CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Shaady A. Alavi Moghaddam

Project Number
J0603

Project Title
Go Organic

Abstract

Objectives/Goals
Are there more antioxidants and Vitamin A in organic spinach versus conventionally grown spinach?

Methods/Materials
Using thin layer chromatography and column chromatography, I used different solvents such as acetone, hexane, methanol, 70% hexane-30% acetone, and 80% acetone-20% methanol to pull out pigments in the spinach. I also used powders such as anhydrous sodium sulfate and alumina for the same purpose. For exact measuring I used Pasteur pipettes, micropipettes, and test tubes to store the extractions from column chromatography. For the Thin Layer Chromatography I used a TLC plate, which was spotted with pigments and developed in solvent, to show the separation of pigments in spinach.

Results
The organic spinach had more antioxidants and Vitamin A content. The carotene in inorganic spinach was only visible in 2 of the experiments. This was because the amount that the pigments traveled in inorganic spinach were 10cm for the first trial, 9cm for the 5th trial, and the rest of the trails did not show the presence of carotene in inorganic spinach. The average distance traveled by carotene in inorganic spinach was 3.17cm. In the organic form of spinach carotene was present in all the experiments with a high of 10cm and a low of 7cm for the distance traveled by the pigment. The average distance traveled for carotene in organic spinach was 8.29cm. Both chlorophyll a and b were not visible in many of the trials in organic spinach. Chlorophyll a only showed on the TLC plate a total of 3 times with an average traveling distance of .97cm, the high being 2cm and the low 2cm. Chlorophyll b was very much the same and was only present in 2 of the trials for inorganic spinach with a high of 1.6cm, a low 0f 0cm, and an average of .52cm. The trend that was shown throughout the entire experiment was that the distance traveled by the pigment increased with the polarity of the object.

Conclusions/Discussion
I hypothesized that only the organic form of spinach would show the presence of Vitamin A and antioxidants in its pigmentation. My hypothesis was partially supported. The data shows that there was more presence of antioxidants and Vitamin A in organic spinach than inorganic spinach.

Summary Statement
Antioxidants and Vitamin A content in organic spinach versus conventionally grown spinach

Help Received
Used Lab facility at C.S.U.F. under Dr. Atar Supervision.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Zekaria M. Beshir

Project Number
J0604

Project Title
It's Time to Rust Some Metals

Abstract

Objectives/Goals
My objective was to test the rusting effect of different metals when they are exposed to different liquids.

Methods/Materials
I have used four common metal screws: stainless steel, aluminum, brass and zinc, and four common liquids representing different pH levels: distilled water, salt-water, Clorox, and lemon juice. Each test set had 80 test tubes consisting of 16 tests of the various combination of the metals and liquids (4X4=16) and five experiments of each test (4X4X5=80). I did three trials for each test set (80X3=240). I had to expose the metals to the liquids for five days and observed the rusting each day and recorded the results (total data sets of 240X5=1200).

Results
After being exposed for five days, Stainless Steel and Aluminum did not rust in distilled water and lemon juice but they did rust in salt water and Clorox. Zinc rusted in all liquids within about two days except for the salt water solution which took more than five days. There was an average of about two days for brass to rust in all of the liquids used in the experiments. All the metals rusted in Clorox within one to three days.

Conclusions/Discussion
In my experiment I found that most of the metals showed a sign of rust depending on the type of liquid used. Overall, the stainless steel was the most rust-resistant while brass was the least rust-resistant. Clorox (base) had the most rusting effect on all four metals while distilled water (neutral) had the least effect.

Summary Statement
Rust resistivity of different metals when exposed to different types of liquids.

Help Received
Dad and sister provided guidance, helped type, and review report; Mother helped with the board; brother helped with the data collection.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jessica Brest

Project Number
J0605

Project Title
How pH Affects Steel

Abstract

Objectives/Goals
The objective of my science project is to determine the effects, if any, of higher and lower levels of pH on mild steel.

Methods/Materials
7 clean plastic containers with lids, 21 clean steel nails, 7 cups of pure water, 6 tbsp of Sodium Bisulfate (acid), 6 tbsp of Sodium Carbonate (base), Gram Scale, 8 labeled plastic bags, Safety goggles, rubber gloves.
1)Record the weight of one clean nail, 2) pour 1 cup of pure water into each container, 3) Add 1 of the following to 6 of the containers: Sodium Bisulfate: 1 tbsp, 2 tbsp, 3 tbsp. Sodium Carbonate: 1 tbsp, 2 tbsp, 3 tbsp (leave the 7th container with just water) 4) Place 3 clean nails into each container. Record the time and date when you put the nails into the solution. 5) Snap on the lids and leave the containers to set for 48 hours. 6) After 48 hrs., open the lid to a container and (wearing gloves) removed all 3 nails; rinse them to neutralize the pH. Record observations of the solution and the nail. 7) After rinsing, put all 3 nails from 1 container into a plastic sealable bag and label. Repeat until all nails are in bags. 8) Record the weight of 1 empty bag, then record the weight of each bag of nails. Subtract the weight of the empty bag from the weight of a full bag and divide by 3 to get the approx. weight of each nail in that bag. Repeat this step for each bag. 9) Put the nails back into their containers and record the time when all are in. 10) Repeat this procedure every 48 hours.

Results
I learned that the lower pH levels are, the more the steel will dissolve and oxidize. the pure water mainly just oxidized the steel while the Sodium Bisulfate (acid) dissolved the steel-to almost nothing in the higher amounts. The Sodium Carbonate (base), however, only corroded very slightly. The Oxygen in the water formed a layer of oxide on the nails, but not much of the nail itself was actually dissolved away like in the acid.

Conclusions/Discussion
Based on the results of this experiment, I conclude that the lower the levels of pH there are around mild steel, the faster it will corrode/dissolve. I do know that my results are not completely accurate. If I had left the nails in the solutions for longer, the reaction would have gradually ended because all of the molecules in the solution would have reacted until there was nothing left to react. This would have caused my graph to curve into a straight line of no corrosion after a longer period of time.

Summary Statement
I determined the effects of pH on mild steel versus oxidation.

Help Received
Father helped set up chemicals correctly and provided gram scale.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jasmeet (Josh) S. Dhaliwal

Project Number
J0606

Project Title
Kinetics of Alka-Seltzer Reaction

Abstract

Objectives/Goals
The objective of my project was to determine how water temperature affected the rate of reaction and quantity (volume) of carbon dioxide produced by an Alka-Seltzer tablet. My hypothesis was that the rate of production of carbon dioxide from an Alka-Seltzer tablet would increase with an increase in water temperature, but that the quantity of carbon dioxide produced would remain constant.

Methods/Materials
I performed my experiment first by testing cold tap water, then ice cold water, and finally hot tap water. For each water temperature, I conducted four trials. Clear plastic tubing was connected from the bottle cap to an upside down 250 mL graduated cylinder full of water, which was kept inside a rectangular plastic box one-thirds full of water. For each trial, I put 4 oz of water in an empty plastic bottle, checked the water temperature, and dropped one Alka-Seltzer tablet into the bottle; I quickly put the cap on the bottle. Immediately after dropping the tablet into the water, I started the stop watch and noted the level of water in the graduated cylinder every ten seconds until the water level was no longer changing inside the cylinder, indicating that the reaction was complete. I also noted down the time to complete the reaction.

Results
As compared to ice cold water, hot tap water produced 135% more carbon dioxide and reaction time was almost 80% faster. Also compared to ice cold water, cold tap water produced 54% more carbon dioxide and the reaction time was 40% faster.

Conclusions/Discussion
My hypothesis was partially correct; the rate of production and quantity of carbon dioxide produced increased with an increase in water temperature. The rate of carbon dioxide increased with an increase in water temperarure because the warmer a substance is, the faster its particles move, causing a swifter reaction. Volume of carbon dioxide produced increased with an increase in water temperature in accordance with the Law of Volumes which states that at constant pressure, the volume of a gas is directly proportional to the temperature on the absolute temperature scale.

Summary Statement
I wanted to see if water temperature affected the rate of production and quantity of carbon dioxide produced by an Alka-Seltzer tablet.

Help Received
My parents helped me with the setup of the experiment and helped me organize my data.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Shirin E. Herzig

Project Number
J0607

Project Title
Scents and Celsius

Abstract

Objectives/Goals
This project asked, "Is it possible to synthesize scents? If so, then are these scents affected by temperature?" The author hypothesized that when the artificial scent is placed in a freezer it would have the strongest scent over all.

Methods/Materials
All the esters that I made were all the same (all from the same batch), and that the wooden sticks all have the exact same ester on them. Each wooden stick is the same, and each plastic bag is the same. I put some wooden sticks (with my ester on them) in 790 F, the ones on the counter. I also put some in a freezer, and I heated some up. I want to see if these wooden sticks can be smelled after being heated up, and frozen. I will have my volunteers use the Odor intensity scale to judge the scents. Each volunteer will judge 9 wooden sticks. In the end each stick will have 6 people who judged it (3 boys, 3 girls). I will do my experiment 5 times. I will make the ester once, but use many different wooden sticks as the different trials.

Results
Results showed that that the ester placed in room temperature and the one that was heated had the strongest scent of 3.5 (on an odor intensity scale 0-6).

Conclusions/Discussion
The author concluded that when one ester was placed in a freezer the chemical reaction reversed, causing the ester to smell like it did before the process of esterfication.

Summary Statement
The experiment#s methodology was to test if homemade artificial scents were affected by different temperatures.

Help Received
Used lab equpment at Ojai Valley School under the supervision of Mr. Inman.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Hailey C. Loehde-Woolard

Project Number

J0608

Project Title

Saccharification of Cellulose to Produce Ethanol, a Sustainable Liquid Fuel, Year Two: Next Gen. Enzymes & Pretreatment

Abstract

Objectives/Goals

Cellulose is one of the main components of the paper waste stream. Ethanol can be used as a fuel. Last year I developed a pretreatment process using pressure cooking and microwave digestion with sulfuric acid to produce cellulosic ethanol. The purpose of my experiment this year is to investigate next generation cellulase enzymes and pretreatment of paper products in order to achieve an efficient yield of glucose.

Methods/Materials

Materials:
newsprint,sulfuric acid,sodium bicarbonate, Novozymes NS22074 Cellulase Colmplex,Genencor ACCELLERASE 1500,pH meter, glucose meter, paper shredder,½ gal. Jars\quart jars,distilled water,large graduated cylinder, small graduated cylinder,pipette,safety equipment.

Methods:
Non Pretreatment: Fill jars with shredded paper and water. Adjust pH. Heat jars to 50C. Add (0.1-0.5mL per gram cellulose) ACCELLERASE 1500 to 3 jars. Add (1-5% w/w) NS22074 to 3 jars. Place all jars in oven and maintain for 24 hours. Check sugar level with glucose meter and record. Measure fluid and record volume.
Pretreatment: Fill jars with shredded paper. Add distilled H2O and H2SO4 to get a pH below 2. Place jars in pressure cooker. Heat for 45min. at 15psi. Transfer jars to microwave oven and microwave on high for 10 1min increments, stirring between each increment. Cool and repeat the steps from the non pretreatment method starting from the pH adjustment step.

Results

Starting with 50 grams of paper and no pretreatment I produced 18.5 g +/- 0.5 g of glucose using Novozymes NS20774 and 22.7 g +/- 1 g of glucose using Genencore Accellerase 1500. Starting with 50 grams of paper and pretreatment I produced 18 g +/- 1.2 g of glucose using Novozymes NS20774 and 27.7 g +/- 3.5 g of glucose using Genencore Accellerase 1500.

Conclusions/Discussion

My result for last year was to produce about 4.2g of glucose from 50 grams of newsprint. This year I produced up to 8 fold as much glucose from the same amount of newsprint. I was surprised by the differences between the two enzymes. I expected them to perform about equal. Pretreatment was not statistically different from non pretreatment for Novozymes but was for Genencor.

Summary Statement

Investigating next generation enzymes with and without pretreatment to produce cellulosic ethanol.

Help Received

I received help from my mother and father in preparing my poster and with chemicals during the experiment.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Nicole Madrazo

Project Number
J0609

Project Title
Just a Needle and a Lot of Surface Tension

Abstract

Objectives/Goals
The objective of this experiment was to determine if surface tension of water is affected by temperature.

Methods/Materials
For this experiment 10 containers were used that had different temperatures of water in them. I poured the water into another shallow bowl under a balance made from two tin cans and a wood rod with a needle as the fulcrum. To balance the beam, I used a small amount of modeling clay. A paper basket tied with eight inches of string was attached to one end of the wooden rod. I put pieces of small paperclips in this basket to allow me to measure the surface tension and a triple-beam balance scale to measure the mass of them. On the other side, four inches of nylon string held a needle which rested on the surface of the water. The different temperatures of water were measured with a digital thermometer in degrees Celsius.
I heated or cooled ½ cup of water. After measuring the temperature, I put the water into the shallow bowl and rested the needle gently on top of it. Using tweezers, I gently put the small pieces of paper clips into the paper basket until the needle lifted off the surface of the water. Then I measured the mass of the pieces of paperclip. Then using the formula F=2sd (s=surface tension, d=length of the needle resting on the water, and F= (mass of paperclips)x(9.83)x(10^-3) to make it N/g). I repeated did this 10 times for each different temperature.

Results
10 trials were taken for five different temperatures of the water. Each trial was measured in grams. I recorded the results in a table and calculated the surface tension with the formula F=2sd where s is the surface tension, d is the length of the needle resting on the water and F is the mass of the paper clips x the gravitational pull of the earth x 10^-3. Surface tension is expressed in Newtons/m.
The results demonstrate that as the temperature of the water increases the surface tension decreases and creates a somewhat linear graph.

Conclusions/Discussion
My hypothesis was proven correct when I discovered that the higher the temperature gets, the lower the surface tension is.
There are various examples of surface tension in real life. Temperature plays a big roll in the behavior of a liquid. When the liquid is stretched by something or is poured on a surface, it tends to form the droplets due to the surface tension.

Summary Statement
My project tests the effect of temperature on the surfaace tension of water.

Help Received
Mother took me to the store to buy materials and organization; Father helpped build balance; Aunt lend me her thermometer; Teacher gave me ideas on project

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Nitya Mani

Project Number
J0610

Project Title
Can Jatropha Oil Be Converted into a Usable and Cost-Efficient Green Alternative Fuel?

Abstract

Objectives/Goals

Fossil fuels are running out, and we are looking for sustainable replacements. Jatropha oil, an inexpensive oil, has potential for being an effective replacement. My experiment focuses on trying to correct three main obstacles that are currently preventing this oil from fulfilling its potential which are that the oil oxidizes too quickly, has a high cloud point, and is currently being extracted with hexane which is both non-sustainable and expensive. I hypothesized that we could use antioxidants to significantly lower oxidation level, add chemicals that completely dissolve in the oil to lower cloud point, and use other common solvents in place of hexane to extract the oil.

Methods/Materials

1.I added TBHQ and ascorbic acid, two antioxidants, to the oil to see how it would affect its oxidation level.
2.To the lower the cloud point of the oil, I tried adding isopropyl alcohol, ethanol, cyclohexane, and ethyl acetate. This experiment had two controls: a positive control (Jatropha oil) and a negative control (Jatropha oil and salt).
3.I performed extractions with hexane, ethanol, and ethyl acetate.

Results

1.The solution of Jatropha oil and TBHQ was the most effective at lowering the oxidation level of the oil. Ascorbic acid was effective at lowering oxidation levels but only when used in relatively high concentrations.
2.Cyclohexane and ethyl acetate both lowered the cloud point of the oil by over 20˚C, whereas ethanol and isopropyl alcohol actually raised the cloud point of the oil.
3.My experiments indicated that ethyl acetate could be a viable alternative to hexane in the extraction of Jatropha oil. Both of them extracted a little over 30% oil from the seed. The ethanol performed significantly worse than the other two.

Conclusions/Discussion

1.The TBHQ was the better antioxidant of the two although both TBHQ and ascorbic acid were fairly good at lowering the oxidation level of the oil.
2.Both cyclohexane and ethyl acetate were both effective at lowering the cloud point. Given that ethyl acetate is cheaper and greener than the cyclohexane, it might be the better alternative.
3.In the case of extraction, ethyl acetate proved to be as effective as hexane. Here also, it might be the better alternative as ethyl acetate is inexpensive and sustainable.

Summary Statement

Changing the oxidation levels, cloud point levels, and increasing the sustainability of the oil extracted from Jatropha Curcas seeds, so that it will be commercially viable and sustainable, yet still retain its low price.

Help Received

Used the facilities and equipment at Schmahl Science Workshop and was guided by Belinda Schmahl and Mark Kent.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Zoe D. Martinez

Project Number
J0611

Project Title
The Effects of Different Solutes and Solution Concentrations on the Boiling Point of Solutions

Abstract

Objectives/Goals
Each solute has different molecular properties that make them boil differently (colligative properties of solutions). This experiment is to see the difference between sucrose (sugar) and NaCl (salt) solutions. The sugar molecule is non-ionic and pretty big molecule. The salt molecule is ionic and electrolytic and is light and dense. This experiment will look at the different boiling and vapor point behaviors of different solutes at different concentrations to see the different reactions, times and boiling points.

Methods/Materials
2 gallons of distilled water
321.12 grams of sugar(sucrose)
452.5 grams of salt non-iodized (NaCl)
Pot, stove, thermometer
1. Heat 4 cups (0.946 L) distilled water in a pot with a thermometer suspended in the center
2. Every 15 seconds read and record the temperature until the water stops getting hotter four consecutive times
3. Observe and make note of the appearance of the water each time the temperature is recorded.
4. Plot the results on a graph with the temperature on the vertical axis and the time of the horizontal axis. Note the vapor point (when vapors form) and boiling point (when temperature remains constant)
5. Repeat and record with 5%, 10% and 25% solutions of NaCl and Sucrose

Results
Sucrose (sugar) had little affect on the boiling point because the structure of the sucrose is very solid, with 11 carbons. There is no ionic or electrolytic reaction as the solution boils. Therefore, the sugar behaved much like the control group, water. The NaCl (salt) solution was dramatic with lots of bubbles and crystals. The reaction went much faster, with a steeper curve in rise of temperature. The solutions with 5% concentration went much faster than solutions than 10% and 25% (except 10% NaCl).

Conclusions/Discussion
All solutes are not the same. Salt forms salt crystals, is ionic and electrolytic and has little vapors and lots of big bubbles. There were also less vapors and water loss. The sucrose solution, which was more "thick" with lots of small bubbles and tons of vapor and water loss, behaved like the water. Depending on how you want to effect the boiling point, choosing a solute can change how long it takes to boil and how much it takes to boil.

Summary Statement
This project shows how the properties of different solutes affect the boiling point of their solutions in water. I chose to use an ionic and a non-ionic compound. By using a series of concentrations I could clearly see each solute's properties.

Help Received
Mother helped me with calculations we found on the internet and to make this application

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Luis A. Perez; Luis E. Rivas

Project Number
J0612

Project Title
Greenhouse Effect

Abstract

Objectives/Goals
The objective is to compare the level of concentrated carbon dioxide (CO2)in the four different gases; (1)Ambient Air, (2)Human Exhalation, (3)Car Exhaust, (4)Nearly Pure CO2 (from baking soda and vinegar).

Methods/Materials
Five test tubes were filled with bromthymol blue indicator solution (15ml of water and 10 drops of bromthymol blue indicator solution to each test tube). Four balloons were filled with one of the four gases each (ambient air, human exhalation, car exhaust, and nearly pure CO2-from baking soda and vinegar). A straw was placed in each balloon's neck and the gas was expelled into each separate test tube. We compared the color to the control vile to note any change. We proceeded to use diluted ammonia to neutralize the carbonic acid and recorded the amount of ammonia needed.

Results
In the results, the car exhaust, once added to the bromthymol solution, was a yellow-green and very close to turning a complete yellow color indicating it has a very high carbonic acid content. The 42.4 drops of ammonia taken to neutralize the carbonic acid in the bromthymol blue was very high in contrast with the 20.8 drops taken for the human exhalation and the 0 drops taken to neutralize the carbonic acid in the ambient air and was also very close to the pure CO2 which took an average of 61.2 drops.

Conclusions/Discussion
Based on my research I learned that CO2 is not the only chemical in the car exhaust. There are also other chemicals such as nitrogen dioxide, formaldehyde, particulate matter, and sulfur dioxide and other harmful chemicals. Research also shows that car exhaust is not the only cause of air pollution. Deforestation and fuel combustion are other causes of air pollution. Since there are high levels of CO2 in the air, there is global warming. Global warming is when the radiant sun energy is trapped by the greenhouse layer to prevent extreme temperature drops during the night.
I have also learned that CO2 is only toxic when it has reached 5% concentration, but we should do our best to try and lessen the atmospheric pollution.

Summary Statement
We are comparing the amount of carbon dioxide in four different gases.

Help Received
Our teacher Mr. Chung Nguy helped get the car exhaust.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Andrew D. Raynes

Project Number
J0613

Project Title
Does Soda Temperature Affect the Height of a Mentos Geyser?

Abstract

Objectives/Goals
My objective was to determine if Mentos mint candies would react differently in different temperatures of soda. I believe that the heated soda will shoot a higher geyser than either the room-temperature soda or the refrigerated soda, because the molecules in the heated soda will become more active and create more pressure.

Methods/Materials
Nine rolls of Mentos mint candies, 9 2-liter bottles of Diet Coke, 1 Mentos Geyser Tube, a digital meat thermometer, a heating pad, a tape measure, blue painter#s tape, and a black and red marker to mark 6-inch and 1-foot intervals were used in this experiment. A camera, a camcorder, a pencil, and paper were used to record data from the experiment. Three bottles of Diet Coke were refrigerated, three bottles were heated with a heating pad, and three bottles were left at room temperature. Eleven Mentos were dropped into each of the bottles, and the heights of each geyser created were recorded.

Results
The three refrigerated bottles of Diet Coke consistently produced the shortest geysers of the nine bottles tested, while the heated bottles of Diet Coke consistently produced the highest geysers of all trials.

Conclusions/Discussion
My conclusion is that the temperature of the soda does have a major affect on the height of a Mentos geyser, with heat creating more energy to produce a higher geyser.

Summary Statement
This project shows how heat intensifies a reaction when Mentos candies are dropped into Diet Coke.

Help Received
Mother took pictures, helped type report, and helped create 3D model on display. Father videotaped.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Stephanie Reese Rillon; Emily Yan

Project Number
J0614

Project Title
A Sticky Situation: Corn Syrup's Angle of Polarization

Abstract

Objectives/Goals
The objective is to construct a homemade polarimeter to find out if corn syrup is chiral, and if yes, what the angle and direction of polarization are.

Methods/Materials
We constructed our homemade polarimeter by using a laptop computer screen as the source of polarized light, and a polarized camera filter lens as the detector. The camera filter lens is fixed on a wood frame attached to a wood base while the laptop screen is mounted on a lazy-susan sitting on the wood base so that the laptop can be easily rotated. The liquid to be tested (corn syrup or glucose solution) is loaded into a cup with transparent glass bottom sitting on the computer screen. We first fix the lazy-susan in a desired position (i.e., perpendicular to the wood frame), and then rotate the camera filter until the computer screen (area without the test liquid) appears dark. We now fix the position of the camera filter and then rotate the lazy-susan until the light coming through the test liquid appears dark. The direction and angle of rotation of the lazy-susan give us the left-handedness or right-handedness of the test liquid and its angle of polarization. We used glucose with known direction of polarization to confirm that the homemade polarimeter operated properly.

Results
Corn syrup is left-handed and pure corn syrup we tested has an angle of polarization of 24°. The angle of polarization decreases with the dilution of the corn syrup.

Conclusions/Discussion
Our study shows that the direction and angle of polarization of a molecule can be measured effectively using a homemade polarimeter that is constructed with common household items such as laptop computer screen and camera filter tens. The angle of polarization decreases with dilution by water makes sense because water molecules are achiral.

Summary Statement
We constructed a simple homemade polarimeter using a laptop computer screen as the light source and a camera filter lens as the detector and measured the direction and angle of corn syrup.

Help Received
Father helped attach the wood frame to the wood base board; Obtained glucose solution from UC Riverside

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jade Noelani Roman

Project Number
J0615

Project Title
Dye Intensity

Abstract

Objectives/Goals
I was interested in finding out if fabric left in natural dyes for longer periods of time would show higher intensity of color.

Methods/Materials
I chose to use 4 vegetables to make natural dyes on cotton and wool fabric swatches. I chopped one cup of each vegetable and wrapped it in cheese cloth. I then boiled 4 cups of water and placed one vegetable in the pot. After 15 minutes I placed 5 cotton and 5 wool swatches into the boiling dye. At fifteen minute intervals I removed one swatch of cotton and wool until all pieces were removed. The final fabrics were in the dye for 75 minutes each. After the fabrics were all completly dried, I then used a light meter to measure the intensity of the colors. I used a piece of PVC pipe formed at a 90 degree angle that had the corner cut open. When I placed the open corner of the pipe on the fabric and held a flashlight at one end, the light would go down and bounce up off the fabric to the other side where I held the light meter. Lighter colors would read higher numbers and darker colors would read lower numbers as more light was absorbed into the fabric and less bounced up to the meter.

Results
Spinach showed the lowest increase in intensity as the dye was a very pale yellow-green color from start to finish, although it did become slightly darker. The Beets, Onion Skins and Blueberries all showed higer levels of increased intensity, with Blueberries showing the darkest results. As my research suggested, the wool did accept the dye more and had even higher levels of intensity than the cotton. After some swatches blew into the grass while drying, I noticed brighter green spots and decided to repeat the entire process on both cotton and wool with fresh cut grass. Unfortunately, I still could not get a true green dye, although it too showed increased intensity on the last swatches.

Conclusions/Discussion
Overall, the results that I achieved did support my theory that the longer the fabric stayed in the dye, the more intense the color would become. All my life I have had interests in fashion, art and cooking, so by doing this project I was able to incorporate all three together. After completing the project I used the leftover Beets and Blueberry dyes to tye dye a t-shirt.

Summary Statement
I wanted to find out if fabric left in natural dyes for longer periods of time would show higher intensity of color.

Help Received
Mother took and printed pictures.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Nicholas M. Sebastiani

Project Number
J0616

Project Title
Chlorine Decay in Tap Water

Abstract

Objectives/Goals
This experiment tested chlorine decay in different temperatures of water. This experiment will help to determine if tap and/or drinking water is clean. Finally, this experiment could help to tell if swimming pools are sanitary and safe enough to use at various times of the year.

Methods/Materials
For each test, a colorimeter (chlorine measuring device) was used. To perform the experiment, three amber bottles, which were the same size for all of the tests, contained water at a controlled temperature (cold or warm), and one bottle was a control at room temperature. All of these bottles had the same amount of chlorine (bleach) in them at the beginning of the experiment. The bottles were tested with the colorimeter once every day for seven days. This controlled time which is also a factor in chlorine decay. Also, the amber bottles controlled light which is another factor in chlorine decay.

Results
The data in this experiment shows how the chlorine concentration changed for each temperature, and it was consistent in each bottle. Throughout this experiment, the warmer bottle lost more chlorine than the cold and room temperature bottles. This means that to keep water chlorinated for extended periods of time, it is more beneficial to use colder water. This is due to the fact that in warm water chlorine undergoes chemical reactions and reacts with other chemical compounds in the water at a faster rate than cold water.

Conclusions/Discussion
The results support the hypothesis. The amount of chlorine in the warm water did decay at a faster rate than the cold water as stated in the hypothesis, but the amount of chlorine in the cold water did not grow as stated in the hypothesis. Overall, it can be said that chlorine decays at a slower rate in cold water, and at a faster rate in warm water.

Summary Statement
This experiment tested chlorine decay at different temperatures of tap water.

Help Received
My Dad showed me how to take chlorine measurements.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Zachary P. Sercel

Project Number

J0617

Project Title

Your Morning Cup of Coffee! Solubility of Caffeine in Various Organic Solvents

Abstract

Objectives/Goals

The purpose of this experiment is to compare the solubility of caffeine in liquid CO2, 1,1Difluoroethane and Methyl Alcohol. I believe that methanol will be the best solvent and liquid CO2 will be the worst because caffeine is a polar molecule and methanol is a polar solvent.

Methods/Materials

I made packages of powdered caffeine tablets in coffee filters and soaked them in 5 milliliters of each solvent. My apparatus for liquid carbon dioxide is a thick plastic test tube screwed to a soda bottle cap with a brass needle sticking into it. The needle is attached to a 4-way brass pipe attached to a pressure gauge, a manual pressure release valve and an automatic pressure release valve good for up to 100 psi. Dry ice begins melting in the setup at approximately 60 psi. I weighed sample boats in a Mettler Balance, soaked the caffeine packets in the solvents, added the liquid to the sample boats, let it evaporate, and weighed the boats again. Then I recorded the difference. I tested the samples for fillers with sodium hydroxide and for caffeine with Dragendorff's Reagent.

Results

All the samples left a residue. The residue was caffeine with no fillers. I found that the longer I left the packets in, the bigger the sample was up to a certain point when the solvent became saturated. My hypothesis was correct and methanol was the best solvent. Liquid CO2 was the worst. By accident, I also discovered that some brands of tonic water do not contain quinine even though the labels say they do.

Conclusions/Discussion

Although CO2 is the worst solvent, it is very useful in factories because it can be kept under very high pressure (2000 psi) and heated to 100 degrees F and it will become supercritical, which makes it a better solvent. It is also completely non-toxic and is a gas at room temperature so cannot leave any bad tastes or residues. Difluoroethane is nasty because even though it is a gas at room temperature it is addictive and explosive. When it explodes it creates very toxic gases. Although methanol is a very good solvent for caffeine, it is flammable and must be evaporated or boiled off because it is a liquid at room temperature. Also, it is very toxic. I think that the best solvent for caffeine would be dimethyl ether because it does not form explosive peroxides and is very polar.

Summary Statement

This experiment is to compare the solubility of caffeine in liquid CO2 to its solubility in other organic solvents.

Help Received

My mom helped me with my data analysis, specifically using Microsoft Excel. She taught me about error analysis. My Dad made me get an automatic pressure relief valve and paid for it. Also Raffi at Pasadena Community College let me use the high precision scale in their Chemistry Department.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Rebecca M. Sine

Project Number
J0618

Project Title
Crazy Crystals: In Which Temperature Condition Do Crystals Grow Largest and Clearest?

Abstract

Objectives/Goals
In my science fair project, I tested which temperature condition crystals grow the biggest and clearest in. The temperature conditions I used were an ice bath (4° C), a refrigerator (10° C), and room temperature (22.22° C).My hypothesis was that the crystals that grew at room temperature would grow the largest and clearest, based on my research.

Methods/Materials
The crystals are formed by recrystallization and are made from a supersaturated solution of borax powder and water (with a ratio of 60 grams of borax for every 235 ml. of water in each cup the crystals were grown in). So I made the borax solution by boiling the water so that more borax would dissolve in it than at a cooler temperature. Then equal amounts of solution was poured into the cups, and then placed in the three different temperature conditions.

Results
The solutions cooled in the ice water grew many small, opaque crystals; the ones cooled in the fridge grew bigger in size, clearer in transparency, and formed a more recognizable cube shape. Finally, the solutions cooled at room temperature grew the best of all, with a large, clear, and hard structure.

Conclusions/Discussion
This shows that crystals grown from a solution need to be cooled slowly, not quickly, in order to grow large and clearly. My hypothesis was right. A real-life application of my project could be to show people how to make large and sweet sugar crystals (rock candy) and other crystals by performing recrystallization at a warm temperature. Scientists also use this method to obtain a desired substance from a solution, which is also called purification.

Summary Statement
I will test in which temperature condition do borax crystals grow the largest and clearest.

Help Received
Mrs. Buck gave advice.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Jacqueline L. Staiger

Project Number
J0619

Project Title
Dyeing for M&M's

Abstract

Objectives/Goals
The objective of this experiment is to identify the FD&C dyes in red, orange, yellow, green, blue, and brown M&M candies using paper chromatography, vinegar solvent, and McCormick and Durkee food coloring controls.

Methods/Materials
Chromatography papers spotted with extracted candy sample or contol food coloring dyes were placed in a chamber containing vinegar solvent. Capillary action created columns containing one or more different colored peaks. The Rf (retention factor) was calculated by dividing the distance traveled by the dye by the distance traveled by the vinegar. The procedure was carried out six times for each control dye and sample candy, and an average Rf was calculated.

Results
Using the data, logic, and some guess work, the dyes were identified as: red--red #40; yellow--yellow #6 and likely #5, blue--blue #1 and #2, orange--yellow #6 and possibly #5, green--blue #1 and #2; and brown--blue #1 and #2, yellow #6 and possibly #5, and red #40.

Conclusions/Discussion
Differences in solubility enabled the FD&C dyes in the M&M candies to be identified by chromatography, which was found to be a fun, easy, and economical process useful in product quality and purity testing.

Summary Statement
Using paper chromatography, I will identify the FD&C dyes in six different M&M candies using vinegar solvent and food color controls.

Help Received
Mrs. Becky Wilson gave advice, and my parents helped with technical explainations, formatting my bar graphs, and critiques of my written and oral presentations.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Alexander Y. Stone

Project Number
J0620

Project Title
The Mighty Sugar Rocket

Abstract

Objectives/Goals
The purpose of my experiment was to see if I could make a functioning rocket using table sugar as fuel and to see which of three commonly available sugars, Sucrose, Fructose and Sucralose (Splenda) would work best at a fixed grain size.

Methods/Materials
Sucrose, Fructose, Sucralose (Splenda), Potassium Nitrate, Plain Paper, Bentonite Clay (Cat Litter), One 1/2 inch diameter Dowel, Scissors, Ruler, Tape, Fireworks Fuse, Drill (and one 9/64 inch drill bit), Hammer, Pasco Force Sensor, Force Sensor Apparatus and Software, Glue gun, Digital scale.
First prepare the fuel mix, the ratio is 20 grams of KNO(3) to 11 grams of sugar. Combine the Potassium Nitrate and sugar and then grind them into a pretty fine powder using a coffee grinder for 5 seconds. Then grind your cat litter or clay into a powder. Now make a tube by cutting three strips of paper 1.5 inches wide and 11.5 inches long and wrap them into a tube with your dowel. Secure it with tape. Next hammer a Bentonite plug (take the clay powder and hammer it) in one side of the tube until you have a plug a little less than 1/2 inch long. Then fill with our KNO3 mixture and ram repeatedly until a bit less than 1/2 inch from top. Ram the rest with some more clay. And use your glue gun to secure it even more. Then take your drill and drill about 3/4 of the way through from the side you rammed with clay first. Secure the fuse. Next tape a cone to the other side. Then hook up to the force sensor apparatus, light the rocket. The data collected was analyzed using the DataStudio software to graph force/time.

Results
At the chosen grain size, the Sucrose rockets gave the most thrust but had a very short burn time; Fructose had a low thrust and medium burn time. Lastly, the artificial sweetener, Sucralose, had a very long burn time with extremely little thrust.

Conclusions/Discussion
My conclusion is that the type of sugar plays an important role in affecting the thrust of a Potassium Nitrate/Sugar rocket. The 'true' sugars (Sucrose and Fructose) in the presence of an oxidizer (KNO(3)) burned faster and were more suitable for rocket propulsion, while Sucralose (an artificial chlorinated sugar substitute) burned slowly and produced very little thrust. Rockets that use Sucrose seem to work better that those with Fructose or Sucralose.

Summary Statement
What commonly available sugar is the best fuel for a homemade sugar rocket.

Help Received
Mother and Father helped with the report and acquiring materials, PCS Physics teacher lent the Force sensor and apparatus, and Youtube for general instructions on how to build a sugar rocket.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Dhiren Suryadevara

Project Number
J0621

Project Title
The Power of Water

Abstract

Objectives/Goals
My project was to determine if the electrolysis of water is affected by the type of electrolyte used, and the voltage of the energy source (battery). My hypothesis was that out of the different batteries and electrolytes used, the MN21 battery and sulfuric acid would be the best for producing the most hydrogen.

Methods/Materials
Three different batteries (AA, 9V, and MN21) were tested along with three different electrolytes (table salt, sodium sulfate, and sulfuric acid). A homemade Brownlee Apparatus was constructed to measure the reaction using a beaker, 2 test tubes, wire, and steel electrodes. The apparatus was hooked up to a battery, and after 15 minutes the reaction was stopped and the data (showing the amount of hydrogen and oxygen) was collected and later analyzed.

Results
Table salt proved to be the best electrolyte 2/3 times, and the 9V battery was the best energy source in terms of hydrogen production. Sulfuric acid was the next best electrolyte followed by sodium sulfate. The MN21 battery was the second best energy source, and the AA battery was the worst.

Conclusions/Discussion
My conclusion is that my hypothesis was not proven, though I still was able to show that the energy source and type of electrolyte affect the electrolysis of water. The data from this project can be used in future applications of alternative energy and hydrogen fuel cells.

Summary Statement
My project is about whether the electrolysis of water can be improved for future widespread use in alternative energy and hydrogen fuel cells.

Help Received
I received some of my materials from my teacher Ms. Skiles, and our family friend Mrs. Rickard helped throughout the experiment.

CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Elise S. Takahama

Project Number
J0622

Project Title
Electrolyte Showdown: Sports Drinks vs. Fruit Juices

Abstract

Objectives/Goals
The goal of the project was to determine how many electrolytes different drinks had, and then compare them. The conductance (electrolytes) of distilled water, tap water, orange juice, Gatorade, Powerade, and raspberry-pomegranate juice was measured. It was thought that Gatorade or Powerade would have the most electrolytes, and orange juice would have the least, since athletes drink sports drinks, not orange juice, to replenish their electrolytes when they sweat.

Methods/Materials
A conductance sensor, attached with copper wires to a multimeter, and a 9-V battery was constructed before testing. The conductance sensor was used to measure the conductance of the six liquids. Each liquid was poured into different bowls, and tested in five trials. The conductance was recorded and then the sensor was rinsed with distilled water between each test.

Results
Surprisingly, the orange juice had the highest conductance rate (0.0058 mA) then Gatorade (0.00354 mA), Powerade (0.00294 mA), Cranberry-Pomegranate Juice (0.00192 mA), tap water (0.00053 mA), and finally, distilled water (0.000015 mA).

Conclusions/Discussion
The experiment found that orange juice has the most electrolytes, which is surprising, since sports drinks are so heavily advertised for their amount of electrolytes. Distilled water had the least electrolytes, probably because the water was purified, and doesn#t have many minerals and ions.

Summary Statement
In this project, six different liquids (tap water, distilled water, Gatorade, PowerAde, Cranberry-Pomegranate Juice, and orange juice) were tested to determine which had the highest concentration of electrolytes.

Help Received
Friend helped set up the conductance sensor