CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Emily E. Aguilar

Project Number
J0601

Project Title
Pharaoh Hot Dog: Hot Dog Mummification

Abstract

Objectives/Goals
In this project I tried to mummify three hot dogs in baking soda over a period of 20 days.

Methods/Materials
Three hot dogs were placed in containers of baking soda for three weeks. Every seven days I used a ruler to check the length, a kitchen scale to check the weight, and piece of string and a ruler to check the circumference. I recorded how the hot dogs changed over time.

Results
All three hot dogs became mummified. The hot dogs got smaller, harder and darker in color.

Conclusions/Discussion
My conclusion is the hot dogs became mummified in the baking soda because the baking soda removed all the moisture from the hot dogs.

Summary Statement
In my project I tried to mummify hot dogs in baking soda.

Help Received
Father helped create graphs; Mother helped arrange board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Vardhaan S. Ambati

Project Number

J0602

Project Title

Effect of the Electrolyte's pH in Optimizing the Hydrogen Fuel Cell Efficiency

Abstract

Objectives/Goals

Hydrogen Fuel Cells are renewable energy cells, and a promising answer to the Earth#s energy crisis. My project was to determine if the pH of the electrolyte used in Hydrogen Fuel Cells has an effect on the efficiency of the Hydrogen Fuel Cell. I believe the efficiency of Hydrogen fuel cells is higher when the electrolyte is more acidic or more alkaline than when it is neutral.

Methods/Materials

Constructed a simplified Hydrogen Fuel Cell using Grove Schematic, with Platinum coated nickel wires as electrodes, and distilled water as the electrolyte. Nine volt battery was used to electrolyze water. Voltmeter and Ammeter were used to measure voltage and current generated due to reverse electrolysis caused by presence of Platinum (catalyst), when battery is removed. Hydroponics pH control kit was used to change the pH of the electrolyte. Voltage and current readings were taken for varying pH levels (4 to 10). Efficiency was calculated by multiplying current and voltage measured for each pH level. The experiment was repeated three times for accurate results.

Results

Consistently, Hydrogen fuel cell with the electrolyte of pH7 had the lowest efficiency and the electrolyte with pH10 had the highest efficiency. Both acidic and alkaline electrolytes had better efficiency than electrolyte with pH7, but alkaline electrolytes were more efficient than the acidic electrolytes.

Conclusions/Discussion

My conclusion is that Hydrogen fuel cells with alkaline and acidic electrolytes are more efficient than fuel cells with electrolytes with pH7 (neutral), but alkaline electrolytes have the best efficiency.

Summary Statement

My project is to determine the effect of the electrolyte's pH in optimizing the Hydrogen Fuel Cell efficiency.

Help Received

Jim McElroy, NASA Scientist & Bloom Energy Co-founder, Arne Ballantine and Chockkalingam Karuppaiah, Leading Scientists from Bloom Energy, Gerry Glaser & Matt Jorgensen, Xilinx, provided guidance and suggested improvements for my project. My parents supervised me.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Siena S. Applebaum

Project Number
J0603

Project Title
What Causes the Most Vitamin C Loss: Water Solubility or Heat?

Abstract

Objectives/Goals
The objective is to determine if it is water solubility or heat that causes the greatest loss of Vitamin C while boiling potatoes.

Methods/Materials
Peeled and sliced potatoes were collected into 100 gram groups. The potatoes were then prepared by boiling, baking at 100 degrees Centigrade or soaking them in a bowl of room temperature water for 15, 30 or 45 minutes. Notice that baking degrades Vitamin C by heat while soaking degrades vitamin C due to water solubility . Also note that boiling involves both heat and water solubility. To test for Vitamin C the potatoes were liquefied and diluted to a fixed volume of 1 cup. They were then titrated at intervals of 0.1 ml into an iodine and starch indicator solution until the solution color changed from blue to gray. Each measurement was repeated 2 additional times.

Results
This table shows the volume of potato mixture that is required to turn an indicator solution from blue to grayish clear.

Time:	15min.	30min.	45min.
Soaking:	0.96,	1.33,	1.83
Baking:	1.33,	1.46,	1.53
Boiling:	1.36,	3.36,	3.70

Conclusions/Discussion
The data showed that baking and soaking produced comparable losses in Vitamin C . I can further determine that it is the interaction between heat and water solubility that causes boiling to diminish so much of the potatoes Vitamin C. I was able to deduce this as the sum of the Vitamin C loses from soaking and baking is less than the loss while boiling alone.

Summary Statement
What factor causes the greatest Vitamin C degredation of potatoes while boiling.

Help Received
None.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Mary Aylozyan

Project Number
J0604

Project Title
Does Cooking Methods Affect Vitamin C in Carrots?

Abstract

Objectives/Goals
The purpose of this experiment was to see which carrot has more vitamins after being boiled, steamed or fried for 15,30 and 45 minutes.Will the boiled have the highest level of vitamin C in carrots then the other cooking method?

Methods/Materials
First I have to prepare the carrots for cooking. # Chop the carrots into 2 centimeters cubes. # Rinse the carrots and boil them. # Put 1000 ml of water into a pot. # Add 750 ml of carrots. # Set temperature for pot to boil. # Start timer as soon as it first boils. # Take 250 ml of carrots out of boiling water when the timer goes off in 15 minutes continue cooking remainder . # Tale 250 ml of carrots out when timer goes off at 30 minutes, continue cooking remainder. # Take 250 ml of carrots out at 45 minutes. # Package and store samples. # Let each batch of boiled carrots cool in colander for 10 minutes. # Vacuum the packed carrots and make sure they aren#t touching any air. # Label each pack of boiled carrots and put there cooking method time # Put them in the refrigerator. # Steaming carrots. # Put 250 ml of water in a pot. # Put a steaming basket on top of the water in the pot. # Repeat steps 2.d-2.g except the steaming part. # Repeat steps 3 for the steamed group. # Measure the vitamin C collect a sample carrot # Put 600 ml beaker onto the electronic balance and tare ,add 100.0 grams of sample # Add 300 ml of distilled or deionized water # Add 5 ml of 10% sulfuric acid using a pipette # Add 5 ml 1% starch solution to mix # Titrate mixture with iodine solution to blue or black end point that lasts for no longer than 20seconds # Record the iodine solution that was used.

Results
My findings were that steam had the most Vitamin C after it was steamed in a pot for 15 minutes. The fried had the least amount of vitamin C levels after it was fried in a pot for 45 minutes.

Conclusions/Discussion
My hypotheses was correct and incorrect at the same time . My hypothesis was correct because I assumed that the fried 15,30 and 45 minutes was gong to lose the most amount of vitamin C . It was also incorrect because I thought that the boiled 15 minutes was going to have the most amount of vitamin C after the experiment. It turned out that I was wrong. According to my experiment, the steamed 15 minutes had the most vitamin C after being steamed for 15 minutes.

Summary Statement
The purpose of this experiment was to see which carrot has more vitamins after being boiled, steamed or fried for 15,30 and 45 minutes.

Help Received
Naralie Sonni , a chemist that worked at Micro Quality Labs Inc. She showed me the equipments and the methodology for titration.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Mikayla E. Bratcher

Project Number
J0605

Project Title
Corrosion Prevention

Abstract

Objectives/Goals
The purpose of my project was to test the most effective method of slowing down the corrosion of metal.

Methods/Materials
I prepared steel washers four different ways. The first washer was my control and was unaltered prior to testing. The second washer was protected with cathodic protection. The third washer was coated with rust proof paint, and I electroplated the fourth washer with copper. Once prepared, each washer was soaked in identical mixtures of bleach and water for a period of 24 hours. I weighed the washers before and after testing to determine how much weight was lost during the corrosion process.

Results
The steel washer coated with rust proof paint consistently had the least amount of corrosion.

Conclusions/Discussion
My conclusion is that the rust proof paint has the least amount of corrosion because the paint sealed the pores in the metal so that the solution and oxygen could not start the corrosion process. The control washer had the most corrosion because it was left unprotected.

Summary Statement
My project is about the most effective way to slow down the corrosion of metal.

Help Received
My mother helped with the purchasing of supplies and stripping of copper wire. She also supervised my use of bleach and electricity. My science teacher helped critique my presentation.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Marshall D.S. Carter

Project Number
J0606

Project Title
The Alka-Seltzer Experiment

Abstract

Objectives/Goals
The purpose of this experiment was to find out whether there was an optimum amount of Alka-Seltzer to water that would pop the lid of the film canister that they were contained in. My hypothesis on this was that 1/2 of an Alka-Seltzer and 1/3 of a canister of water would propel the cap the most distance horizontally.

Methods/Materials
My materials for this were: Alka-Seltzers (containing the active ingredient, sodium bicarbonate), water (with hydrogen and oxygen), a film canister with tight-fitting lid, tape measure, yard stick, timer, and science notebook. I observed the explosive reaction between the sodium bicarbonate and water by: setting-up a third of a film canister with water and adding Alka-Seltzer, going through that process with four different amounts of Alka-Seltzer (1 whole, 3/4, 1/2, 1/4 tablet) three times each for a total of twelve rounds. I got the average distance from each amount of Alka-Seltzer and recorded my results. Following that, I repeated the set-up for each amount one time to measure the time it took for the cap to pop off. I recorded these results and graphed them.

Results
From measuring the distances, I observed that the set-up with 1 whole Alka-Seltzer sent the cap the farthest, but not by much. From measuring the times and graphing my results, I observed that the time it took for the cap to pop off was strongly correlated to the different amounts of Alka-Seltzer in the set-up, with the largest amount (1 whole tablet) taking the least time.

Conclusions/Discussion
The active ingredients in my experiment were the sodium bicarbonate in the Alka-Seltzer and the oxygen in the water. The sodium bonds with the oxygen to create the hydrogen gas which then forces the canister lid off. The second round of experimentation was to find how fast the chemical reaction would create the necessary pressure from the different amounts of Alka-Seltzer. As I decreased the amount of Alka-Seltzer by 1/4 tablet increments, the time increased by approximately 8 second increments. If I did this again, I would repeat the process for each amount three times and calculate an average for each to minimize the effect of errors in my set-ups.

Summary Statement
This project was about observing the physical results from the chemical reaction of sodium bicarbonate (Alka-Seltzers) and oxygen (in water) creating hydrogen gas in a confined space (a film canister).

Help Received
My father assisted me with setting up my experiment so I could measure my results accurately. My mother helped me with the diplay board and this registration form. I did the rest of the work myself.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jacen Castillo; Sophia Dela Pena

Project Number
J0607

Project Title
The Window to a Spider

Abstract

Objectives/Goals

Our main objective is to see a clear anatomy of a spider and finding out which solution would show the best translucency of a spider under a microscope after soaking them in different solvent or solution after a period of three hours.

Our hypothesis is that alcohol would show the best translucency of a spider after being soaked for a period of three hours among other solutions used without damaging its body parts.

Methods/Materials

The materials we used in this experiment are: 14 spiders, 10 ml of the solvents and solutions alcohol, ammonia, bleach, lemon juice, polish remover, vinegar, 6 test tube vials, 6 plain glass slides, 1 plastic transfer pipet (dropper), 1 pair of forceps, digital microscope, and a laptop.

The methods we used to perform this experiments are: examining spiders soaked in different solutions and checking them every 20 minutes for a period of three hours, looking at the spiders under a microscope to see their internal body structures, and taking digital pictures of the spiders with our digital microscope hooked up to a laptop.

Results

After soaking six spiders in six different solutions for three hours and taking them out of the test tubes and placing under a microscope, we found out that alcohol proved to be the best solution to use to show the translucency of the spider. Surprisingly, bleach disintegrated/dissolved the spider. Lemon juice made spider moderately distinct while vinegar, ammonia, and polish remover had no effect at all on the spiders.

Conclusions/Discussion

Our hypothesis is correct. We were able to prove that the alcohol showed the best translucency of a spider among all solutions used. It also gives a distinct appearance of the spider's internal body structure without damaging it.

Although we were able to find out which solution would show the best translucency of the spider, we were disappointed not to be able to distinguish and differentiate the internal body organs of the spiders with the microscope we used. We feel that we needed a better microscope magnification and a better alcohol concentration to be able to pin point one organ from the other.

Summary Statement

Our project is about finding out which solution or solvent would show the best translucency of a spider to see its internal body structure after soaking it for three hours.

Help Received

Ms Duda & Mr. Collins, Science teachers and advisors; Parents for providing us with board and help to gather materials and spiders; Aunt for providing us with test tubes and glass slides.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Stephanie Y. Chang

Project Number
J0608

Project Title
Activated Charcoal: The Environmental Savior

Abstract

Objectives/Goals
My project was to determine if granular activated charcoal is more effective in removing organic pollutants than charcoal. I believe that granular activated charcoal that has tremendous surface area will be more effective in removing organic pollutants.

Methods/Materials
I measured one gram of granular activated charcoal and put it into its set of plastic containers. I did the same for the charcoal. To prepare four different food coloring solutions in four different glass jars, I added 3 drops of food coloring into 200ml of water. Then I measured 10 ml of each individual food coloring and put it into its individual set of plastic capped containers. Each individual set included three plastic containers: The first set was the control group, the second set contained the activated charcoal experimental sample, and the third set contained the charcoal experimental sample. I let the plastic containers settle for a period of time (about a week), and I observed and recorded the results. Afterwards, I prepared a set of standard solution with different dilutions. I compared the transparency of the experimental samples with the sets of standard solution.
The independent variable would be the type of charcoal, and the dependent variable would be the transparency of the food coloring.

Results
The food coloring in the set of plastic containers that contained granular activated charcoal had become completely transparent, while the food coloring in the set of plastic containers that contained charcoal had only been partially removed.

Conclusions/Discussion
My conclusion is that activated charcoal is more effective in removing organic pollutants than charcoal; therefore, I had proven that my hypothesis was correct.

Summary Statement
Throughout my experiment, I have determined that activated charcoal is more effective in removing organic pollutants than charcoal.

Help Received
My parents drove me to places to get my supplies. Ms. Johnson double checked my school science fair packet. Ms. Ligeti lent me the balance for my science fair project.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Pooja Desai, Dheer Patel

Project Number
J0609

Project Title
Electro-Lyte It Up

Abstract

Objectives/Goals
To measure the amount of electrolytes in various drinks and investigate if sports drinks has more electrolytes than daily drinks.

Methods/Materials
Materials: 1 digital multimeter; 1 foot of copper wire, bare; 1 wire cutter; 2 alligator cords, 12 inches; 1 roll of masking tape and a pen; 7 plastic containers; 1 inch of a plastic tube; ½ cup Fruit Punch+Berry Gatorade; ½ cup of Fruit Punch Powerade; ½ cup of Juicy Juice Apple Juice; ½ cup of Minute Maid Lemonade; ½ cup of Tap Water; ½ cup of Deionized Water.

To Make the Conductor Sensor
1. Using wire cutters, cut two pieces of copper wire, about 6 inches long. 2. Cut the plastic tube into a 1 inch piece. 3. Wrap one piece of the wire around the tube near one end a few times, leaving about 2 inches of wire free. 4. Wrap the other piece of wire around the tube at the other end a few times, again, leaving 2 inches of wire free. There should be no contact between the 2 wires.

Testing the Drinks
1. Label the 6 containers with the drinks of your choice. Label the 7th with Deionized Water. 2. Turn the multimeter on to DCA 200 microamps. 3. To complete conductor sensor attach alligator cord to copper wires on plastic tube. 4. Now place the completed conductor sensor into chosen drink with alligator cords not touching 5. Record amount of electrolytes after 10 seconds of application 6. Dry conductor sensor after rinsing in Deionized Water 7. Repeat steps 4-6 for each drink 3 times

Results

	Propel Zero	Gatorade	Apple Juice	Powerade	Lemonade	Tap Water
Test 1	9.4	16.3	3.5	20.3	6.0	.2
Test 2	7.5	11.6	2.6	16.6	3.8	1
Test 3	7.5	11.1	2.1	12.7	2.2	.2
Average	8.13	13	2.73	16.53	4.0	.467

Numbers Refer to number of microamps

Conclusions/Discussion
Our hypothesis was correct. We proved sports drinks advertisements are correct because they can give you more electrolytes. Specifically, Powerade has the most electrolytes and tap water has the least.

Summary Statement
Measuring electrolytes in various drinks

Help Received
Father supervised experiments, Mother and sister helped with shopping and board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Divya L. Empranthiri

Project Number
J0610

Project Title
Effect of Temperature on a Chemical Reaction

Abstract

Objectives/Goals
In this experiment, I decided to find out how temperature would affect endothermic reactions compared to exothermic reactions. An endothermic reaction absorbs energy in the form of heat. This reaction feels cold because it is taking heat away from its surroundings. It also releases gases. An exothermic reaction is a reaction that releases energy as heat. Since the energy is released, the exothermic reactions feel hot.

Methods/Materials
I did three experiments. I mixed lemon juice and baking soda,ammonia and vinegar, and finally, hydrochloric acid and sodium hydroxide. I did each experiment when the acid was 0, 20, 40, 60, and 80;all in degrees Celsius. Therefore, I could compare the exothermic reaction with the endothermic reaction at each temperature. For the Lemon Juice + Baking Soda experiment, I had a different set-up. On a beaker, which had baking soda in it, I put a stopper. The stopper had two holes that I put tubes through. At the end of each tube, there was a syringe. In one of the syringes, I had lemon juice. When I released that syringe, the second one would inflate. Therefore, I could accurately measure the amount of gas being produced. For the vinegar + ammonia test, I had the ammonia in the beaker, and I poured the vinegar into it. Similarly, for the hydrochloric acid + sodium hydroxide test, I had the sodium hydroxide in the beaker, and I poured the hydrochloric acid into it.

Results
I did each test 4 times. This is the average of all the tests. 0,20,40,60,80 are all in Celsius.
Lemon juice+baking soda: 0-15mL; 20-23mL; 40-30mL; 60-33mL; 80-40mL.
Vinegar+Ammonia(results in Celsius): 0-3; 20-23; 40-43; 60-63; 80-82
HCl+NaOH(results in Celsius): 0-44; 20-53; 40-64; 60-72; 80-90

Conclusions/Discussion
For the lemon juice + baking soda experiment, as the temperature went higher, more gas was produced. The vinegar + ammonia experiment was a very weak exothermic reaction. The temperature of the resulting product only increased by 2-4 degrees Celsius and no gas was produced. In the hydrochloric acid + sodium hydroxide test, the temperature increased drastically from 8-34 degrees Celsius and produced no gas. Overall, I correctly guessed how rapidly the temperature increased and decreased, and the amount of gas one reaction would produce compared to another. Thank you judges for reading my abstract.

Summary Statement
My project is about changing the temperature of the acid in a chemical reaction to see how the factor of temperature affects an exothermic reaction compared to an endothermic reaction.

Help Received
My science teacher gave me advice on how to improve my project; my mom helped me heat up the chemicals and watched over me as I did the experiment.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Ethan Feiber; Jared Park; Kaveh Pezeshki

Project Number
J0611

Project Title
Measuring Sugar Content with an iPod Touch and 3D Glasses

Abstract

Objectives/Goals
A simple way to check the sugar content of beverages would be useful in restaurants and when buying drinks with unknown ingredients. We developed a method of using an iPod or other Smartphone and 3D movie glasses to measure the polarization rotation , and thereby the sugar content of drinks.

Methods/Materials
We bought 5 different test liquids, including three different varieties of apple juice, and regular and diet 7-Up. We produced, as calibration liquids, three types of solutions, each with a different amount of dissolved sugar. The iPod touch provided a source of linearly polarized light that was passed through the liquid. We measured the polarization rotation created by the test liquid using a pair of 3D movie glasses. We plotted a graph with our calibration liquids, and compared our test liquids to that graph to find our measure of its sugar content.

Results
We got fairly accurate results with apple juice (28 grams on label to 25 grams measured), low-calorie apple juice (14g on label to 15g measured), half strength apple juice (14g on label to 13g measured), and diet 7-Up (0g on label to 0.5g measured). However, our results were not very accurate for regular 7-Up (25g on label to 8g measured).

Conclusions/Discussion
Our results proved that it is possible to measure sugar content in various liquids using an iPod touch and 3D movie glasses. However, our procedure did not provide accurate results for the 7-Up. We think that this is because 7-Up is sweetened by high fructose corn syrup. Since fructose rotates the polarization negatively, and sucrose rotates it positively, the two sugars cancel out and give an inaccurate reading. This project gives people an easy and cheap way to test sugar content in liquids.

Summary Statement
Measuring sugar content in liquids using an iPod and 3D movie glasses.

Help Received
Mother helped me look online. My dad served as an advisor, looking over data and helping with Excel.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Philip M. Felizarta

Project Number

J0612

Project Title

Ethanol Producing Potential of Mouse Barley (Hordeum murinum subspecies leporinum)

Abstract

Objectives/Goals

The focus of my project is to select an energy crop that requires less fertilizer input, does not compete with food supply and can use low-value land. Plants from the grass family fulfill all these criteria. However, efficient and cost-effective pretreatment of grass cellulose is a challenge. My hypothesis is that higher hydrochloric acid concentrations and longer durations of sterilization will result in greater sugar and theoretical alcohol yields for a local grass known as Mouse Barley (Hordeum murinum subspecies leporinum).

Methods/Materials

Pulverized grass was subjected to nine different pre-treatments based on two independent variables: 1) HCl at 1.5%, 3% and 4.5% concentrations 2) sterilization at 20 psi for 15, 30 and 45 minutes. Three replicates were done for each of the 9 treatments. The values were then subjected to the ANOVA to test the significant differences. Then, multiple test comparisons were made using two sample paired t-test for means (alpha = 0.05).

Results

The mean sugar contents (percent) were 0.32 for 1.5% HCl/15 minutes, 0.48 (3%/15min), 0.59 (4.5%/15min), 0.35 (1.5%/30min), 0.48 (3%/30min), 0.60 (4.5%/30min), 0.35 (1.5%/45min), 0.48 (3%/45min) and 0.59 for 4.5% HCl/ 45 minutes.

Conclusions/Discussion

My conclusion is higher hydrochloric acid concentrations alone resulted in greater sugar and theoretical alcohol yields for Mouse Barley.

Summary Statement

To identify which optimal HCl concentration and sterilization duration would produce the highest sugar yield for Mouse Barley.

Help Received

Father assisted with the handling of HCL and the sterilizer; Mother helped with my board design. The statistical programs that were used are Microsoft Excel and Feliz Stats (a program I created using C# codes).

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Jesus D. Garcia

Project Number
J0613

Project Title
Amateur Studies in Polymer Construction

Abstract

Objectives/Goals
The objective of my experiment was to determine if common household items such as flour, maseca, gelatin, and cornstarch can be substituted in place of borax in a polymer recipe. If they can, then how much of that item is needed to make a polymer and how does it compare to the original borax polymer.

Methods/Materials
The materials I needed for my experiment include:
10 large styrofoam cups
10 stirring spoons
5 bottles of Elmer's School Glue(4oz.)
Measuring cup
Teaspoon
Large bowl
Meter stick
Wax paper
Video camera
One teaspoon each of flour, Maseca, cornstartch, and gelatin

Results
None of the items that I tested made a polymer that had comparable properties to the borax polymer. None of the test polymers set up like the borax polymer. They were all thick, white liquids, too viscous to be considered a polymer.

Conclusions/Discussion
None of my items succeeded in making a polymer similar to the borax polymer. However, maybe if I use a different method or even try different amounts of each material then they might form polymers. My theory is that maybe the reason that the materials didn't work is because, unlike the borate ions in borax, the other materials don't conatin anything that has the ability to cross-link the polyvinyl acetate molecules inside the glue with the H2O molecules in the water. These long chain molecules are what give polymers their properties.

Summary Statement
I wanted to determine if common household materials can be used to construct a polymer with similar properties to a borax polymer.

Help Received
Mrs. Villsenor and Mr. Ramirez helped me by taking me to the competitions and with completing my application for the competions; My parents helped me with tranportaion to the stores and to the mentor meeting; The Kern County LIbrary helped with some of my research; Used the computers at Mountain

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Theodore D. Hoss

Project Number
J0614

Project Title
Does the Temperature of an Acid Affect the Ending pH and Temperature of the Mixture When the Acid Is Mixed with a Base?

Abstract

Objectives/Goals
My objective was to find out how different temperatures of an acid affect the pH and temperature of a solution when the acid is mixed with a base having a constant temperature.

Methods/Materials
I did a series of 6 experiments of 8 trials each, mixing 3 different acids into a base. The 3 acids, lemon juice, vinegar and muriatic acid, were each heated or cooled to 8 different temperatures at 10 degrees Celsius apart before I mixed them with the base, sodium bicarbonate in water, which was a constant temperature. I measured the pH and temperature of each acid and the base. Then I used an ice water bath to cool or an evaporation dish burning rubbing alcohol to heat each beaker of acid to 8 different temperatures at 6 degrees C, 16 degrees C, 26 degrees C, 36 degrees C, 46 degrees C, 56 degrees C, 66 degrees C and 76 degrees C. I mixed 20 ml of each acid with the sodium bicarbonate solution which was 15 ml of water and 10 ml of sodium bicarbonate. The base was always at 14 degrees C. I then measured the pH and the temperature of the mixture. For the first 3 series, I used a non-temperature compensating pH meter and for the second 3 series I used a temperature-compensating pH meter. I repeated the 6 series for a total of 12 series and 96 trials in all.

Results
My results show that as the temperature of the acid went up, the pH of the resulting mixture went up as well. This means that more hydrogen ions were freed up when the mixture was heated, even though adding the acid to the base tended to neutralize the pH of both the acid and the base. It also appeared that the temperature-compensating meter showed the correct pH and the non-temperature compensating meter was not as accurate.

Conclusions/Discussion
I am trying to figure out how to make a perpetual battery, and changing the temperatures of acids, bases and a mixture of them could be used to make a stronger battery, since the strength of an acid is measured by the number of free hydrogen ions, and heating and cooling acids, bases and mixtures of them can cause there to be more or less free hydrogen ions, and the hydrogen ions in battery acids is what causes the current to flow, at least in a car battery. As a result, I now know that temperature could be effective in controlling the release of hydrogen ions and as a result in building a better battery. Next, I intend to test how this could be used best in a battery.

Summary Statement
When I mix heated or cooled acids with a base which is at a constant temperature, cooling and heating the acids results in changes in the pH and temperature of the mixture.

Help Received
My mother edited my report; she also acted as the Designated Supervisor (required by County Science Fair rules for acids research); I had a Qualified Scientist (required by County Science Fair rules for acids research) who helped explain the chemistry of acids and bases; and my father helped me with the graphs.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Anjini Karthik

Project Number

J0615

Project Title

Green Nanotechnology: Novel Environmentally Benign Synthesis of Gold Nanoparticles for Bioapplications

Abstract

Objectives/Goals

Goal: The aim was to see if plant material could be used to produce gold nanoparticles, and, if yes, to analyze the characteristics of the nanoparticles produced. Challenge: Nanotechnology has amazingly diverse applications, from stain-resistant clothing to a potential cure for cancer. The conventional methods of producing nanoparticles utilize chemicals toxic both to the environment and the body. It is critical that nanoparticles be produced in a safe, green way so that they are environmentally friendly and biologically benign. Proposed Solution: Plants contain naturally occurring phytochemicals that give the plant antioxidant, anticancer, and antimicrobial properties. It was hypothesized that phytochemicals in plants can be harnessed to produce gold nanoparticles, and a resistance to aggregation in plant material-synthesized gold nanoparticles is expected.

Methods/Materials

The solvent was water, and the reducing and capping agent was the plant material. Three different plants were tested: cinnamon, cumin, and turmeric. The gold salt was HAuCl4. After production, nanoparticles were characterized with UV-Visible Absorption Spectroscopy and TEM analysis. In vitro stabilities of nanoparticles were tested with different dilutions, the addition of 5% NaCl, 0.5% cysteine, and Phosphate Buffer-7 to raise the pH of the solution to the physiological pH. Also, nanoparticles were produced using a conventional reducing agent, sodium citrate; the stability of these nanoparticles was tested as well. All tests were done in triplicates.

Results

UV-Vis showed that the peak wavelength was ~540 nm for cinnamon, ~531 nm for cumin, ~556 nm for turmeric. TEM showed particles were mostly spherical and had a size distribution of 13+/-6 nm. The peak wavelength did not change significantly through all stability tests. The nanoparticles had a robust coating and resisted aggregation.

Conclusions/Discussion

The hypotheses were supported. Plant material can be used to produce stable and biocompatible gold nanoparticles. Also, plant material-synthesized nanoparticles were strongly capped and resistant to aggregation, opposed to citrate-produced nanoparticles. This method uses environmentally friendly solvents, reducing, and capping agents and produces biologically benign nanoparticles. As the nanorevolution unfolds, this green method can help solve a pollution problem at the beginning state of a developing technology.

Summary Statement

This project investigated a novel, green chemistry approach to synthesize environmentally friendly and biologically benign gold nanoparticles using plant material, in an energy efficient and cost effective process.

Help Received

I acknowledge my family and teacher for their support; Dr. Terrill from SJSU for guidance with the UV-Vis; Dr. Susnitzky from EAG for use of TEM.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

Madeline C. Kuney

Project Number

J0616

Project Title

The Effect of Electrolysis on Solar Desalination

Abstract

Objectives/Goals

I investigated whether the electrolysis of water affects solar desalination. My hypothesis was that electrolysis of saline water will increase the solar desalination process because the electric current generated by a solar panel will break apart the hydrogen and oxygen atoms in the water molecule increasing the total quantity of desalinated water produced.

Methods/Materials

METHODS: Collected five gallons of saline water from a groundwater well. Placed one cup (236.5ml) of water in 40 clear glass bowls. Added 3 drops of red coloring dye to distinguish between the saline and distilled water. Connected wires to the positive and negative output on a solar panel. Attached a carbon electrode to each wire and placed one positive and one negative charged electrode in 20 bowls. Inside all 40 bowls I placed a smaller bowl to collect the water produced during the experiment. All bowls were covered with plastic wrap with a fishing weight in the middle so that the plastic wrap sloped down over the center of the small bowl. All bowls were placed on a door wrapped in black aluminum foil. The solar panel was turned on and all bowls were placed outdoors and exposed to the same environment for 2 days (7am to 7pm). Every two hours I observed and recorded the voltage generated by the solar panel and the environmental conditions. At the end of two days I made final measurements of the total quantity of water produced in all 40 bowls. Finally, I took water samples for the original and desalinated water to a commercial laboratory to determine the salinity.

MATERIALS: 5 gallons groundwater; solar panel; 40 large & small glass bowls, weights, rubber bands; 20 carbon electrodes & alligator clips; wiring; air/water thermometers; aluminum foil; dye; paint.

Results

Test results showed the total salinity of the groundwater reduced significantly from 3200uS/cm (Original) to 200-170uS/cm (Distilled). The electrolysis of the saline water increased the total water produced during solar desalination by 33.94%. The total production for the Base Condition was 272.5ml compared to 365ml for the Electrolysis bowls. The average production for the Base Condition bowls was 13.625ml compared to 18.25ml for the Electrolysis bowls.

Conclusions/Discussion

The electrolysis of the saline water had a significant effect on the amount of water produced by solar desalination.

Summary Statement

This project applies the process of solar desalination to highly saline groundwater to investigate whether electrolysis affects the quantity of desalinated water produced under set conditions.

Help Received

My father assisted by connecting the wires to the solar panel and electrodes, and working with me to record some of the measurements during the experiment. Semitropic WSD provided the groundwater sample, Power Systems, Inc. loaned the solar panel and Zalco Laboratories, Inc. donated the salinity

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Stephanie M. Liu

Project Number
J0617

Project Title
The Most Efficient Electrolyte for Hydrogen Production through Electrolysis

Abstract

Objectives/Goals
This study determined which electrolyte from iodized table salt, baking soda, calcium chloride, sea salt, and lye was most efficient in harnessing hydrogen through electrolysis. The hypothesis was that the iodized table salt would help produce the most hydrogen.

Methods/Materials
A 5% solution of each electrolyte was made and brought to a temperature of 38 degrees Celsius. Electric current from a 9 volt battery was passed through 400ml of solution using copper wires attached to graphite rods as electrodes for 5 minutes. The hydrogen was captured by a test tube also filled with the solution that was placed over the negatively charged graphite rod. The hydrogen was measured by drawing a line on the test tube and measuring the amount of water filling up to that line in milliliters. This procedure was repeated 5 times for each electrolyte.

Results
On average calcium chloride harnessed 1.8ml of hydrogen, baking soda 3.1ml, sea salt 6.6ml, iodized table salt 6.74ml, and lye harnessed an average of 17.94ml. Lye was the most efficient electrolyte.

Conclusions/Discussion
Lye was the most efficient of those tested, harnessing over twice the hydrogen that iodized table salt did. But lye is more than twice as expensive as iodized table salt, making iodized table salt the most economical choice. This is an important factor given that one of the biggest problems with clean hydrogen is cost. At the moment gasoline is the cheapest, most readily available way of powering our vehicles, but with increasing oil prices and negative impact on the environment, gasoline may soon no longer be an option. Hydrogen energy is a possible solution to this problem, and the cleanest way of obtaining hydrogen is through electrolysis.

Summary Statement
The testing of the efficiency of different electrolytes in the harnessing of hydrogen through electrolysis.

Help Received
Mother helped put together display board and took some pictures

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Kai R. McNamee

Project Number
J0618

Project Title
Desalination: Will the Ocean Be the Future Source of Our Fresh Drinking Water?

Abstract

Objectives/Goals
The worldwide demand for fresh water is on the rise. Will the oceans be the source of our future drinking water? To help answer this, I have created a question to test: Which method of desalination is preferred within the criteria of speed, efficiency, and cost of materials?

Methods/Materials
Three methods were tested. 1) Evaporation and Condensation: using a pressure cooker and copper tubing. 2) Freeze and Thaw: testing the salinity before and after freezing. 3) Boiling: testing the belief that boiling produces fresh water.

Results
The pressure cooker method produced the greatest volume of fresh water quickly. Freezing also works, but is slow. Boiling in an open container actually increases salt content.

Conclusions/Discussion
The pressure cooker requires expensive equipment and a constant heat source, which may create its own environmental problems. Freezing is cost efficient, but may not be practical for most of the world#s climates. One would have to consider financial resources and environment in whether or not a particular method is a good choice for their situation.

Summary Statement
Testing desalination methods in order to make ocean water potable.

Help Received
Parents helped procure hardware, take photographs, and affix papers to display board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Ardo Nashalian; Raffi Titizian

Project Number
J0619

Project Title
Burning Calories: How Much Energy Is Stored in Different Types of Food?

Abstract

Objectives/Goals
our objectives were to find how many calories are stored in different types of foods.

Methods/Materials
Methods:we burned food in calorimeter, measured items and used formula to find the actual calories of each food./Materials: 2 tin cans, cork, needle, hammer, nail,graduated cylinder,water thermometer, matches, food to be tested,walnut,almonds, marshmallow, dog food.

Results
out of the three experimental trials the walnut had the most calories and the marshmallow was the least calories, but the almond had the most consistent results.

Conclusions/Discussion
after the trials, we noticed the food that burned longer contained the most calories. this was helpful because the foods that we thought would be the most caloric,like the marshmallow, was proven to have the least.

Summary Statement
our project is about using the calorimeter and the formula to find the amount of calories stored in food

Help Received
parent helped in understanding the formula, and school science fail judge gave tips to improve project.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Maddison C. Perkins

Project Number
J0620

Project Title
Electrify Your Electrolytes

Abstract

Objectives/Goals
The objective of my project was to determine which drink contained the highest amount of electrolytes. Since electrolytes are lost during exercise through our perspiration, I wanted to find a drink that could replace them the best after a workout. Electrolytes, like potassium, contain free ions that conduct electricity. These ions are important for many normal bodily functions. Out of a variety of beverages tested, I believe that the juices will have some of the highest number of electrolytes.

Methods/Materials
Sixteen beverages including juices, teas, sports drinks, energy drinks, enhanced and regular waters were tested five times and an average was used for comparison. The ability of tested beverages to conduct an electrical current was tested using a homemade conductive sensor consisting of a 9-volt battery, and a multimeter. The multimeter was used to measure the electrical current in micro-amps. The average for each beverage was plugged into the conductance formula, G=I (current)/V (voltage), to get the electrolytes in Siemens. I used a copper wire, a pen tube, alligator clips, and 9-volt battery to make the conductive sensor.

Results
Tomato juice had a conductance of one 17.05 siemens and V8 had a conductance of one 13.19 siemens. All other beverages had less than 5 siemens.

Conclusions/Discussion
The tested hypothesis was correct. Since tomato juice conducted a stronger current, it contained more electrolytes than the other beverages. This could be due to its lower pH content compared to the other drinks which causes it to have more H+ ions.

Summary Statement
This project attempted to describe the relative quantity of electrolytes in a beverage in terms of its ability to conduct an electrical current in an effort to discover the beverage that was best for me to drink after a workout.

Help Received
Parents helped with pictures and sensor.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Annie Renas

Project Number
J0621

Project Title
Causes and Effects of Vitamin C Depletion through Heat Application

Abstract

Objectives/Goals
Because Vitamin C is an essential vitamin for health, my objective was to test the impact of heat applied through common cooking methods on the vitamin C levels in fruits. This project was performed with the intention to educate the American community of the most healthful ways to prepare foods and be able to consume as much vitamin C as possible.

Methods/Materials
6 oranges and 6 tomatoes, two fruits high in vitamin C, were cut into quarters and baked, steamed, microwaved, and tested raw. Once the fruits reached 140 degrees Fahrenheit, they were juiced and titrated with an indicator solution made of iodine and starch. The vitamin C reacts with the indicator solution, causing it to turn clear, a reversal of the redox reaction. Based on the number of drops of juice it took to turn the indicator solution clear, this exemplified the content of vitamin C in the morphed juice. A control made of a 100mg vitamin C tablet dissolved into one liter of warm water was also titrated raw and microwaved.

Results
In the orange samples, the concentration of vitamin C in order from greatest to least was raw, microwaved, baked and steamed. For tomatoes, the concentration of vitamin C in order from greatest to least was microwaved, baked, raw and steamed. However, in the control, the unheated vitamin C tablet contained four times the amount of vitamin C compared to the microwaved vitamin C tablet.

Conclusions/Discussion
Averages from both tests demonstrated that microwaving increased the available vitamin C, then baking, raw, and lastly steaming. My results showed that steaming is the most insalubrious heating method for vitamin C because vitamin C, being a water-soluble vitamin, is dissolved in condensation and water vapor through the steaming process. To explain why the microwaving of the fruit samples lead to an increase in vitamin C in the titration test, additional tests may be necessary, but one possible explanation could be that, because neither tomatoes nor oranges are consistent inside, there may have been vitamin C stuck in fibrous bundles or concentrated in a particular part of the fruit, that were released after microwaving.

Summary Statement
Within these studies, a titration of vitamin C in common fruits with a simple indicator solution, demonstrates how vitamin C is depleted or enhanced by common cooking methods.

Help Received
Parents, school science advisor and science teacher proofread my report. School science advisor helped with the research. Science teacher lent beakers, test-tubes, and test-tube holders.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Rann A. Rogando

Project Number
J0622

Project Title
3...2...1... Combust! What Ratio Is Best?

Abstract

Objectives/Goals
The experiment was conducted to identify the optimum ratio, or the ratio that would cause the most powerful combustion and loudest explosion, of oxygen gas (O2) to hydrogen gas (H2) in a rocket, or more specifically, a micro mole rocket. It was expected that the rockets with a 2:4 ratio of oxygen gas to hydrogen gas would produce the loudest explosion.

Methods/Materials
Five groups of five, graduated, and congruent pipette bulbs were filled with varied amounts of oxygen gas and hydrogen gas, the ratio of which have been predetermined (1:5, 2:4, 3:3, 4:2, and 5:1). Initially, the gas generators were formed; hydrogen gas was produced by combining hydrochloric acid (HCl) and mossy zinc in a test tube with a one-hole rubber stopper, and oxygen gas was produced by combining hydrogen peroxide (H2O2) and freshly-prepared yeast. Water displacement was the method used to identify the amounts of each gas present in the micro mole rocket. The explosions# volumes were measured using a sound level meter.

Results
The group of micro mole rockets with a 2:4 ratio of oxygen gas and hydrogen gas produced the loudest combustion, averaging at about 94.04 dBA.

Conclusions/Discussion
As was hypothesized, the micro mole rockets with a 2:4 ratio of oxygen gas to hydrogen gas produced the loudest explosions, therefore the most powerful combustion. The ratio produced the most efficient combustion, because it is similar to the theoretical or stoichiometric combustion ratio of two moles of hydrogen gas per one mole of oxygen gas (Avogrado#s law: volume ratio=mole ratio).

Summary Statement
The project is on the combustion process that happens inside the combustion engines of space shuttles and some automobiles.

Help Received
Parents bought materials; Instructor (Emily Hoffman) ordered materials and assisted in researching and formatting; Siblings helped conduct experiment and take pictures.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Callista E. Schoettmer

Project Number
J0623

Project Title
Does the Viscosity or Density of Gasoline Correlate to Its Energy?

Abstract

Objectives/Goals
This project's purpose is to determine if the energy content of gasoline has a connection to its density, grams per volume of an object, or its viscosity, the resistance for a fluid to flow against itself.

Methods/Materials
I tested the energy content, viscosity, and density of gasoline. I measured the energy content with a bomb calorimeter. First the gasoline is placed in a sample cup being suspended in the bomb, or a tightly closed container, the bomb is filled with pure oxygen so that way all of the gasoline will burn cleanly. Inside of the bomb there are fuse wires that hang above the gasoline. The bomb is then placed in a bucket of water (2000g=M), inside of the machine. Protruding from the machine are lead wires, these lead wires are plugged into the bomb, and they send an electric charge through the fuse wires to ignite the gasoline. The gasoline burns creating a change in temperature in the water. I then calculated the calories using the equation, Q=MCdeltaT, Q being the calories, M being the mass of water which in my case was 2000 grams, C being the heat capacity of water which is 1° Celsius per one gram of water, and deltaT being the change in temperature.

For the density, a small amount of gasoline is injected into a U-shaped tube in a density meter. The U-shaped tube bounces up and down; the more it bounces the less dense the gas is, the less it bounces the more dense it is.

To test the viscosity I used a kinematic viscometer. How this mechanism works is by placing gasoline in a tube, this tube is placed into the viscometer which is basically an Anti-freeze bath that controls the temperature. Little suction cups are placed on the tube, it draws up the gasoline to a certain point then times how long it takes for the fluid to go from one point to another. When the fluid passes one point, an optical sensor sends a signal for the time to start and once the liquid reaches the second point, the sensor signals the time to stop. The time in seconds is then multiplied by the tube constant to get the viscosity.

Results
There appears to be a correlation between gasoline's energy content and its density and viscosity.

Conclusions/Discussion
My conclusion is that the density and viscosity correlate to the energy content of gasoline. I would like to do further research about how gas companies perform their gasoline blends and test other characteristics of gasoline to look for correlations.

Summary Statement
This project's purpose is to determine if there is a correlation between the density and viscosity of gasoline and its energy content.

Help Received
I used laboratory equipment at the Air Force Research Laboratory, Edwards AFB, CA under the supervision of Jo ann La Rue and my mother, Amanda Wheaton. My mother helped me make my board.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Zack P. Sercel

Project Number
J0624

Project Title
Gone in a Flash: Solubility and Burn Rate of Nitrocellulose as a Function of Nitration Time

Abstract

Objectives/Goals
I have seen many recommended nitration times for nitrocellulose. I would like to find out how the nitration time effects its solubility in acetone and its burn rate.

Methods/Materials
To nitrate cellulose, I soaked 1 gram samples of cotton in a 2:1 chilled mixture of sulfuric acid and nitric acid for different times. Adding sulfuric acid to nitric acid acts as an acid base reaction where the sulfuric acid acts as an acid and nitric acid acts as a base, although it is strongly acidic. This generates the nitronium ion, which attacks the cellulose structure by replacing hydroxyl groups with nitronium groups. The excess hydroxyl groups combine with an extra hydrogen ion from the nitric acid and create water. When I took the cellulose out of the acid, I neutralized it in a saturated sodium carbonate solution, then put it in a different bucket of water to wash out the created sodium salts. I then dried the nitrocellulose by sunlight and divided the samples in half. The first half of each sample I burned while filming. I played back the video in slow motion and recorded the time it took to burn. The second half I dissolved in acetone, filtered, and dried. I weighed the residue and recorded the weight.

Results
All of the nitrated samples burned very rapidly. An un-nitrated cotton ball used as a control burned so long that it was not included on the chart (greater than 20 seconds). Plots of burn time as a function of nitration time show a steady decrease. The 10 minute nitrated sample showed a longer burn time and lower solubility than the trend shown by the other data points. I believe that this is because the cotton that I nitrated was not pulled apart and did not get evenly soaked in the acid mixture. The solubility showed an increase as a function of nitration time except for the same problem with the 10 minute sample. I was surprised that the size of a sample of cottony nitrocellulose barely effected the burn time. However, this wasn#t true for the plasticized samples.

Conclusions/Discussion
The results of this project show that a 15 minute nitration time is the most desirable of the soak times tested as commercial nitrocellulose. If it were nitrated longer, it may become unstable and sensitive to static electricity, making it a fire hazard. For future work, I would try dissolving nitrocellulose in other solvents, probably other ketones and ethers, to see if they could dissolve it better.

Summary Statement
I am measuring the solubility in acetone and burn rate of nitrocellulose as a function of nitration time.

Help Received
My mother supervised use of chemicals and fire, and filmed the burning nitrocellulose.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Eliana Stone

Project Number
J0625

Project Title
Trends in the Emission Spectra of Elements

Abstract

Objectives/Goals
The overall goal of my project is to understand how the visible emission spectrum of an element may relate to its position in the periodic table. The first objective is to determine whether elements in the same group within the periodic table emit similar spectra of visible light. The second objective is to determine whether an element will have more colors and lines if it has a higher atomic number. The third objective is to determine whether spectra will be different enough to distinguish one element from another.

Methods/Materials
The materials were lithium, sodium, potassium, calcium, and cupric chloride salts, wooden splints, and distilled water. The equipment was a gas-stove burner and a quantitative spectroscope (a calibrated prism). To conduct my experiment, I put each of the individual salts or no chemical at all (as a control) on dampened wooden splints, and held each of them in turn in the stove#s flame. I then recorded three repeated measures of the emission spectrum observed for each salt.

Results
The first result was that the emission spectra of the three elements tested within Group 1 (lithium, sodium, potassium) were not similar. The second result was that the elements with a higher atomic number did not necessarily have more lines and colors in their spectra (e.g., lithium chloride had more lines and colors, but a lower atomic number than sodium). The third result was that the five elements tested all had distinct visible emission spectra.

Conclusions/Discussion
The main conclusion is that my hypotheses were only partially supported. The data support my third hypothesis, that the emission spectra of different elements are distinguishable, at least for the five elements tested. The data however did not support my first hypothesis, that elements in the same group will have similar emission spectra, nor my second hypothesis, that elements with a higher atomic number will necessarily produce more colors and numbers of lines.

Summary Statement
My project determined that the visible emission spectrum can be used to distinguish between elements, but that there was no consistent effect of group or atomic number.

Help Received
My mother and father helped me conduct my experiment, by holding the salts in the flame, and helped me assemble my poster and edit my abstract.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Kalati J. Tuilesu

Project Number
J0626

Project Title
Which Evaporates Fastest?

Abstract

Objectives/Goals
The objective is to determine which liquid: water, vinegar, rubbing alcohol, or olive oil evaporates the fastest and why.

Methods/Materials
Equal amounts of water, vinegar, rubbing alcohol, and olive oil were poured into 4 separate vials of identical shape, material, and size. I used a camera to take records of the speed of evaporation of each liquid over time ending the experiment on the 15th day. The liquids were left at room temperature. I used various materials to make models of atoms and molecules.

Results
The rubbing alcohol evaporated the fastest followed by water and finally vinegar. Olive oil didn#t seem to evaporate at all.

Conclusions/Discussion
My conclusion is that molecule size and polarity of molecules affects the liquid's ability to evaporate. Since rubbing alcohol has both a small molecule as well as less polarity, the molecules are not holding on to each other so it evaporates the fastest.

Summary Statement
My project is about the evaporation of four liquids which depends on molecular structure and size.

Help Received
Grandmother helped with research and making of molecular models. Mother helped with board layout. Uncle gave telephone interview and confirmed polarity question.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Timofey Volkov; Andreea Vorobchevici

Project Number
J0627

Project Title
Melodies in the Ice

Abstract

Objectives/Goals
We compared playing classical music to rock music during the freezing process of water to see if it affects the size, shape, count of the crystals formed.

Methods/Materials
1. Imported rock and classical music in Audacity to keep levels the same.
2. Put water in Petri Dishes.
3. Put Petri Dishes in Freezer with edited songs playing.
4. Put petri dish under microscope; take picture.
5. Count crystals by gridding pictures like counting bacteria.
6. Find number, shape, and size of crystals.

Results
The average number of crystals in the control was 105.8 crystals in each petri dish, the classical music group had about 99.6 crystals in each petri dish, and the rock music group had the greatest number at about 159.9 crystals in each petri dish. In the control group, there were 18 petri dishes that had crystals of blobby shapes, 16 petri dishes that had crystals of circular shapes, 1 petri dish with crystals of cubed shapes, 0 petri dishes with crystals of polygon/sided shapes, and 6 petri dishes with crystals of random/fragmented shapes. In the average Classical music group, there were 20 petri dishes with crystals of blobby shapes, 1.5 petri dishes with crystals of circular shapes, 2.5 petri dishes with crystals of cubed shapes, 3.5 petri dishes with crystals of polygon/sided shapes, and 11.5 petri dishes with crystals of random/fragmented shapes. The average Rock music group had 19 petri dishes with crystals of blobby shapes, 3.5 petri dishes with crystals of circular shapes, 1 petri dish with crystals of cubed shapes, and 0 petri dishes for both polygon/sided and random/fragmented shaped crystals.

Conclusions/Discussion
Only the classical music category formed polygonal/sided crystals, however unlike what we thought in our hypothesis, the classical music group formed random/fragmented crystals while the rock music group did not form any at all. The control and classical had a similar, but lower average count of crystals at about 99.6 and 105.8 than rock music which had a much larger count of about 159.9 crystals per petri dish. Rock music, however, does not cause random/fragmented ice crystals to form when played during their freezing process, but classical music does cause polygonal/sided and random/fragmented ice crystals to form. Music does affect the crystallization of ice in some form.

Summary Statement
We determined rock and classical music affects the growth of ice crystals, and how.

Help Received
Coach helped with giving us a freeze rto use.

CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
Alexander Woodside

Project Number
J0628

Project Title
Sugar in Candy

Abstract

Objectives/Goals
The purpose of this project was to discover if the sugar composition affects the time it took to construct a lollypop. Each sugar had their own composition.

Methods/Materials
The experiment involved creating a sugar solution with 2 cups sugar, 1 cup of water, and placing them in a stainless steel pot. Once the propane burner was on high, I started the stopwatch and started stirring with a wooden spoon. When the sugar solution started to boil, I stopped stirring and positioned a candy thermometer on the side of the pot (not touching bottom of the pot). As soon as the candy reached the Hard Crack Stage (300 F), the stopwatch was stopped. All 13 different sugars were recorded in this fashion.

Results
The sugars'time varied when becoming a lollypop. C&H's Light Brown Sugar, C&H's Dark Brown Sugar, and Grandma's Molasses burned at 275 F.

Conclusions/Discussion
My results proved my hypothesis that the sugar composition affects the time it took to make a lollypop.

Summary Statement
The sugar composition affects candy.

Help Received
Mother helped put together display board and encouraged me; Father helped printing pictures; Connie Hunter from C&H Sugar supplied product information.