibacterial properties. To test this, I applied different deodorants to fabric swatches and exposed them to strong odors from onion. The deodorants were then rated on their ability to neutralize the odor on a scale of 1 to 10. The results showed that the regular deodorants with alcohol and aluminum performed better, receiving an average rating of 7.6/10, while the aluminum- and alcohol-free deodorants were rated 8.3/10. Despite both deodorants performing higher than expected, the regular deodorant was more effective at controlling odor. This suggests that alcohol and aluminum contribute to better odor control, but individuals with sensitive skin may need to choose deodorants based on their skin's needs. The findings highlight the trade-off between effectiveness and skin sensitivity when selecting deodorants.

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Abstract: Science and Engineering Fair of Houston

1157

Green Is Clean

Milan De Jager
Clear Creek ISD /Seabrook Intermediate School

Category

Chemistry

Green hydrogen is the cleanest type of hydrogen. Not many chemical facilities use it, and it should be used more often. There was an inspiring YouTube video of a man doing an electrolysis experiment at home. Testing the impact of the electrolyte strength and temperature on the electrolysis reaction seemed important to improve green hydrogen production. The hypothesis is that if the temperature or electrolyte strength is increased, then it will speed up the electrolysis reaction. In the experiment a tank had to be built to test the hydrogen made from electrolysis. The electrodes were made of stainless steel and had stainless steel scrubs in them. The amounts of KOH were ranging from 126g-767g of KOH for the experiment where the KOH solution strength was changed. For the experiment where the temperature changed, the temperature was varied from 30°C-70°C. The electric current consumed by the electrolysis reaction and the hydrogen volume produced was measured. The results showed that if the KOH solution strength was increased the more hydrogen was produced. The results also showed that if the temperature was increased the more hydrogen was produced. In conclusion, the hypothesis was proven correct. Green Hydrogen is the cleanest way to produce hydrogen because grey hydrogen emits CO2 into the atmosphere, whereas in the production of green hydrogen there is not CO2 emitted and so, green hydrogen can replace grey hydrogen to reduce the CO2 emissions.

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Abstract: Science and Engineering Fair of Houston

1158

From Trash to Treasure: Exploring Pectin Extraction from Watermelon Rinds

Serene Huang
Conroe ISD /McCullough Junior High

Category

Chemistry

Watermelon rinds, making up 30-40% of the total weight of the watermelon, usually get thrown away. Each year, millions of watermelons are consumed worldwide, meaning a lot of biological material goes to waste. The rinds contain many valuable nutrients including vitamins and pectin. Pectin is found in plants and is used as a food-thickening agent in the food industry. Traditional extraction sources include apple and citrus waste, but watermelon rinds have never been commercially used due to their dense texture. Previous studies have used strong acids like nitric acid or HCl to help release pectin. However, disposal of these harsh chemicals can do a lot of harm to the environment. In this research, watermelon rinds were used as the main source for pectin extraction at home. Frozen and dried watermelon rinds were tested to compare the better method to preserve the source material. Different concentrations (0, 0.2, 0.5, 1, 2, 5%) of citric acid, a mild and environmentally friendly acid, were used to aid extraction. Peels of citrus fruits and apples were also tested for comparison. Frozen watermelon rinds resulted in more pectin yield compared to dried rinds. 5% citric acid trial yielded the most pectin. Although citrus and apple peels produced more pectin, watermelon rinds are still a reasonable alternative, adjusted for their high moisture content. This research found an environmentally friendly way to extract pectin from watermelon rinds, which also reduced organic waste. This provides a sustainable alternative for the pectin production industry.

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Abstract: Science and Engineering Fair of Houston

1159

Solute Impact on Pop Rocket Height

Levi Johnson
Conroe ISD /McCullough Junior High

Category

Chemistry

This project investigates the impact of different solutes and solvents on the performance of a pop rocket, specifically focusing on how these combinations influence the rocket's launch height. By systematically varying the chemical composition of the propellant mixtures, the study aims to explore the interactions between solutes and solvents and their effects on the release of gas pressure that propels the rocket. This experiment provides insights into fundamental principles of chemistry, including solubility, reaction rates, and energy release, while demonstrating their practical applications in propulsion systems. The findings could enhance understanding of chemical reactions in controlled environments and inspire innovative approaches to small-scale propulsion technologies.

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☒ yes ☐ no

Abstract: Science and Engineering Fair of Houston

1160

How does Water Temperature Affect Sugar Solubility

Avery Cantu
Weis Middle School

Category

Chemistry

My project is does it, why, and how waters temperature affects sugars solubility levels. I tested what was the maximum amount of sugar that water at different temperatures could contain. Matching up with my hypothesis, the hotter the water the more sugar could dissolve. The overall purpose of this project was to determine if water temperature affects solubility levels of sugar. In conclusion to this project, i can confidently explain and state that heat in fact does result in more sugar dissolving. This statement aligns with my previous hypothesis, the higher the temperature the higher solubility levels. This is due to the increase of kinetic energy as the water heats up, the molecules start moving faster resulting in the water ultimately dissolving the sugar in higher amounts. I can also confidently provide evidence from my experiment, for example, when the water was at 50Â°F it dissolved an average of 3 ounces. However when the water was at 80 F it dissolved an average of 4.8 ounces, when comparing the results, we can conclude that as the temperature rose, the solubility also did as well.

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☐ vertebrate animals ☐ microorganisms ☐ rDNA ☐ tissue

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Abstract: Science and Engineering Fair of Houston

1161

Will a Basic Solution Outwit an Acidic Solution in Electroplating?

Kylie Cline
The Woodlands Methodist School - MS

Category

Chemistry

In the time researching and experimenting during this project, I discovered a few different things that may seem insignificant to the average person, but to the bigger picture, can be revolutionary. This project in particular is important because electroplating is used in very important places, like the medical industry and the electronics industry. Electroplating and being able to perform it correctly in these industries is extremely important because electroplating can prevent corrosion. This in itself is important because medical tools need to be in pristine condition to be used without causing infections, as well as electronics, so they can function correctly. My main question in this project was, can a solution with a higher pH level work in the meticulous process that is electroplating? I approached this question during experimentation by testing out electroplating with two different solutions; a basic solution, and an acidic solution. I recorded the progress of both solutions every five minutes, then observed the plated metals after 20 minutes of soaking in each solution. After performing the experiment four times, I found that the metal soaking in the acidic solution tended to have a larger plated surface than the metal from the basic solution. In conclusion, I found that the acidic solution was much more fit for electroplating than the basic solution. This makes the contribution to prevent mistakes like using a solution with too high of a pH for electroplating in the future.

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Abstract: Science and Engineering Fair of Houston

1162

Cleaning Pennies

Carter Michalec
Conroe ISD /York Junior High

Category

Chemistry

This project is over which liquid cleans a penny the best. This project's purpose is to enlighten on how good different cleaning properties are on copper. This project also includes useful information on oxidation and tarnish, plus the similarities and differences between the two. Out of the five liquids tested; vinegar, lime juice, soda, lemon juice, ketchup, and water, the results conclude that ketchup is best for cleaning copper and that water is the worst. All of the other liquids are in between and still not bad options for cleaning copper. Overall, the project has produced the data to say that ketchup cleans copper the best. This project required 6 liquids, 18 pennies and 18 cups. The steps to conduct this project are, pour the liquids in the cups, set a 25 minute timer, and put the pennies in the cups. Observe the changes after 25 minutes. To replicate this project follow the steps above.

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Abstract: Science and Engineering Fair of Houston

1163

Computational Design of Improved Antibiotics

Ksenia Kolomeisky
EMERY WEINER JEWISH SCHOOL

Category

Chemistry

Antibiotics are the main medical drugs that are used to eliminate infections, and there are many requirements for them to be efficient and environmentally safe. They need to dissolve well in water (i.e., have high solubility) to be effective in the human body. However, many antibiotics are poorly water-soluble, which reduces their effectiveness in treating diseases. This raises a challenge: Is it possible to make small changes to the antibiotic structure to increase their water solubility while retaining their antibacterial activity and avoiding side effects? To answer this question, it is proposed that more effective antibiotics that are more easily absorbed by the body and thus deliver therapeutic effects faster at lower dose amounts be designed by theoretically exploring various chemical modifications of these drugs. This project focused on using computational methods to predict how specific chemical changes in the structure of antibiotics affect their solubility and health impact. It is based on the hypothesis that substituting non-polar groups with polar groups might increase the solubility without lowering the antibacterial properties. Candidate modifications have been automatically generated from antibiotics already proven to be effective against E. coli bacteria. The solubility of the modified antibiotics has been computationally evaluated, focusing on the impact of functional groups known to increase or decrease solubility. The most promising candidates have been identified and the most promising candidates will be evaluated by experimental chemists.

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Abstract: Science and Engineering Fair of Houston

1164

Lint To Paper

Lucas Zhou
Christopher Daoura
Harishankar Pitchiah
Fort Bend ISD /Fort Settlement Middle School

Category

Chemistry

The project demonstrates a simple and innovative method for converting lint, a common household waste material, into paper. By combining lint with water, breaking down fibers, and pulping lint, it is possible to create a unique and sustainable paper product. This process not only reduces waste but also promotes creative reuse of materials. The resulting paper can be used for various applications, such as writing, drawing, or crafting. This project showcases the potential of repurposing everyday materials to create something new and valuable, while also highlighting the importance of reducing waste and promoting environmental sustainability. When the lint paper comes at another advantage if you spill water on it the lint paper can soak it effectively, Although the lint paper is good at solving most daily problems, it really comes at a disadvantage in the flexibility aspect where normal paper is really great at just the right moment. Even though the Lint paper has a few disadvantages, The Environmental benefits outweigh these disadvantages. The areas to be explored in future studies like mass production of paper and a suitable writing utensil.

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Abstract: Science and Engineering Fair of Houston

1165

Investigating the Inhibitory Effects of Grape Extract on Alpha Amylase

Manas Kinge
Conroe ISD /McCullough Junior High

Category

Chemistry

Alpha amylase is an enzyme responsible for helping break apart the common sugar present in many foods called starch, and a potent inhibitor of alpha-amylase that reduces its activity is grape seed extract. The hypothesis of a relation between these two was, "If the alpha-amylase amount is increased but the inhibitor and substrate amount is constant, then the rate of reaction will also increase." To investigate this hypothesis, an experiment was conducted where a 1 centimeter russet potato cube was exposed to different amounts of alpha-amylase but a constant amount of grape seed extract, and this was all in a beaker set on a hot plate. Once on the hot plate, a stopwatch was started and the potato cube was consistently titrated with iodine to check for the presence of starch. Once the iodine didn't react with the starch, the time it took for the solution to break down the starch was recorded. The average rate of reaction was calculated from this data, and the result was higher amounts of alpha-amylase had greater reaction rates, indicating that the inhibitor's efficiency had dropped. To conclude, the hypothesis was proven true, but an implication to improve was that hot plates can cause uneven heating in the experiment. The findings of this could be applied to find dosages of grape extract for diabetic people, as alpha-amylase is present in human saliva and plays a major role in sugar breakdown.

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Abstract: Science and Engineering Fair of Houston

1166

The Affect of phosphorescence in Lunar meteorite NWA 11474

Fatema Zahra
AL-HADI SCHOOL OF ACCELERATIVE LEARNING

Category

Chemistry

This project investigates the effects of temperature on the UVA-induced phosphorescence of a sample of feldspathic breccia from lunar meteorite NWA 11474. Phosphorescence occurs when electrons are temporarily trapped in metastable states and subsequently release light over the duration of excitation. While this behavior has been studied in terrestrial materials, little is known about how extraterrestrial phosphorescent materials, such as lunar meteorites, respond to varying temperatures. To explore this, the NWA-11474 sample was subjected to three temperature conditions: cold, room temperature, and heated. After reaching the desired temperature, the sample was exposed to 365 nm UVA radiation to induce phosphorescence, and its glow was recorded at 120 frames per second for analysis. When compared to the room temperature control, the results revealed that heating the sample caused a brighter but shorter-lasting glow, while cooling the sample led to a dimmer yet more prolonged emission compared to room temperature. These findings demonstrate that temperature significantly impacts the phosphorescent behavior of the feldspathic breccia by influencing the release of trapped electrons within the mineral lattice. This project highlights the similarity between the temperature-dependent phosphorescence of lunar materials and what is established regarding the phosphorescent behaviors of terrestrial materials, reinforcing the universal nature of the physical processes governing electron excitation, trapping, and release that drive phosphorescence in these materials. These insights shed light on the unique properties of lunar geology and their phosphorescent behavior, paving the way for further research into potential uses in material science and their relevance to understanding extraterrestrial environments.

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Abstract: Science and Engineering Fair of Houston

1167

Face The Future

Makayla Cavins
Misty Hampton
Central Middle School

Category

Chemistry

"Face The Future" Is a project that me, Makayla Cavins, and Misty Hampton created to help people find out what they need for their skin. We decided to do this because we have a few family members and friend that struggle with their skin, mainly dry skin. We thought that it would be a new and creative idea if we decided to do our own research on the chemicals we could use to create our own skincare products.

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[X] yes [ ] no

Abstract: Science and Engineering Fair of Houston

1168

Go away stains

Emmmarie Duncan
Clear Creek ISD /Seabrook Intermediate School

Category

Chemistry

Stains have been a problem for a very long time. People have tried to come up with ways to remove these stains. Some have been failures others have succeeded. Although research can show sometimes that certain product will work best there can be better substances. So, what is the real effect of stain removals on coffee stains, and which one works best? A study was devised to test this hypothesis that if various stain removals are applied on a coffee stain, then hydrogen peroxide will remove the stain the most. Five different cleaning agents were used on ten fabrics each, with 5ml's of Ruta Maya coffee. The results showed the hydrogen peroxide was the most effective in removing Ruta Maya expresso and leaving an average of 3.34% coffee in the white t-shirt fabric. In this experiment the hypothesis was supportive, because hydrogen peroxide did in fact remove the most of the coffee stain when compared to the other tested variables in the experiment.

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Abstract: Science and Engineering Fair of Houston

1169

What's Popp'in

Anthony Rangel
Roberson - MS

Category

Chemistry

The purpose of this experiment was to determine which brand of popcorn has the most popped kernels and the fewest unpopped kernels, essentially identifying which brand offers the best value for money. To conduct my experiment, I first counted the number of kernels in each bag and then counted the amount of leftover kernels after popping. I repeated this process for popcorn cooked on the stove. I discovered that the method of heating significantly affects the overall popping percentage. In conclusion, the different cooking methods resulted in some brands performing well in the microwave but poorly on the stove. Therefore, the best results are achieved by using the stove, depending on what device is available.

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Abstract: Science and Engineering Fair of Houston

1170

Crazy for Crystals

Anna Joji
Asin Scaria
Fort Bend ISD /Lake Olympia Middle School

Category

Chemistry

Crystals are really fascinating objects. They come in all different types of shapes and sizes. However, the purest and cleanest crystals are usually the ones that grow to be the largest in size. In this science fair project, we experimented and compared the size and shape of crystals grown in three different temperature conditions: room temperature, refrigerator, an ice bath. With just water and borax, a household cleaning product, we found the best recrystallization method for growing large, pure crystals.

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Abstract: Science and Engineering Fair of Houston

1171

Which salt melts ice on roads the fastest?

Madison Lock
Conroe ISD /Knox Junior High

Category

Chemistry

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Abstract: Science and Engineering Fair of Houston

1172

Glue.Blink.Stay

Taylor Thomas
Alief ISD

Category

Chemistry

The global beauty market is growing fast and will continue to keep growing due to trends that are making the perfect skin, the perfect make-up, and the perfect look so popular. In 2020, it was estimated that about 1.36 billion dollars were spent in the U.S. on eyelash extensions alone. From teenagers to Instagram Models to the average soccer mom, many will go great lengths, to increase the length, volume, and curl of their natural lashes. While some may splurge on eyelash extensions by a licensed esthetician, many opt for adhering their lashes on their own. Eyelash extension wearers, not only seek perfection in the final look, but they want to get the best of what they pay for. With an increase in the number of consumers purchasing eyelash extensions, it is important to know which brand of eyelash adhesive will provide the longest and strongest adhesion / bond retention. Many eyelash adhesives contain the active ingredient Cyanoacrylate. Cyanoacrylate molecules are known to create strong adhesive bonds with other substances; in this case the eyelid or natural lash. To determine which brand of eyelash adhesive glue provides the best bond retention, this experimental investigation will test each adhesives drying time, ability to withstand rubbing of the eyelash, and suitability to wet conditions.

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Abstract: Science and Engineering Fair of Houston

1173

Computational Design of Antibiotics with Improved Stability

Laszlo Kurti
Houston ISD /T. H. Rogers MS

Category

Chemistry

Infectious diseases caused by bacteria pose significant public health risks, and antibiotic research is crucial for developing new therapies. However, the high cost and complexity of developing novel antibiotics limit progress. This study hypothesizes that enhancing the stability of existing antibiotics by making them more resistant to metabolism will improve their effectiveness. Using ChemDraw, Anaconda, and Jupyter Notebooks, we modified the structure of ofloxacin to design novel antibiotics. The molecular structures were converted into SMILES format for analysis, and logP values were predicted to reflect changes in polarity. Literature mining and machine learning suggest that increasing polarity could enhance stability and effectiveness. The predicted logP values were compared to ofloxacin, revealing several structural modifications that could potentially enhance antibiotic stability and increase efficacy.

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Abstract: Science and Engineering Fair of Houston

3137

Simultaneous Electrochemical Descaling and Electrocoagulation for the Effective Removal of Microplastics from Water

Irene Qian
Conroe ISD /AST: Academy of Science and Technology

Category

Chemistry

Water, the cornerstone of life, increasingly faces pollution by microplastics and limescale. While limescale buildup lowers industrial water supply efficiency and heightens energy consumption, microplastics lack biodegradability and persist in the environment, endangering aquatic ecosystems and human health. In order to eliminate these toxic contaminants from water, this study explores the simultaneous application of electrocoagulation and electrochemical descaling in a single-cell system. It was hypothesized that this integrated strategy would precipitate limescale from floating calcium ions and effectively aggregate microplastics using coagulants formed from dissolving metal electrodes, proposing a novel method to treat water. This was tested by applying different voltages to a synthetic wastewater solution containing fluorescent microbeads, calcium ions, and bicarbonate ions in a coupled-aluminum-electrode cell. Observing agglomeration was used to monitor the removal of microbeads while the cathode was visually assessed for calcium carbonate electrodeposition over a 60-minute reaction period. Experimental results demonstrated successful and visible accumulation of microplastics atop the water's surface, and concurrent deposition of calcium carbonate on the cathode, verified by SEM/EDXS analytical techniques. Furthermore, the solution's steady pH rise suggested the production of hydroxide ions at the cathode, bolstering the coagulation and precipitation processes. This dual-purpose system presents a major breakthrough in wastewater treatment; its potential for scalability, cost-effectiveness, and sustainability makes it extremely relevant for industrial applications and bettering global access to clean water. This research promises a more operationally-efficient and adaptable solution to water pollution by synergistically tackling two key impurities, ensuring the preservation of humanity's most valuable resource.

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Abstract: Science and Engineering Fair of Houston

3138

Purifying the Future: An Eco-Friendly, Selective Graphene Oxide-Chitosan Membrane Filtration System

Nikita D'Souza
Conroe ISD /AST: Academy of Science and Technology

Category

Chemistry

One out of every three people continue to suffer from access to safely managed drinking water. This is due to the costly, high energy-intensive molecular separation structures currently used for water filtration. With a rising population and the impacts of climate change, such as saltwater intrusion, a sustainable water purification membrane is crucial. This research created an environmentally friendly Graphene Oxide-Chitosan membrane by exploring the versatile applications of chitosan, a biodegradable natural polymer derived from the shells of crustaceans and the cell walls of fungi. The researcher cross-linked chitosan with graphene oxide (GO) and conducted tests within two categories: membrane characterization and filtration performance. Results of the membrane characterization demonstrated the hydrophilicity of the vacuum-annealed GO-Chitosan membrane, with a contact angle of 49.6 degrees. The membrane delamination test displayed high structural integrity, with height variability remaining between the -200 nm to 200 nm range before and after purification. Filtration was performed through a dead-end cell setup, and the membrane exhibited metallic salt rejection levels from 95-100% subsequent to the conductivity test. The low absorbance levels during the ultraviolet visible spectroscopy indicated high levels of dye rejection for the vacuum-annealed GO-Chitosan membrane. From a financial perspective, the cost-analysis revealed that the manufacturing, initial material, and cleaning costs are significantly lower than traditional membranes. In conclusion, the researcher engineered a cost effective and selective Graphene Oxide-Chitosan membrane filtration system to reduce reliance on synthetic purification mechanisms and to foster the development of a greener future.

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Abstract: Science and Engineering Fair of Houston

3139

PEI-Glass Fiber Mesh for CO2 Capture and Utilization

Alexander Gao
Conroe ISD /AST: Academy of Science and Technology

Category

Chemistry

Carbon dioxide has become a prevalent global environmental issue, with an estimated 3340 gigatonnes in the atmosphere today. CO2 poses dangers to global ecosystems and extrapolates environmental disasters. Existing carbon dioxide removal methods are limited because of high expenses and inefficient absorption; consequently, an energy-efficient, cost-effective, and regenerative absorption mechanism is necessary. A three-part linking process is used to synthesize glass fiber to polyethyleneimine (PEI) via (3-glycidoxypropyl)trimethoxysilane (GPTMS) which acts as a linker compound. FTIR and SEM scans were conducted and analyzed to confirm accurate synthesis of the composite. Two testing mechanisms were developed, one to confirm the complete synthesis of the composite material using a methyl red dye filtration test, and another to evaluate its carbon absorbing efficiency by designing a CO2 sensor hardware and program. When varying CO2 ppm is passed through the glass fiber composite mesh a recorded absorption of ~4.6mm/g polyethylenimine was recorded, placing it among the most efficient modern composite carbon capture materials. Thermogravimetric analysis was used to measure the regeneration rate of the composite with change in temperature, and a new, more thermodynamically favored regeneration pathway was found using a amine-swap reaction to convert added ammonia into urea. Finally a computational fluid dynamics model was created to predict the efficiency and kinetics of the CO2 absorption in motion. While future refining is needed, this new carbon absorbing solid composite macromolecule is first-of-its-kind, safely and effectively filtering carbon dioxide through amine technology.

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Abstract: Science and Engineering Fair of Houston

3140

Silicon Materials for Sodium-Ion Battery Anodes

Aditya Kejriwal
The Kinkaid School - HS

Category

Chemistry

Sodium-ion batteries are being researched as a low-cost alternative to lithium-ion batteries. However, as cell design is being developed, there are questions about efficient electrode and electrolyte materials. Currently, carbon-based compounds are the leading anode material, but Si's high specific capacity makes it efficient and its abundance in the crust makes it economically and environmentally ideal. I researched the use of crystalline (c-Si) and amorphous (a-Si) silicon as sodium-ion battery anode material. Using the Atomic Simulation Environment, I modeled c-Si and created irregularities through a process of melting and quenching to create a-Si. Then I introduced and removed sodium-ions from both silicon structures and used Molecular Dynamics to model their interactions, measuring the change in volume through multiple charge cycles. I also measured the maximum amount of sodium-ions the silicon structures could hold to estimate their specific capacities and used Density Functional Tight Binding to estimate their conductivities. I found that the a-Si had a conductivity twice that of c-Si at 3.16e-4 Siemens/m. However, the latter was much more stable through multiple cycles and had a higher specific capacity of 1878.735 mAh/g. While a-Si completely deformed, the volume of the c-Si fell more gradually to just above 80% of its initial volume after 25 cycles. Although its volume continued to decrease, due to its high specific capacity c-Si can be a potential sodium-ion battery anode material if created into a composite with other materials such as carbon to improve its conductivity and stability.

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Abstract: Science and Engineering Fair of Houston

3141

Water evaporation experiment

William Sullivan
Ball High School

Category

Chemistry

For this experiment, I used 3 bottles of water each containing the same amount of liquid. I put one under the natural sunlight, one under a lamp, and one in my closet to have complete darkness. I think the sunlight bottle will have less water because it was exposed outside.

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Abstract: Science and Engineering Fair of Houston

3142

Effect of pH on Epsom Salt Crystal Formation

Claire Collura
Clear Creek ISD /Clear Lake High School

Category

Chemistry

The experiment was conducted to discover how pH affects crystalline growth and structure. The experiment can be used for different fields of research as crystal growth is important to many different industries. To better understand and help these industries, the experiment was conducted regarding crystals. The scientist had a hypothesis that stated that the lower the pH of a crystal was, the smaller the sizing of the crystal would be due to the lower amounts of ionic bonds formed to create a lattice structure. The scientist created 10 cups of five different pH solutions. These cups were left out for 10 days with a string to stimulate crystal growth. The data represented stated that the crystals with a higher pH grew larger and that the crystals in a lower pH did not grow as well. All pH solutions had a major impact on the crystalline growth. The scientist had a correct hypothesis as the lower pH proved to create smaller crystals. The pH of solutions can be adjusted to achieve the desired type of growth in crystalline formation. This can be used in developments in the pharmaceutical industry or in geological research.

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Abstract: Science and Engineering Fair of Houston

3143

Improving Alkaline Electrolyzers: The Role of Forced Convection in Hydrogen Generation

Prachi Natoo
Conroe ISD /AST: Academy of Science and Technology

Category

Chemistry

As global hydrogen demands reached 20 million tons in 2024, electrolysis—the chemical process of splitting water into hydrogen and oxygen—remains one of the most promising methods for clean hydrogen production. While the cost of materials and production for Alkaline electrolysis is relatively low, challenges like electrode corrosion, and low energy efficiency arise. To address these problems, this project utilized a novel approach called forced convection to accelerate hydrogen bubbles to the surface faster with direct seawater alkaline electrolysis. This forced convection was accomplished by building the electrolysis chamber within another chamber of saltwater, creating a vacuum force pulling more water into the electrolysis chamber as hydrogen leaves. With forced convection, the bubbles' average velocity was 0.143 m/s while without forced convection it was only 0.0248 m/s, as the stream of water intake helped redirect and speed up the bubbles. Additionally, the forced convection increased the lifespan of the electrodes by 20% of its original time. Greater bubble velocities decreases bubble attachment and ensures a better overall efficiency of Electrolysis. This design was further tested with different electrocatalysts grown on the electrodes, and finally powered by a solar panel, creating truly green hydrogen. While more testing with variability of hole sizes and placements needs to be experimented with, this project is the first to successfully decrease bubble adhesion with no external energy involved, confirming the ability of forced convection to increase hydrogen efficiency.

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Abstract: Science and Engineering Fair of Houston

3144
Tenderizing

Dino Bulikj
Ball High School

Category

Chemistry

My project will address the process of deciding how marinating or dry-aging a steak can affect its nutritional values and texture. i will do this by having two separate steaks, and one will be marinated while the other dry-aged. then for my project, I will test out their nutritional values via taste testing, texture feeling tests, research documents, etc.

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Abstract: Science and Engineering Fair of Houston

3145

Enhancing Tomato Resilience: Identifying a Reversible Inhibitor for Beta-Fructofuranosidase to Combat Drought Stress

Clare McKenna
Conroe ISD /TWHS: The Woodlands High School

Category

Chemistry

Crop droughts account for over 78% of crop and livestock production losses in developing countries, while in more developed nations, the economic toll exceeds $9.6 billion per event. One of the most affected crops is the tomato, a staple in both the agricultural and food industries, contributing $4.8 billion to the US GDP alone. Today's solutions for addressing drought stress are antiquated, often relying on carcinogenic chemicals. Furthermore, these methods are based on inaccurate assumptions that plants will reliably produce the necessary inhibitory molecules to cope with water scarcity. This study introduces a sustainable, long-term, and natural method of in silico identification of reversible beta-fructofuranosidase inhibitors for tomato resilience to drought stress, ensuring metabolic pathways are clear to maximize crop growth. This study encompasses: (1) conducting extensive large-scale drug screening to identify potential inhibitors; (2) identifying candidate substances through computational screening that closely match the functional characteristics of the targeted inhibitors; (3) performing in vitro assays to assess the inhibitory effects of the substances on beta-fructofuranosidase activity; and (4) evaluating inhibitors on tomato plants under drought stress. Overall, this method significantly streamlines drought resistance in tomato plants, reducing costs and time by upwards of 90% and 55%, respectively.

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Abstract: Science and Engineering Fair of Houston

3146

Wash Impact!

Ronald Lamb
Heath Lowery
Jorge Mendoza
Conroe ISD /ASHP: Academy for Science and Health Prof

Category

Chemistry

This study investigates the impact of washing fire-resistant fabrics and how washing fire resistant materials affects its fire resistance, with a particular focus on the implications for firefighter safety. Data was collected from both experimental tests and interviews with firefighters regarding the construction and maintenance of their gear. Fire-resistant suits typically consist of multiple layers that provide heat and flame resistance, as well as specialized washing protocols due to the suits unique fabric. These special washing protocols include the use of specific detergents and washing machines to accommodate for the suits unique chemical compounded fabrics. The procedure used to research this topic used 12 pieces of fabric (a fire/heat resistant material) that were split into 4 groups; control, 1, 2, and 3. The control group was scorched for 3 seconds then set aside while groups 1-3 went through 1-3 washes depending on their group number. The washing process was done in a bucket with 1 gallon of water and 6ml of tide to replicate the washing process of firefighters suits. Once the fabrics were finished washing they would be hung to dry then heated, scorched, and rated based off of the burn that was left on the fabric. The data collected in the project concluded that groups 1-3 did not have a major difference in fire resistance but what was found was that the unwashed fabric (control group) did not get burnt to the degree that the already washed groups 1-3

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Abstract: Science and Engineering Fair of Houston

3147

Understanding the Molecular Mechanisms of Calcium Phosphate Crystallization in Nephrolithiasis

Sanjita Chinta
Fort Bend ISD /Elkins High School

Category

Chemistry

A medical issue that is becoming more and more concerning is urolithiasis. By preventing complicated calcium phosphate stone crystallization, supplements that are used to treat kidney stone disease can reduce the chance of developing new stones. For people who have alkaline urine, the alkali may reduce the effectiveness of certain kidney stone therapeutics since it raises the urine pH. In this study, citrate (CA) and hydroxycitrate (HCA) are tested as potential therapeutics for calcium phosphate stones. Hydroxycitrate and citrate are promising candidates as they are known to be digested by humans and have negligible effect on urine pH. In this study, the effect of citrate and hydroxycitrate on calcium phosphate crystallisation is studied in the context of kidney stone disease. Both CA and HCA affect Calcium phosphate stone formation by inhibiting the formation and growth of crystals. Citrate leads to the formation of more flower-like and pencil-shaped crystals, affecting their morphology. Additionally, citrate causes the crystals to grow preferentially in one direction, resulting in a thin, rod-like structures. Hydroxycitrate (HCA), on the other hand, behaves differently. It completely inhibits nucleation at low concentrations, showing its efficacy as a potential therapeutic. HCA also leads to the formation of visible defects on the crystal surface, yielding a surface that is uneven and textured, which further hints towards its ability to suppress kidney stone formation and growth.

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Abstract: Science and Engineering Fair of Houston

3148

Year II: Comparative Analysis of Heat Damage Detection Effectiveness in Epoxy Reinforced Carbon Fiber in Airplanes Between the NDE16 ThermalProbe (AJNDE16) and Infrared Thermography

Andrea Shi
Conroe ISD /AST: Academy of Science and Technology

Category

Chemistry

Modern airplanes are built of epoxy-reinforced carbon fiber that can weather harsh temperatures while airborne. An issue associated with carbon fiber is heat damage, which is caused in many ways at a temperature of 230°C . However, heat damage is difficult to detect in carbon fiber, leading to various proposed solutions including the ThermalProbe, or AJNDE16, which activates a fluorescence when exposed to a certain amount of heat when seen under a UV light. In application, the ThermalProbe is cured with epoxy, more easily activated with a higher concentration. Through Year I's experimentation, it was determined that the approximate ratio of best fit between epoxy and ThermalProbe is 20:0.01, or 0.05%. To further expand, the purpose of this experiment was to further narrow down the concentration of epoxy to ThermalProbe at 0.075%, 0.05%, 0.025%. Multiple trials were conducted by heating each concentration at 215, 230, and 245°C for 60 minutes, in 15 minute increments. Luminescence was determined by determining the RGB values, then using the formula for luminescence (0.2126R + 0.7152G + 0.0722B). T-tests were performed to calculate the significant difference between intensities, and the 0.025% ratio was deemed of best fit at $p<0.05$. To further investigate, a handheld infrared thermometer was used to detect heat in epoxy at 215, 230, and 245°C to compare against the ThermalProbe. The application of this project is to determine the most accurate method of heat damage detection in epoxy-reinforced carbon fiber.

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Abstract: Science and Engineering Fair of Houston

3149

pH LEVEL AGAINST SPHERIFICATION

Vielle Eone Averson Pascual
Alief ISD

Category

Chemistry

This experiment investigates the science behind popping boba, particularly how pH affects its texture and appearance. As popping boba gains popularity, I hopefully plan to create a spherification kit to make the process more accessible due to rising prices. Spherification, a technique from molecular gastronomy, transforms liquids into semi-solid spheres using sodium alginate and calcium chloride. I conducted three trials with different juices and sodas, testing their ability to spherify. Surprisingly, Coca-Cola (pH 2) and pineapple juice (pH 3) were successfully spherified, while orange juice (pH 3) failed due to its high calcium content. Tomato juice (pH 4) was also spherified, but pineapple juice needed longer chilling time because of bubbles affecting the process. The experiments showed that pH impacts the gelling process and the interaction between calcium ions and sodium alginate. Low pH reduces alginate's negative charge, hindering spherification, whereas high pH can create overly strong bonds, preventing the spheres from popping.

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Abstract: Science and Engineering Fair of Houston

3150

Virtual Screening of Potential Alzheimer's Disease Therapeutics: Molecular Docking Analysis of ZINC Library Compounds Targeting the Acetylcholinesterase Active Site

Elijah Abumere
Harmony South District

Category

Chemistry

The purpose of this experiment is to find candidate molecules with a better result than existing inhibitors for treating Alzheimer's disease by targeting Acetylcholinesterase (AChE). Alzheimer is a brain disease that mostly affects memory, but also affects ability to do everyday tasks. Alzheimer is also a common cause of dementia in older adults. Alzheimer can develop from things like genetics, age, and lifestyle. Around 4000 natural compound molecules are selected from the Select Chem database. Then we convert those molecules from SDF to PDBQT. The converted molecules were docked to the active site of AChE using AutoDock Vina. Four existing inhibitors are compared in the docking analysis, Physostigmine, Donepezil, Galantamine, and Edrophonium. There are 10 identified drug-like candidate molecules that are more effectives than the four existing inhibitors. This discovery can speed up the development of treatment for Alzheimer's disease.

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Abstract: Science and Engineering Fair of Houston

3151

Accelerating the Carbonate Silicate Cycle-$Mg_2SiO_4 + 4CO_2 + 4H_2O \rightarrow 2Mg^{2+} + 4HCO_3^- + H_4SiO_4$

Briley Grimm
Clear Creek ISD /Clear Falls High School

Category

Chemistry

Why aren't there more experiments directed at finding solutions to society's excess CO_2 problem? Pulling CO_2 from the ocean and burying it in geologic voids or creating CO_2 chambers are current accepted solutions. Olivine, NaCl and $NaHCO_3$ assist in CO_2 absorption. What is the effect of crushed olivine, NaCl, and $NaHCO_3$ on the ppm of CO_2 present in ocean water? If ocean water samples are taken and tested for CO_2 levels and then different amounts of crushed olivine, NaCl, and $NaHCO_3$ are introduced to those ocean water samples and then the ocean water is agitated, settled, (mimicking weatherization) and retested for CO_2 then the levels of CO_2 will decrease most dramatically ppm in the tests with $NaHCO_3$ present. Ocean water was gathered in jars, olivine was crushed and added to ocean water: some samples were just ocean water and olivine, some ocean water, olivine, and NaCl, and some ocean water, olivine, and $NaHCO_3$. CO_2, pH, and alkalinity tests were completed. A control of plain ocean water was tested. Ocean water with olivine lowered CO_2 levels, raised pH, and slightly raised alkalinity. Ocean water with olivine and NaCl lowered CO_2 even more and raised pH and alkalinity. Ocean water with olivine and $NaHCO_3$ lowered CO_2 the most and raised pH and alkalinity the most. White carbonates were observed in all samples resting on top of the green olivine in the jars. This proves using olivine, NaCl, and $NaHCO_3$ and combining CO_2 sequestration/mineralization processes accelerate CO_2 absorption creating useful carbonate silt.

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Abstract: Science and Engineering Fair of Houston

3152

Impact of Storage Duration on Ascorbic Acid Levels in Harvested Citrus sinensis

Amanya Reddy Gottam
Conroe ISD /AST: Academy of Science and Technology

Category

Chemistry

Ascorbic acid, or vitamin C, is essential for immune function, wound healing, and overall health, yet many individuals unknowingly consume fruits that have lost a significant portion of their nutrient content due to prolonged storage. This experiment investigated how the storage time of navel oranges affects their ascorbic acid (vitamin C) content, using iodine titration to measure the concentration of vitamin C in juices from oranges stored for 1 day, 1 week, 2 weeks, 3 weeks, and 4 weeks. The hypothesis was that as the oranges aged, their vitamin C content would decrease. Results confirmed this, showing that the 1-day-old orange had the highest vitamin C concentration at 2.68 mg/mL, while the 4-week-old orange had the lowest at 1.79 mg/mL. These findings highlight the importance of eating fresh fruit to ensure optimal nutrient intake, especially vitamin C, which is vital for preventing deficiencies, boosting immune health, and maintaining connective tissue strength. Additionally, this study emphasizes the need for consumers to make more informed choices when purchasing fruit. Fresh oranges provide significantly higher nutritional value, ultimately supporting better health and well-being. This research also has broader implications for reducing food waste. By understanding how storage time impacts nutritional content, consumers and producers alike can make smarter decisions about purchasing, storing, and consuming fruits, ensuring that fresh, nutrient-dense produce is prioritized. In the long term, this may improve both individual health outcomes and environmental sustainability by reducing waste associated with nutrient degradation in stored produce.

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