CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Safa Anis

Project Number
J0601

Project Title
Salt Water Battery

Abstract

Objectives/Goals
The objective of this experiment is to make a small salt water battery and to see if it can generate enough electricity to light a small low voltage bulb. And also to find out what is the effect of varying amounts of hydrogen peroxide on the saltwater solution by measuring the voltage.

Methods/Materials
First I made a circuit for the bulbs to be connected, then connected red alligator clip to the steel wool and black alligator clip to the magnesium coil and other ends of the wires to the bulbs. Then, I made a strong solution of warm saltwater. Then, I inserted the steel wool and magnesium coil into the empty plastic container. Finally, I poured the warm saltwater solution into the plastic container, which contained the steel wool and magnesium electrode. I noted a slight amount of light in both bulbs and measured the voltage across them. Then, I added varying amounts of hydrogen peroxide (H2O2) to the warm saltwater solution to strengthen the light in the bulb and recorded my data and results. Three set of readings were taken each time.

Results
As I poured the warm saltwater solution into the plastic container containing steel wool and magnesium electrodes, the light bulb glowed up after a while, which was the positive sign of my experiment indicating I was able to make a small saltwater battery enough to light a small bulb. Further, by adding different amounts of hydrogen peroxide solution to salt water solution resulted in a little stronger light, which indicated that the saltwater solution got more oxygen from the hydrogen peroxide.

Conclusions/Discussion
Based on the information that was collected and the experiment that has was completed, it was concluded that the solution of warm salt water along with the dipped steel wool and magnesium coil, did result in a small amount of electricity, enough to light a small low voltage bulb. I also concluded that adding different amounts of hydrogen peroxide resulted in the light getting brighter which supported my hypothesis.

Summary Statement
To make a small saltwater battery enough to generate small amount of electricity and to observe the effect of adding different amounts of hydrogen Peroxide to the saltwater solution.

Help Received
Father, partially helped pasting report

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Maya S. Clarkson

Project Number
J0602

Project Title
Coastal or Mountains?

Abstract

Objectives/Goals
Through this experiment I tried to make successful glazes for potters to use made from materials near my home.

Methods/Materials
I gathered and processed twelve materials from around the area I live in. I created tiles where each material was applied alone, applied in a 2 part mix with wood ash, and applied in a 3 part mix with ash and local clay.
I fired 3 sets of tiles to 3 different temperatures, Cone 3, Cone 6, and Cone 10.

Results
I found that several local materials or combinations of materials could form glazes, especially at higher temperatures.

Conclusions/Discussion
Our local materials have a wide range of color and surfaces at different temperatures. Materials from lower altitudes seem to have lower melting points. I am excited for further testing and making pottery with my results.

Summary Statement
Creating ceramic glazes from local materials.

Help Received
Mother helped type, Father drove and helped make test tiles. Father helped load and fire kilns.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Lianna M. Daug

Project Number

J0603

Project Title

When the Lime is Right: A Study on the Use of Calcium Hydroxide (Lime) in Ethanol Production

Abstract

Objectives/Goals

Agricultural wastes high in cellulose can be used in ethanol production but pretreating these materials can be costly and challenging. The objective of this project is to determine if lime, an inexpensive alkali, can be used to pretreat corn husks for ethanol production. It seeks to find out the optimal conditions, in terms of lime concentration, soak time, and temperature, that will result in the highest sugar and theoretical ethanol yield.

Methods/Materials

Corn husks were blended, poured in 8 jars, and allowed to soak with different lime concentrations (no lime for Control, low dose LD, medium dose MD, and high dose HD). Sugar content was measured using a refractometer every hour from 0 to 8 hours. After determining optimal dose and soak time, the experiment was repeated putting the jars in a water bath to compare room temperature, medium temperature (50-55°C), and high temperature(60-65°C).

Results

The average % rise in sugar content after 8 hours at room temperature was highest for HD at 70%, followed by MD at 67.21%, LD at 50%, then Control at 3.92%. Although HD performed the best, it was only marginally better than MD so I determined that the most cost effective dose was MD. Maximum sugar content was reached for all setups at 5 hours. The medium temperature was the best with a rise in sugar content of 105.88% after 5 hours, compared to 98.07% for high temperature and 67.21% for room temperature.

Conclusions/Discussion

This project shows that lime, a readily available, easily handled, and inexpensive alkali, can be used in the pretreatment of high cellulosic materials such as corn husks for ethanol production. The optimal pretreatment conditions were determined to be 0.3g lime/g corn husks (MD), 5 hours soak time, and medium temperature (50-55°C).

Summary Statement

This project is about determining if lime can be used to pretreat high cellulosic agricultural waste products for ethanol production and to find out the optimal conditions in terms of lime concentration, soak time and temperature.

Help Received

Dr. Felizarta provided the refractometer; Parents helped gather materials.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Pelin Ensari

Project Number
J0604

Project Title
The Effects of Acid and Heat on Fructose Content

Abstract

Objectives/Goals
The objective is to understand the fate of fructose during food preparation and digestion; therefore, the effects of both heat and acid on the fructose content in food were studied.

Methods/Materials
Three different foods were used: applesauce, carrots, and canned spaghetti. Each food was prepared by mixing a portion with phosphate buffer saline that would keep it at neutral pH. Then this solution was exposed to four conditions: control condition, experimental condition 1(heat, no acid), experimental condition 2(no heat, acid), and experimental condition 3(heat, acid). Next the samples were diluted so that the fructose amount would come down to a measurable range. Finally, the diluted samples were mixed with chemicals from an assay kit to measure its fluorescence in accordance with the food's fructose content.

Results
The results showed that there is less fructose at no heat condition(mean=29.85) mg/g) when compared to the heat condition(mean=43.9 mg/g). This implies that fructose content increases when exposed to heat. The second set of results showed that there was more fructose content in the neutral acidic condition(mean=43.17 mg/g) than the acidic condition(30.58 mg/g). These results proved that fructose content decreases when exposed to acid. Out of all the foods, applesauce was proven to have the most fructose(mean=73.66 mg/g) than spaghetti(mean=30.78 mg/g) and carrots(mean=6.19 mg/g).

Conclusions/Discussion
In conclusion, fructose content decreased when exposed to acid but increased when exposed to heat. These results were unexpected because heat was expected to decrease fructose, along with acid. Fructose content increased when exposed to heat because; (1) The fructose attached to the food can dissolve into the liquid, which is what the fluorometer measures; (2) The glucose in the food can isomerize to fructose, thus increasing the measurable fructose. Fructose content decreases when exposed to acid because the chemical bonds in sugars separate easier when exposed to acid. These results suggest to the public that acidic conditions are always more favorable than heat conditions for food containing fructose and that eating food raw whenever possible does not pose as much health risks.

Summary Statement
As an ingredient in our food, high consumption of fructose leads to major disorders; therefore, the effects of heat and acid were tested on fructose content.

Help Received
Father taught how to execute fructose assay beforehand; Mother taught statistical analysis, Mr. Briner also assisted along the way.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
John R. Haggerty

Project Number
J0605

Project Title
The Effect of Dextrose as an Interfering Agent on Sugar Crystal Formation

Abstract

Objectives/Goals
This experiment investigates the relationship between the interfering agent, dextrose and crystal formation in sugar solutions. What is the least amount of dextrose that can be added to a sugar solution to prevent crystals from forming? The hypothesis is that a solution with one molecule of dextrose for every molecule of sucrose (ratio 1.0) will prevent crystals from forming.

Methods/Materials
Four different sugar/dextrose solutions were tested with ratios of 0, 0.5, 1.0, and 1.5 dextrose molecules to sugar molecules. The solutions were placed in jars with strings suspended by toothpicks and allowed sit for twelve days. Half of the jars had strings that were seeded with sugar crystals. The resulting crystals were observed and weighed to compare the amount of crystals formed.

Results
The 1.0 ratio solution yielded the least crystallization. The 0.5 ratio solution yielded significantly more crystallization than the control. The 1.5 ratio solution yielded more crystals on the string than the 1.0 ratio solution and had many small crystals forming throughout the solution. Seeding the strings had little to no effect on the crystallization.

Conclusions/Discussion
The hypothesis was incorrect because all solutions yielded crystals. The 1.0 ratio solution did yield the least amount of crystallization. However, the dextrose seemed to support crystallization in the lower and higher concentration solutions. Additional testing of a greater variety of ratios of dextrose to sucrose would more precisely identify the effect of dextrose.

Summary Statement
The experiment investigated the relationship between the interfering agent, dextrose and sugar crystal formation to determine the least amount of the dextrose that can be added to a sugar solution to prevent crystals from forming.

Help Received
My father taught me how to use Excel for data analysis. My mother assisted with seeding the strings and mixing the solutions when more than two hands were needed at the same time. My mother also assisted with typing.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Marc C. Hudson

Project Number
J0606

Project Title
Hydrogen: The Quest for Renewable Energy

Abstract

Objectives/Goals
DETERMINE THE MOST EFFICIENT METAL TO PRODUCE HYDROGEN THROUGH ELECTROLYSIS

Methods/Materials
I FILLED THE TUB WITH THREE GALLONS OF WATER. I FILLED COLLECTION CONTAINERS WITH WATER UNTIL NO AIR WAS LEFT. I PLACED THE ELECTRODES AND RAISED THE CONTAINER AND THE ELECTRODE UPRIGHT WITHOUT LETTING ANY AIR IN. I CONNECTED THE STRIPS TO THE POWER OUTLET. THE 6V BATTERIES DID NOT PRODUCE ENOUGH POWER, SO I SWITCHED TO A HOME WALL OUTLET. THIS CURRENT IS ALTERNATING CURRENT, NOT DIRECT CURRENT FOUND IN BATTERIES. I READ THE AMOUNT OF GAS CAPTURED IN THE COLLECTION CONTAINERS EVERY SIXTY MINUTES, FOR FOUR HOURS. I CHANGED THE WATER AND REMOVED ALL RESIDUE ON THE METALS WITH SODA AFTER EACH EXPERIMENT. I RECORDED THE DATA, AVERAGED AMOUNTS COLLECTED AND FOUND THE PRODUCTION RATE. I CREATED GRAPHS TO COMPARE THE DATA AND FOUND WHICH METAL WAS MOST EFFICIENT.

4 EACH NICKEL, STAINLESS STEEL, MAGNESIUM STRIPS, 4 COLLECTION CUPS, 4 6V BATTERIES , 1 EACH: PLASTIC TUB , 1V POWER SOURCE, BAG OF MINI CLIPS, BREADBOARD, MULTI-METER, PACKAGE OF 22-GAUGE HOOKUP WIRE, 10K OHM CARBON-FILM RESISTERS, SAFETY GOGGLES, TIMER , FIRE EXTINGUISHER.

Results
ALL METALS PRODUCED HYDROGEN AND OXYGEN. STAINLESS STEEL PRODUCE 2.042 ML ON AVERAGE OVER 4 HOURS. NICKEL PRODUCED 6.417 ML ON AVERAGE. MAGNESIUM PRODUCED THE MOST WITH 36.667 ML ON AVERAGE. MAGNESIUM PRODUCED ABOUT 20 TIMES MORE GAS THAN NICKEL AND 67 TIMES MORE THAN STAINLESS STEEL. THE AVERAGE RATE OF PRODUCTION WAS 0.56 ML/HR FOR STAINLESS STEEL, 1.58 ML/HR FOR NICKEL AND 117.5 ML/HR ON AVERAGE FOR MAGNESIUM. AFTER THE EXPERIMENTS I OBSERVED THAT ALL THE ELECTRODES CORRODED. MAGNESIUM SHOWED THE MOST WEAR AS IT BECAME SMALLER AND FIT MORE LOOSELY IN THE STAND. I OBSERVED THE PRODUCTION RATE PEAKED AND THEN DECLINED.

Summary Statement
To determine the most efficient metal for an electorde used to produce hydrogen through electrolysis,

Help Received
Parents Supervised Experiment, Proof reading by parents

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Bristol Hume; Ava Sierra

Project Number
J0607

Project Title
The Effect of Surface Area on Reaction Time

Abstract

Objectives/Goals

How does the diameter of a test tube affect the time it takes for the Elephants Toothpaste reaction to occur? Knowing how to control chemical reaction times by changing the diameter of a test tube could prove to be a valuable tool in a wide variety of scientific experiments. Our hypothesis is that the tube with the wider diameter will have a faster reaction time because there will be more molecular contact.

Methods/Materials

1. Label the 8 cm tube #Tube A# and the 5 cm tube #Tube B#.
2. Put 1 teaspoon of active dry yeast dissolved in 2 Tablespoons of very warm water in Tube A.
3. Put 50 mL of Dawn detergent in Tube A.
4. Put 5-6 drops of food coloring into Tube A.
5. Put 50 mL of 12% hydrogen peroxide in Tube A.
6. Repeat steps 2-5 ten times in Tube A recording the reaction time each time beginning with the addition of the hydrogen peroxide and ending with the stopping of foam movement. Rinse the tube well with cold water between each test.
7. Repeat steps 2-6 using Tube B.

Results

For the smaller tube, Tube B, we averaged out the times to be 102.6 seconds. The range of times for all ten trials was 81-130 seconds. The foam created in the small tube came out smooth and steaming.

In our bigger tube, Tube A, the average time was 69.95 seconds. The range of times for all ten trials was 45-105.2 seconds. The foam came out smooth and steaming.

In trials 2 and 8 the reactions in Tube B actually took less time than the reactions in Tube A. We believe this occurred because Mr. Hume timed these two trials. He used a different timing method than all other trials that were timed by us.

Conclusions/Discussion

We found that the bigger test tube,with the larger diameter, worked as expected. The three centimeter difference between the two diameters was enough to show differences with our time results. Our hypothesis was correct because the chemical reaction in the small tube took longer to occur than the large tube. Knowing how to control reaction times by controlling surface area will be helpful in many laboratory experiments.

Summary Statement

In our project, we studied how surface area affects a chemical reaction called Elephants Toothpaste.

Help Received

The parents of Bristol Hume and Ava Sierra supervised the chemical reactions and collection of timing data. Kevin Hume built the test tube stands.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Rishabh Jain

Project Number

J0608

Project Title

From Fields to Fuels: A Comparison of Energy Content of Biodiesels Made from Waste Vegetable Oils

Abstract

Objectives/Goals

This project compares the energy content of biodiesels produced from different kinds of waste vegetable oils (soybean, canola, and corn). It was hypothesized that waste canola oil would have the highest energy content.

Methods/Materials

After the oils were filtered and warmed to remove suspended impurities and water, they were neutralized with potassium hydroxide (KOH). Equal volumes of oil samples were then treated with methanol and a catalyst, KOH, to create biodiesel. The biodiesel was separated from the glycerol byproduct and weighed. To determine energy density and total content, a calorimetric procedure was conducted in which the biodiesel was burned to transfer its energy in the form of heat to water. Using an energy conversion equation factoring increase in water temperature and decrease in biodiesel mass, the energy density for each biodiesel sample was calculated in Joules/gram. This energy density multiplied by the total mass of biodiesel produced determined total energy content in kilojoules.

Results

For the six calorimetry trials, the average energy density of canola biodiesel was almost 18,000 Joules/gram, surprisingly higher than commercial diesel fuel (15,000 Joules/gram), the control. Starting with 100 mL of waste oil, the total energy content of canola biodiesel averaged about 1,400 kilojoules, soybean had around 1,070 kilojoules, and corn yielded 900 kilojoules.

Conclusions/Discussion

The data collected proved my hypothesis correct, as canola biodiesel did have the highest energy content. Interestingly enough, every one of the three biodiesels released far less soot than diesel. In this investigation, canola biodiesel proved to be the best fuel source in terms of combustion cleanliness and energy content -- even when produced from used oil. At a macroeconomic level, the United States should invest in mass production and nationwide distribution of biodiesel to counter increasing dependency on diminishing fossil fuel reserves.

Summary Statement

This experiment investigates the energy content of biodiesels produced from three different common waste vegetable oils from restaurants.

Help Received

I would like to thank my parents for sourcing the chemicals used in this project, obtaining oil from several restaurants, and ensuring my safety during the burning of the biodiesels.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Eunice Lai

Project Number
J0609

Project Title
Temperature, Acids, and Rusting Rates: Which Is More Prevalent?

Abstract

Objectives/Goals
The objective of this experiment is to test the effect of temperature on the rusting rate of steel and iron, versus the effect of acid on the rusting rate of these two metals.

Methods/Materials
The steel nails and iron bolts were weighed before and after the temperature and acid trials, with the rusting rate being calculated by the percent differences of the before and after weights. Three different temperatures were tested, along with two different acids, citric and acetic.

Results
The hypothesis was that the effect of temperature on the rusting rate would be at least 95% higher than the effect of the acid. The results proved that half of the hypothesis was wrong, for the part that states that the effect of temperature on the rusting rate would be at least 95% higher than the effect of the acid was off; for example, in the sample I+A, Ht, the percentage loss was 2.82, while in sample I+A, Rm, the percentage loss was 0.17. This compares iron in acetic acid, but in different temperatures.

Conclusions/Discussion
Some patterns that were seen in the results of the experiment were that in all the trials, the iron samples that were in the control group that were put in the cold condition had the same percentage loss as the iron samples in the control group but in the room temperature condition.

Summary Statement
This experiment tested the rusting rate differentiation when steel and iron was subject to temperature changes versus being submerged in acid.

Help Received
Parents helped to buy supplies; used lab equipment at SDSU under the supervision of Dr. Chun-Ta Lai

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Bridget J. Macmillan

Project Number
J0610

Project Title
The Effect of Biodegradable Dye on the Evaporation Rates of Salt Water

Abstract

Objectives/Goals
The purpose of my experiment was to test the effectiveness of biodegradable dye on the evaporation rates of a 20% brine solution. My hypothesis was that blue dye, as indicated by the New Mexico State University study of 1965, would prove the most effective, as its darker color increases the amount of light energy absorbed. This light energy would increase the speed of the water molecules allowing more of them to escape from the water's surface.

Methods/Materials
The experiment consisted of six trial sets, measuring the evaporation rates and temperatures. Each trial set included five trials, where each possible layout combination was tested to eliminate error.

Results
The results supported my hypothesis, in that the blue dye consistently has higher evaporation rates and temperatures, though the difference between it and the control was minimal. I concluded that the results were significant enough however, to warrant additional testing on a larger scale.

Conclusions/Discussion
The initial application of the experiment was to increase potash production at the Intrepid Potash Site, located in Utah, adjacent to the Bonneville Salt Flats. As I did more research, I discovered other applications such as disposal of brackish water, and mineral laden water as mining byproducts. Increasing the evaporation of brine is also useful for increasing the production of pure water in desalination projects. The use of a biodegradable dye would be additionally useful as the byproducts would be environmentally friendly and at the ANSI/NSF Standard 60 for use in drinking water.

Summary Statement
This project tested the effect of blue biodegradable dye on the evaporation rate of a 20% brine solution, and found that the blue dye caused the solution to evaporation faster than the other colors and control that were tested.

Help Received
Mom helped with the board and Dad with assembling the environment.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Chloe Sky Ortiz

Project Number
J0611

Project Title
Fuel and Fire: Analyzing Tomorrow's Power

Abstract

Objectives/Goals
The purpose of this experiment is to see the differences in burning time, caloric energy, and carbon emissions of gasoline, diesel, and ethanol.

Methods/Materials
Materials: 1 teaspoon Diesel, 1 teaspoon Ethanol, 1 teaspoon Gasoline, Stop watch, 1 muffin tin (to light the fuel in), Funnel, Plastic syringe,Celsius thermometer, Closeable test tube, Small metal cup, Matches, Carbon dioxide detection Titration kit
Methods:
Experiment 1 - Caloric Energy Released and burning time
1. Set out the muffin tin in a safe, well ventilated area. 2. Place 1 teaspoon of first fuel in a cavity of the muffin tin. 3. Place a small metal cup on top, filled with 30mL of room temperature water. 4. Place the thermometer in the cup and make sure that it is 13A°C. 5. Light the first fuel on fire, and observe the temperature reading on thermometer. 6. When finished burning, record the highest reached water temperature and stop the timer. 7. Repeat steps 2-6 for the next two fuels. 8. Calculate the calories released from each fuel by multiplying the change in temperature by 30. 9. Record the burning time per fuel.
Experiment 2 - Carbon Emissions released
1. Complete steps one and two from experiment one. 2. Light first fuel on fire using the matches. 3. Quickly place the funnel with the syringe on top. The funnel should be slightly raised over the burning fuel. 4. Make sure to only draw in the smoke coming from the fuel into the syringe. 5. When the fuel stops burning, take out the syringe and inject the smoke into the closable test tube that has 20mL of water in it. 6. Close the test tube and gently shake it to mix the water and smoke. 7. Follow directions on Titration kit. 8. Repeat steps 1-7 for next two fuels.

Results
Diesel showed the highest in all the tests and ethanol was the lowest in all of the tests except for burning time.

Conclusions/Discussion
There is no easy answer to which fuel is the best one to use. While diesel has more energy and burns for the longest time, ethanol does not release very much Co(2), as diesel does, but it doesn't have very much energy or burn for as long. Gasoline was mostly in the middle for all of the tests. It is the most commonly used.

Summary Statement
The purose of this experiment is to see the differences in burning time, caloric energy, and carbon emissions of gasoline, diesel, and ethanol.

Help Received
Father was adult supervision, Leighann Work helped edit final paper

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Andrew T. Ostrom

Project Number
J0612

Project Title
Bio-Rusting: The Effect of Bacteria on Corrosion

Abstract

Objectives/Goals
The purpose of this project was to determine the effect of bacteria on rusting by adding different samples of bacteria to iron nails in water. My hypothesis is that adding bacteria to water will slow down or prevent the rusting of the nails because the bacteria will use up the available oxygen needed to cause the nails to rust.

Methods/Materials
Three samples of bacteria (yeast, yogurt, and soil) were added to two pre-weighed iron nails immersed in 100 ml of deionized water in a closed jar and observed for the formation of rust. Two nails in a closed jar were the control. Using a straw, bubbles were blown through a final sample to displace dissolved oxygen in the water. All samples were prepared in duplicate. Observations were made every other day for two weeks before the nails were removed, dried, and re-weighed.

Results
The nails in the water alone (the control samples) had a lot of rust sediment and a significant weight loss. The weight loss was from the rust falling off the nails. The color of the rust was brown, but the solution was clear. The samples that had bubbles blown into it also had appreciable rust sediment and a similar weight loss to the control. However, the color of the sediment and the water was orange. The jars with soil and yeast had very little weight loss and very little visible rust. Although the jar with yogurt had no rust sediment, it had a significant weight loss.

Conclusions/Discussion
Based on my measurements and observations, I concluded that the jars with bacteria prevented or limited the formation of rust, which was my hypothesis. My research for this project determined that some bacteria need iron to live, which is found in the nails. I think that this caused the weight loss for the yogurt samples without generating the rust.

Summary Statement
The purpose of this project is to determine the effect of bacteria on rusting by adding different samples of bacteria to iron nails immersed in water and observing the nails for the formation or rust.

Help Received
My father supervised the experiments and helped me fill out this form. My mother helped me assemble the project board.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Hannah P. PIngol

Project Number
J0613

Project Title
Do Temperature and Particle Size Affect the Rate of a Chemical Reaction?

Abstract

Objectives/Goals
The objective is to determine whether the particle size of Alka-Seltzer tablets and the temperature of water affect the reaction time, or the time it takes for the tablets to dissolve in the water.

Methods/Materials
Alka-Seltzer tablets were used as a particle, and water as a solvent. 12 Alka-Seltzer tablets were used for each trial; 3 tablets were kept as whole, 3 tablets were split into halves, 3 were split into fourths, and 3 were pulverized into a powder. 3 glasses of water were used, labeled as cold (20°C), lukewarm (40°C), and hot (65°C). Each tablet was dropped into each glass of water, the glass being refilled after each trial. The amount of time the tablets took to dissolve was measured in seconds, and was recorded when the tablets completely dissolved in the water.

Results
The average reaction rates in seconds for the whole tablets were 19.53 seconds for hot water, 36.15 seconds for lukewarm water, and 96.17 seconds for cold water. The average reaction rates for the tablets spilt in halves were 18.97 seconds for hot water, 30.50 seconds for lukewarm water, and 89.53 seconds for cold water. The average reaction rates for tables cut into fourths were 16.25 seconds for hot water, 29.75 seconds for lukewarm water, and 77.65 seconds for cold water. The average reaction rates for the tablets pulverized into powder were 7.40 seconds for hot water, 24.24 seconds for lukewarm water, and 57.30 seconds for cold water. The pulverized tablets dropped into hot water proved to be the fastest chemical reaction. The whole tablets dropped into cold water proved to be the slowest chemical reaction.

Conclusions/Discussion
As a result of the experiment, the hot water caused the Alka-Seltzer tablets to dissolve about 2 times quicker than water at lukewarm temperatures, and about 3 times faster than water at a cold temperature. Reducing the particle size quickened the reaction rate as well. Pulverizing the tablets cause the reaction to occur almost 2 times faster than keeping the tablet as a whole. Combining hot water with pulverized tablets was the quickest chemical reaction to occur. These results fully supported the hypothesis. The higher the temperature of water and the smaller the particle size of the tablets, the faster the rate of the chemical reaction.

Summary Statement
Do particle size and temperature affect the time it takes for the tablets to dissolve?

Help Received
Teacher (Mr. Buckles) helped answer questions; Father (Ronald Pingol) bought supplies and helped with display board; Sisters (Sarah and Anna Pingol) helped do the experiment; Mother (Annellyn Pingol) supported the student and bought supplies; Used books at National City Public Library

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Madeline Renteria; Andrea Uribe; Thelma Yeboah

Project Number
J0614

Project Title
Electrolytes

Abstract

Objectives/Goals
After a hard basketball game or practice and losing may electrolytes through our sweat, we wanted a way to regain them. Drinking liquids seemed to be the best way, but what liquid could we use that had the most electrolytes was still a mystery. Our group's objective became to find out what drink between Orange Juice, Powerade, Gatorade, Sustain Sports Drink, tap water, and distilled water had the most electrolytes. We expected the Sustain Sports Drink to have the most electrolytes and expected there to be a big difference in the amount of electrolytes between the sports drink, orange juice, and the distilled water and tap water.

Methods/Materials
To figure out what drink had the most electrolytes we created a circuit using a digital multimeter, copper wire, a nine volts battery, a pen cap, and two alligator clips. After creating the circuit we dipped the pen cap portion of the circuit, into a ceramic bowl that held one of the drinks, and measured the current. The drink with the highest current would be the one with the most electrolytes.

Results
Our results showed that there wasn't much of a difference between all of the drinks except for the distilled water which was always at 0.

Conclusions/Discussion
Our hypothesis was not supported by our experiment nor was it close to what we expected it to be, but we do not find this a failed experiment at all. Although our hypothesis was not correct we did obtain the goal of our project to find out what drink held the most electrolytes.

Summary Statement
This project was based on the idea to try and find out what drink had the most electrolytes, and we discovered there wasn't a big difference between tap water, sports drinks, or orange juice.

Help Received
Mr. Ornelaz helped with the digital multimeter; Mrs. Coppolo helped with the hypothesis; Madeline's and Andrea's moms helped putting the board together the fist time; Mrs. McCloskey helped organizing the events; Science teachers helped choose project.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Manaal A. Sayed

Project Number
J0615

Project Title
Rate of Crevice Corrosion

Abstract

Objectives/Goals
The objective of my experiment was to determine how the increase in temperature of an acid bath affects the corrosion of aluminum. My hypothesis states there is a direct correlation between temperature and the corrosion of aluminum. As temperature increases, the aluminum corrosion rate increases and as the temperature decreases the corrosion rate decreases.

Methods/Materials
I created three different temperature conditions using a bath of 250ml of vinegar and 4 grams of sodium chloride at 61˚C (using an incubator), 32˚C (using an aquarium heater) and 20˚C (room temperature) each in three beakers. Aluminum strips were submerged into each beaker for a period of 4 days. I observed the rate of corrosion occurring on each aluminum strip and recorded the results.

Results
The aluminum strip in the first beaker had the highest corrosion rate, while the beaker at room temperature of 20˚C had the lowest corrosion rate. I noticed that most of the corrosion occurred at the crevice points of the aluminum strips where there is a greater concentration of oxygen. Adding sodium chloride to vinegar also accelerates the corrosion process.

Conclusions/Discussion
My hypothesis was supported by the evidence recorded in my notes. As the temperature of the acid bath increases, the corrosion rate of aluminum increases and if the solution temperature is decreased the corrosion rate will decrease. I learned that when manufacturing goods from aluminum, temperature is a key factor to consider. I also learned why machine shops that use aluminum for manufacturing must operate in controlled temperature environments. Negative effects of corrosion can be harmful for our environment, if not controlled properly.

Summary Statement
This experiment attempts to answer the question of how temperature of an acid bath affects the corrosion rate of aluminum.

Help Received
My parents guided me through this project and got all the materials I needed. My Dad helped me with all the printing. My science teacher, Sr. Abir helped me develop an analytical interest in Science. The Culver City library staff assisted me with finding the resources I needed for the project.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Vanessa Sun

Project Number
J0616

Project Title
Floating Needles

Abstract

Methods/Materials

I found that my hypothesis was correct. The densities of the liquids do relate to the surface tension; the denser the liquid, the greater the surface tension. For example, the density of the hand sanitizer had a higher density than the density of water, so more needles were able to float on the sanitizer's surface. However, I also learned something unexpected -- 7-Up would sizzle when it touched the tissue paper and make air bubbles in the tissue paper; the paper wouldn't break and I had to pop the air bubbles. During the entire experiment I learned a lot about surface tension. Before, I was quite confused with the concept. However, doing this experiment has cleared things up for me, and I have learned how to measure water tension easily and in an interesting way. I had never thought about needles floating in different liquids; I always thought that needles could float on any type of liquid, but I have learned that they're successful floatation depends on the density of the liquid and that the liquid can't be acidic. I also had to make sure that the water was at room temperature, and unfortunately, I only had one bowl at that time, so every time I finished testing a liquid I had to wash the bowl and make sure no oil was left inside, because that might affect the testing of my other liquids. I think that in the future I can improve my experiment by doing multiple trials to make sure my information is accurate, and perhaps use smaller needles. I should also use a bigger variety of liquids with more extreme densities and check what the needles are made of. Lastly, I should try the liquids at a different temperature, and not limit the liquids to only room temperature.

Conclusions/Discussion

I found that my hypothesis was correct. The densities of the liquids do relate to the surface tension; the denser the liquid, the greater the surface tension. For example, the density of the hand sanitizer had a higher density than the density of water, so more needles were able to float on the sanitizer#s surface. However, I also learned something unexpected#7-Up would sizzle when it touched the tissue paper and make air bubbles in the tissue paper; the paper wouldn#t break and I had to pop the air bubbles. During the entire experiment I learned a lot about surface tension. Before, I was quite confused with the concept. However, doing this experiment has cleared things up for me, and I have learned how to measure water tension easily and in an interesting way. I had never thought about needles floating in different liquids; I always thought that needles could float on any type of liquid, but I have learned that they#re successful floatation depends on the density of the liquid#and that the liquid can#t be acidic. I also had to make sure that the water was at room temperature, and unfortunately, I only had one bowl at that time, so every time I finished testing a liquid I had to wash the bowl and make sure no oil was left inside, because that might affect the testing of my other liquids. I think that in the future I can improve my experiment by doing

Summary Statement

How the densities affect the surface tension of different ntypes of liquids.

Help Received

Teacher helped edit typing.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Jun S. Wema

Project Number
J0617

Project Title
Battery That Makes Cents

Abstract

Objectives/Goals
To find out what coin works as the best battery and if size and material affects the amount of produced electricity.

Methods/Materials
I stacked a penny under a small square 1cm x 1cm soaked in a vinegar-salt solution and the next coin (quarter, dime,or nickel)alternating each one so I have the same number of coins and paper towel for each stack. I will be using pennies, quarters, dimes, nickels, vinegar(any kind, 1/4c), salt(1 tbsp.), multimeter(any kind that reads mA and mV.), paper towels, a bowl or container, and a pair of scissors for my experimenting.

Results
The quarters with pennies worked better than the dimes and nickels with pennies. The quarters and dimes are made of the same material with same percentage which was 92% copper and 15% nickel while the nickel was made of 75% nickel and 15% copper and produced the least amount of electricity.

Conclusions/Discussion
I said before that I wanted to know if size and material affects the amount of produced electricity and it does. The dime is smaller in diameter compared to the nickel but it had a larger amount of produced electricity because it had a high percentage of copper and the nickel had a small amount of copper. This proves to me that size and material does affect the amount of electricity.

Summary Statement
To find out if size and material affects the amount of electricity the coins will produce.

Help Received
Mother helped decorate the display board.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Michael D. Wu

Project Number

J0618

Project Title

The Effects of Different Antacids and PPIs on the pH Intensity of Gastric Acid

Abstract

Objectives/Goals

My objective was to help find the most effective medicine for lowering the pH of Gastric Acid and treating acid reflux, whether it be an antacid or a Proton-Pump Inhibitor. My goal was to help the 50 million Americans who suffer from severe heartburn, including my dad, in most effectively decreasing their heartburn.

Methods/Materials

I used three different antacids, Alka-Seltzer, Baking Soda, and Antacid Tablets, as well as two different PPIs, Omeprazole and Lansoprazole. Then, I put the medicines in a chemical solution similar to Gastric Acid, in the way that they would be ingested. For example, one would ingest 2.5g Baking Soda in 4 ounces of water. I then periodically tested the pH level with my pH meter after intervals of 30min, 1 hour, 6 hours, and 24 hours. I tested each medicine seven times to avoid experimental errors.

Results

The seven containers of the 2.5g of sodium bicarbonate had the most immediate results; the pH levels of all containers increased an average of 3.7pH after half an hour and the pH level continued to increase after the next 24 hours. Next best were the Alka-Seltzer results, increasing 2.22pH after 24 hours and Antacid Tablets followed in terms of immediate response. Both PPIs, Omeprazole and Lansoprazole had the exact same results: a small increase after six hours, and then a slow gradual downward sloping after 24 hours to increase the pH level to 3.9pH from 3.4pH.

Conclusions/Discussion

In conclusion, the most effective, cheapest, and available treatment in lowering the acidity of heartburn was 2.5g of sodium bicarbonate. Next best was the Alka-Seltzer, then the Antacid Tablets.

Summary Statement

My project is about the most effective medicine in immediately lowering the effects of acid reflux; the most effective medicine was 2.5g of sodium bicarbonate.

Help Received

Parents helped me obtain the materials needed; Parents and Mrs. Driscoll helped edit.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
Stephanie Y. Chang

Project Number
J0698

Project Title
Polyester: The Ultimate Oil Spill Solution

Abstract

Objectives/Goals
The objective is to find out which biodegradable or recyclable material is the best oil spill absorbent. Since polyester is processed from crude oil, which has the "like dissolves like" principle in organic chemistry, my goal is to prove that recyclable polyester will absorb the most oil.

Methods/Materials
I used gravimetric method to do this experiment. First, I weighted 10g of each oil absorbent material. Then I put it in a pan that contained motor oil. After 2 minutes, I reweighed the absorbent. I then calculated the mass of motor oil absorbed and compared the absorbing capability between the different oil absorbent materials. My independent variable was the different types of oil absorbent materials, and my dependent variable was the mass of the absorbed motor oil. My controlled variables included: the type of motor oil, the mass of the oil absorbent material, and the duration of time in absorbing oil.

Results
The order of absorbency from least to greatest was: charcoal, oak bark, human hair, cheese cloth, and polyester. Polyester absorbs about 28 times its weight in motor oil. The absorbing capability of polyester is about three times compared to cheese cloth, which is the second best motor oil absorbent.

Conclusions/Discussion
In conclusion, I learned that polyester is the best motor oil absorbent among charcoal, oak bark, human hair, and cheese cloth. I also learned that different textures and fiber of polyester have a different capability in absorbing motor oil. Among all the different types of polyester that were used in the experiment, polyethylene terephthalate has the best oil absorbing performance. Through this experiment, I had proven my hypothesis to be correct.

Summary Statement
Throughout my experiment, I have determined that polyester is the ultimate oil spill absorbent.

Help Received
My parents taught me how to plot the graphs using Excel spreadsheet.

CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

Nicholas A. Sablan

Project Number

J0699

Project Title

Microwave Safe: Determining Bisphenol A Leaching in Microwave-Safe Packaging Using GC/MS

Abstract

Objectives/Goals

Bisphenol A (BPA), a hormone-disrupting substance that has recently been discovered as being dangerous to humans, has quietly and dangerously existed under our noses since the 1950s. The focus of my science project was to test whether BPA leaching occurred in commercial microwave-safe plastic packaging during the cooking process because the epoxy lining used to seal canned food products contain plastic.

Methods/Materials

To test this, I gathered four different types of microwaveable products made by different companies. I used four water samples collected from each container that were allowed to sit for 48 hours without microwaving. I microwaved each container for two minutes with a water sample, tansferring theses into glass containers. All eight samples evaporated at room temperature and were taken to Professor Kimberley Cousins at Cal State San Bernardino (CSUSB) for analysis using the Gas Chromatograph/Mass Spectrometer (GC/MS). Professor Cousins, myself and graduate assistant Jeffrey Yang prepared each trial sample with acetonitrile to test for the presence of BPA. Each of the samples was then analyzed for the presence of BPA using GC/MS.

Results

My hypothesis was that BPA would be leached into the microwaved samples. Luckily, this was proven wrong and no BPA was found in any of the samples.

Conclusions/Discussion

No BPA was found in any of my tested samples. Other chemical compounds were identified in the microwaved samples including various steroids and other unidentified plastics. These could be the basis for furthering this science fair project as I have not yet located research or information regarding the leaching of steroids during the microwave cooking process and am curious to whether there are any related health issues that we are not aware of.

Summary Statement

To determine whether or not the heating of microwave-safe packaging will result in the leaching of Bisphenol A.

Help Received

Use of the Gas Chromatography/Mass Spectrometry (GC/MS) at California State University San Bernardino under the supervision of Dr. Kimberley Cousins in the Organic Chemistry Laboratory.