CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Christopher W. Allen

Project Number
J0501

Project Title
Cooking Away the Vitamins

Abstract

Objectives/Goals
To determine which of the three cooking methods, boiling, steaming, or microwaving, preserves the most vitamin C in vegetables, specifically, broccoli. These cooking methods will be compared to a control of raw broccoli.

Methods/Materials
To do this, an iodine and starch-based vitamin C indicator solution is made, which turns from a dark blue to a lighter blue in the presence of more vitamin C. Using different concentrations of vitamin C supplement powder in water, and adding a constant amount of each to tubes of indicator solution, five different colors from lightest to darkest blue are made. The amount of vitamin C in each is: 2.4mg C/ml water, 2.2mg /ml, 2.1mg /ml, 1.9mg /ml, and 1.7mg /ml. Four ounces broccoli is then boiled, drained, processed with 100-ml water, and the juice is strained. The juice is added drop by drop to indicator solution until it matches the color produced by the 2.2 mg C/ml water concentration, using the other concentrations to aid in the matching. A formula is used to find the mg/oz of vitamin C in the sample of broccoli. Data is recorded. This process is repeated with the other cooking methods and the control of raw broccoli, ten trials each.

Results
I found that steaming the broccoli is the best way to retain vitamin C. The control of raw broccoli had an average of 37 mg C/oz, steaming, 31 mg C/oz, microwaving, 29 mg C/oz, and boiling, 24 mg C/oz.

Conclusions/Discussion
My results support my hypothesis that steaming the broccoli would be able to preserve the most vitamin C in the vegetable. The main factors that cause this are the water-solubility and high reactive properties of the vitamin C. This knowledge is very important. In a society that is very much surrounded by health issues, the need to make our food as healthful and useful as possible, especially concerning one of the most important vitamins, is crucial.

Summary Statement
My project examines which of three methods preserves the most vitamin C in broccoli during cooking.

Help Received
Father helped give second opinions during some of the broccoli sample and indicator concentration matchings and ideas during one brainstorming session, research information was obtained from Mary Dalporto, a dietician, and Mary Tanga and John Mirsalis from Stanford Research Institute.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Haruna Asakawa

Project Number
J0502

Project Title
Nutty Calories

Abstract

Objectives/Goals
The purpose of my experiment was to determine from a selection of different types of nuts which one contained the highest caloric content. My research indicated that the almond would exhibit the highest calorie release, thus, I hypothesized that the almond would release the most heat and raise the temperature of the water the greatest.

Methods/Materials
This experiment began by obtaining the weights of the different nuts involved using a three beam scale. The nuts used were pistachios, almonds, walnuts, pecans, and peanuts. I then weighed a certain volume of water that would be used to measure the heat released. The container for the water was an aluminum coke can, modified by removing the top portion to accommodate the 200mls of water. The nut holder that was used during the burning process was fashioned from a wire paper clip. Finally, I used a wrought iron vase holder to hold the aluminum water container over the burning nut. I measured the temperature change of the water by using a Celsius thermometer and calculated the amount of energy in calories used to raise the temperature of the water. This was done by multiplying the temperature difference by the mass of the water and the specific heat factor for water.

Results
The pecan released the most heat and raised the temperature of the water the most. The amount of heat released in order of decreasing magnitude is: pecan, almond, walnut, peanut, and pistachio.

Conclusions/Discussion
My hypothesis was proven incorrect as the pecan released the most heat. However, this result can be explained by the fact that the initial weights of the pecan were more than the almond. The pecan burned longer and had time to raise the temperature of the water the most. The calculated calories per gram in decreasing order are: almond, pecan/pistachio (tie), walnut, and peanut. I would have gotten better results if the heat that was lost to the air and absorbed by the can could have been captured in the experiment.

The applications of nuts to one#s health and to bio-technology are very interesting. Nuts are a compact source of calories that also have health benefits like fighting heart disease and cancer. A very exciting area where nuts# highly compact caloric content can be used is in the area of alternative fuels. The oils from the nuts could be extracted and used as an automotive fuel alternative.

Summary Statement
The purpose of this experiment was to examine the caloric content of almonds, pecans, pistachios, peanuts, and walnuts.

Help Received
Mr. Snell, my advisor, gave me helpful suggestions and guidelines to complete this project. My parents supported and guided me throughout this experiment.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Sonia E.M. Barrad

Project Number
J0503

Project Title
Adjusting Chlorine Level to Minimize Evaporation Loss of Pool Water

Abstract

Objectives/Goals
My objective was to determine whether water used in pools could be conserved by adjusting the concentration of pool chlorine (sodium hypochlorite) in order to minimize the evaporation rate of the pool water.

Methods/Materials
Eleven 1000ml beakers were prepared with different concentrations (from 0% to 100%) of pool chlorine (6% sodium hypochlorite solution) in distilled water and placed in a room with constant temperature, pressure, air flow and humidity for one week. (Household bleach, or 6% sodium hypochlorite solution, was used as a surrogate for pool chlorine because it is the same compound but less concentrated than pool chlorine tablets or solution.) The fluid remaining in each beaker after 168 hours (7 days) was measured and recorded. The experiment was conducted three times for each concentration, and an average was calculated.

Results
I discovered that the greater the concentration of pool chlorine in the beaker, the slower the evaporation rate.

Conclusions/Discussion
My results suggest that pool water can be conserved by adjusting the level of chlorine in it. The evaporation rate of swimming pool water can be reduced by maintaining the highest concentration of pool chlorine acceptable for human use. The evaporation rate of other pools, such as fountains, can be reduced by increasing the concentration of pool chlorine in the fountain water. People should be encouraged to be careful to keep chlorine at the right level so that water can be conserved.

Summary Statement
My project determines if pool water can be conserved by adjusting the concentration of chlorine (sodium hypochlorite) to minimize evaporation loss.

Help Received
My parents supervised my use of sodium hypochlorite, and my aunt showed me how to use Excel to make the charts and graphs.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)

Gary Berwick; Derrick Duran

Project Number

J0504

Project Title

Masses of Gasses: What Veggies Create

Abstract

Objectives/Goals

Our project is based on acids and bases reacting together to create gases.We wanted to see if fresh, frozen, or canned vegetables would produce the most gas when mixed with an acid (vinegar) and a base (baking soda). According to research, we found that fresh vegetables will produce the most gas because of the natural enzymes, whereas frozen or canned are changed by the freezing and canning process.

Methods/Materials

We first obtained fresh, frozen, and canned vegetables that were all alike using corn, peas, green beans, and carrots. The vegetables were grinded up in a food processor and poured into separate 2 liter bottles. We then added 2 cups of vinegar and capped each bottle and allowed to stand for 30 minutes. After 30 minutes we added 1/4 cup of baking soda. When the carbon dioxide bubbles formed we then placed a round balloon over the bottle and observed it fill with the gas.

Results

After 4 experiments the canned vegetables filled the balloon with the most carbon dioxide gas. We took the average circumference of all four experiments and converted it to the metric system to formulate the following answers: Canned vegeatbles =8259.62 cent.cub., Fresh vegetables=6647.08 cent.cub., Frozen vegetables=3473.48 cent. cub.

Conclusions/Discussion

The natural enzymes did not help the fresh vegetables create the most gas. Instead, the preservatives were more dominant and helped the canned vegeatbles create the most gas. Preservatives in the canned vegetables were salt and water. Salt is a form of sodium and baking soda is sodium bicarbonate. The two chemicals combined produced the bigger reaction. Frozen vegetables produced the least amout of gas because the freezing process stops the formation of bacteria and molds from growing to help create the bigger reaction.

Summary Statement

My project focus is mixing acids, bases, with fresh, frozen, and canned vegetables to see which would create the most carbon dioxide gas.

Help Received

Mrs. Berwick helped type our graphs, Mrs. Duran helped with supplies and use of her home, Mr. Jared Derksen, Math Chairperson at Racho Cucamonga High School helped with the math calculations.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Greg D. Biles

Project Number
J0505

Project Title
How Well Do Vegetable Dyes Work?

Abstract

Objectives/Goals
The purpose of my experiment was to see which vegetables make stronger dyes. I wanted to research this project because in ancient times, all that people had was natural dyes to color their clothes. What if they washed it or just wore it on a sunny day? Would it fade? Could I guess this by looking at the color of the vegetable itself?

Methods/Materials
1. Choose a minimum of five vegetables to make dyes out of.
(beets, red cabbage,carrots, bell pepper, sweet potatoes).
2. Extract the pigment dyes from the five vegetables.
3. Dye 3 sets of five strips of 100% cotton fabric with the dyes (one set will be the control)
4. Examine the strips to determine which ones are darker in color
5. First set: store in an enclosed container in a dark place (control set)
6. Second Set: water rinse, then wash with laundry soap. Observe fading.
7. Third Set: set out in the open in a sunny window for 24 hrs. Observe fading.
8. Compile the data and then draw conclusions

Results
The beet dye made a darker dye solution and dyed the fabric strip darker at first, but it did not stay in after washing. The purple cabbage also made a dark solution, but it hardly dyed the fabric at all. The three lighter vegetables, (sweet potatoes, carrots, bell pepper) appeared to produce a weaker dye solution in the beginning, but they actually made a stronger dye that stayed on the fabric after washing.

Conclusions/Discussion
My hypothesis was that darker vegetables would make stronger dyes and that lighter vegetables would make weaker dyes. But my experiment showed that the strength of the dye does not always depend on the color of the vegetable. I read that for a dye to be strong, it has to have a stronger affinity to the cloth than it has to other things like water, soap, and air (oxygen). So it must be that the vegetable dyes that worked better in my experiment had a stronger affinity to the cloth.

Summary Statement
My experiment tests how well different vegetable dyes work when using them to dye 100% cotton fabric.

Help Received
Mother helped with display format; father helped with graph.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Matalie T. Church-Nyberg

Project Number
J0506

Project Title
Electrographic Metal Detection

Abstract

Objectives/Goals
To determine whether diferent samples of metals and minerals have iron, copper or lead in them.

Methods/Materials
There were eleven samples used in my project, each tested several times with an acidic solution. My three solutions were potassium ferricyanide, potassium ferrocyanide and potassium chromate. I first consulted a chemistry teacher at College of the Redwoods, then obtained a research approval certificate. Iron, copper and lead were my three main samples, my other samples consisted of metals which I tested for iron, copper and lead.

Results
Iron pyrite and galena showed signs of iron. Glacial formed copper and magnetite showed signs of copper. The nickel I tested showed signs of both iron and copper, it also showed signs of an unknown substance. Magnetite was the only sample that showed any signs of lead.

Conclusions/Discussion
Overall I think this was a successful project. I feel that I learned a lot throughout this experiment. It was very interesting to see that after testing the nickel I could see the shape of the building on the filter paper. However not very many of the statements that I made in my hypothesis turned out to be true. For example, I though lead would be green whereas, it turned out to be yellow.
I also learned about how electrographic metal detection is used in forensic science. A classic example of the forensic use of electrography was the investigation of a crime during which a cooper wire had been severed. Electrographic analysis revealed traces of copper on a hatchet in a suspect's possesion.

Summary Statement
My project is about testing metals and minerals for iron , copper and lead.

Help Received
Obtained chemicals from chemistry teacher at College of the Redwoods. My Grandpa helped set up wires. Experiment done under the supervision of my Grandmother.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Andrea Collins; Sunny Yan

Project Number
J0507

Project Title
Vitamin C Content After Storage

Abstract

Objectives/Goals
Our objective was to learn how the vitamin C content in citrus fruits changes when put in storage at room temperature (68 degrees).

Methods/Materials
Our first task was to pick three of each of the following fresh citrus fruits from an orchard: lemons, limes, grapefruits, mandarin oranges, tangerines, valencia oranges, and washington navel oranges. Then, we made our cornstarch and iodine solutions. We took a vitamin C tablet and titrated it as our standard. It took six drops to turn the blue iodine solution clear. This became our starting point which we used to compare to the citrus fruits. The next day we ran our first experiment. We squeezed the juice from the fruit and and compared the vitamin C content to our standard. We repeated this experiment two more times over the next two weeks.

Results
The more drops of juice from our fruits it took to make the blue iodine solution clear, the less vitamin C the fruit had.

Conclusions/Discussion
Based on the results of our experiment, we conclude that 71% of the fruits tested decreased their vitamin C content when put in storage in room temperature, 68#a. 29% of the fruits¡# vitamin C increased.

Summary Statement
We are testing the vitamin C content in fruits after storage by titrating the juices.

Help Received
Mother bought board, friend let us pick fruit off his orchard

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Keelan Dann

Project Number
J0508

Project Title
Which Metals Produce the Highest Voltage?

Abstract

Objectives/Goals
For my science fair project I am doing an experiment to find out which metals produce the highest voltage.

Methods/Materials
The materials I used include lead, zinc, copper, nickel, gold, steel, aluminum, carbon, plastic cups, voltmeter, clip leads, orange, milk, tap water, and salt water. The procedure I used is, connecting the clip leads to the metal and voltmeter, sticking the metals in the solution, and reading the voltmeter.

Results
The amount of electricity depends on which metals and solutions are being used. Although I thought copper would produce the highest voltage, gold and zinc did.

Conclusions/Discussion
Since the samples of metals were different sizes, it would be better to get samples the same size for further experimenting.

Summary Statement
Which metals and solutions produce the highest voltage?

Help Received
Dad showed me how to use volt meter

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Jia Han Deng

Project Number
J0509

Project Title
Fruits: Healthy or Not?

Abstract

Objectives/Goals
The problem is ¡°How does the different types of fruit have different types of vitamin C and Sugar¡±. Many people in the U.S. suffer from diabetes and obesity, they like all other people need vitamin C to stay healthy, but unlike regular people, they cannot consume certain amounts of sugar. This project was done to try to identify the different amounts of sugar and vitamin C in fruits to see which is most beneficial to diabetics and people with obesity. It is hypothesized that the Oranges will have the most Vitamin C and the least sugar, and the Apples will have the least vitamin C and the most sugar. The hypothesis was made based on the research conducted about fruits before the project. (http://www.childbehave.com/chapters/vitamin/toc-vitamin.html).

Methods/Materials
A brief procedure is stated below. Blend each of the four fruits to a liquid puree, those are the variables, and put them each in five test tubes, fifty drops per test tube. Then, add ten drops of Benedict¡#s Solution, and see what color the fruit puree becomes. This produces 5 samples per fruit. The data is recorded by the color, for example, blue color means no sugar, and red is a lot of sugar. After that, fill the other 25 test tubes with 40 drops each of Vitamin C indicator solution. Take a fruit puree and, using a dropper, drip drops of puree into the solution until it turns clear. Count the drops. Repeat for all fruits and control, water.

Results
The results don¡#t support the hypothesis because the results show that the grapes have the most vitamin c and the least sugar, and the fruit the most sugar and the least vitamin c is apple.

Summary Statement
This project tests the different amounts of sugar and vitamin C in fruits to identify which is most healthy for the diabetic and obese.

Help Received
Dad proofread abstract

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Danie C. Diamond

Project Number
J0510

Project Title
It's Crystal-Clear, Or Is It?

Abstract

Objectives/Goals
Problem statement: Does the type of water affect the growth of crystals?

Hypothesis: The type of water does influence the crystals# growth.

Methods/Materials
Materials: Jar, alum powder, hot water (variable), temperature probe, magnifying glass, small scale, digital camera, coffee filter, tape, stirring spoon, container, string (half of experiments), paper clip (half of experiments)
Procedure: A. Major steps: # Pour two cups of solution into a container; # Heat it; # Let it cool for 7 minutes; # Measure 80 grams of alum; # Pour into container; # Mix with stirring spoon; # Once dissolved, divide solution into two jars (each one cup); # Rinse utensils thoroughly; # Repeat process for next type of water.
B. Variable: type of water (distilled, ocean, fresh, tap, mineral)
C. Sample size: six jars (each containing one type of water) Number of trials: four trials
D. Measured the weight of crystals (in grams) over a certain period of time

Results
Results: Experiment one (with string): Distilled best, Mineral, Fresh, Ocean, Tap
Experiment two (with string): Distilled best, Mineral, Fresh, Tap, Ocean
Experiment three (without string): Fresh best, Tap, Distilled, Mineral, Ocean
Experiment four (without string): Fresh best, Tap, Distilled, Mineral, Ocean

Conclusions/Discussion
Conclusion: Water type does affect growth of crystals
Every crystal needs a seed, but ocean has so much that it reduces space for crystal growth. If there are strings placed in the solution (1st and 2nd experiments) distilled will grow the best because the string will serve as a string. If there are no strings placed in the solution (2nd and 3rd experiments) fresh water will grow the best because of the moderate amount of seeds it has. This proves that with no extra materials added into the solutions, alum crystals will grow the best in fresh water. My hypothesis was proved wrong because ocean grew the worst and fresh grew the best.

Summary Statement
Crystal grow influenced by fluids they are grown in.

Help Received
Mom helped glue/tape board; John Gregg (geologist) helped understand results

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Matthew A. Fonda

Project Number
J0511

Project Title
Energy Content in a Candy Bar

Abstract

Objectives/Goals
The objective is to use calorimetry to determine the gross energy content (calorie/ gram) of Snickers, Milky Way, and Reese#s candy bars.

Methods/Materials
An oxygen bomb adiabatic-type calorimeter was used to measure heat of combustion for three candy bars. Separate homogeneous samples were placed into an oxygen enriched chamber in a bomb calorimeter surrounded by water jackets. Samples were ignited and measurements were collected on the difference between initial and peak water jacket temperatures following combustion. Acid base titration was also used to determine chemical energy content of the nitric acid formed during combustion. The sum of chemical and heat of combustion energies were used to determine total candy bar caloric content.

Results
Snickers had the most gross energy with 5198 calories per gram. Reese#s had the next highest gross energy with 4914 calories per gram. The candy bar with the lowest gross energy was MilkyWay with 4055 calories per gram.

Conclusions/Discussion
Snicker#s and Reese#s candy bars had more gross energy because of their peanut content. Peanuts contain more fat than found in an equal quantity of sugar. In fact, fat has 2.25 times more energy than equal amounts of carbohydrates. Based on my experiment, I conclude the peanut content of Snickers is greater than that of Reese#s. However, both of these candy bars had more gross energy, because of their peanut content, than found in MilkyWay candy bars. Therefore, this explains the similar gross energy content between Snickers and Reese#s.

Summary Statement
Explaining the gross energy content differences found in Snickers, Milky Way, and Reese#s candy bars using a bomb calorimeter.

Help Received
Father supervised experiment that I completed at Cal Poly University's animal nutrition lab.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Alexander T. Friedman

Project Number
J0512

Project Title
Vitamin C Concentrate in Bell Peppers

Abstract

Objectives/Goals
To determine what color bell pepper (red, yellow, green) contains the greatest amount of vitamin C concentrate.

Methods/Materials
I started my experiment by picking ten peppers of each color. First, using a blender, I liquified one pepper of each color to make three separate solutions. Next, using an eye dropper, I put drops of the pepper liquid into an iodine solution. The vitamin C concentrate will turn the iodine solution blue. The least amount of drops needed, the stronger the vitamin C concentrate in the pepper. I performed this procedure 10 times with each color bell pepper to increase the accuracy in my my results.

Results
The results proved that green peppers contain the mosy amount of vitamin C and that yellow peppers contain the least amount.

Conclusions/Discussion
I hope my experiment will advise people to eat more green peppers since they are now proven to contain more nutritional value. Even though red and yellow peppers might taste better remember that taste isn't everything!

Summary Statement
My experiment was to determine if the different color bell peppers contain different amounts of vitamin C concentrate

Help Received

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Casey L. Fu

Project Number
J0513

Project Title
Density Fun with Cooking

Abstract

Objectives/Goals
Why do some foods such as dumplings float on water when cooked? My hypothesis was that their density becomes less than that of water. I also thought that all foods decreased in density after they were cooked in boiling water.

Methods/Materials
Foods from different food groups (peanuts, apple, sweet rice flour, chicken, and carrots) were tested. To find the density, divide the weight by the volume. The scale was used to weigh the food. Since you can#t measure the volume directly (foods that were tested have irregular shapes), the graduated cylinder was used to find the volume: Fill the graduated cylinder with tap water to about 50 mL. Record the volume. Next, place the food in the cylinder (If the food is partially out of the water, use a toothpick to push it down until the food is completely under the water) and record the new volume. The difference between the two volume readings is the volume of the food. The density of each food before and after cooked were tested.

Results
Dumplings had the most significant density change before and after cooked, and they floated on boiling water. Their density decreased from 1.19 to 0.92. Second place was chicken, which decreased from 1.12 to 0.99 and floated on boiling water also. Surprisingly, apples and peanuts increased in density after they were cooked. Carrots decreased slightly in density.

Conclusions/Discussion
My hypothesis was partially correct. Foods become floating when cooked because their density decreased to less than that of water, but some foods such as apples and peanuts increased in density on boiling water. From this experiment, you can tell when cooking chicken or dumplings, once you see them float, they are ready to eat. You can save energy and time, and foods taste better when they are not overcooked.

Summary Statement
Dumplings and chicken float on boiling water because their density become less than water while foods such as apples and peanuts increase in density after cooked.

Help Received
Mom helped cook. Mom and Dad went over the report and gave suggestions. Sister helped decorate the board.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Sara N. Hargraves

Project Number
J0514

Project Title
Does Heat Affect Crystal Growth?

Abstract

Objectives/Goals
To determine if heat affects crystal growth.

Methods/Materials
Pottasium Fericyande
Cupric Sulfate
4 petri dishes
4 crystal growing papers
1 cup of water

Results
My results is that heat does affect crystal growth. When put by a heater it grows faster and larger.

Conclusions/Discussion
As stated in my hypothesis, I believed that heat would make the crystals grow faster. The experimental data supported my hypothesis, indicating that heat affects crystal growth. I believe this is the case because the heat flow moves atoms and grows faster and larger, while in the cold it doesn't move the atoms as much.

Summary Statement
It is to determine if heat affects crystal growth.

Help Received
My mother in helping me typing my report, my father in also helping me type my report , and Mr. Scott in buying the materials i needed and spending long hours to help correct my report.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Elizabeth M. Hatakeyama

Project Number
J0515

Project Title
Surface Tension of Water

Abstract

Objectives/Goals
To what extent does the surface tension of water decrease as the amount of detergent is increased? If adding detergent to distilled water affects its surface tension, then capillary rise will decrease with increasing concentration of detergent. It should reach a point where the addition of detergent no longer affects the height of the solution in the capillary tube.

Methods/Materials
I started with distilled water and continually added small amounts of detegent to the water. I took capillary height readings after each addition of soap. I continued until the capillary height remainded constant even when adding more soap.

Results
The capillary height started at 16mm for distilled water, then gradually got lower until it stayed at 6mm.

Conclusions/Discussion
The results supported my hypothesis and verified information that I read in a reference book which stated that the surface tension of a soap solution is approximately one third that of distilled water. In my experiment, the final capillary height of the soap solution was 37.5 percent of the capillary height of the distilled water.

Summary Statement
I measured the affect of soap on the surface tension of distilled water.

Help Received
Dad helped perform the experiment and type the report. Medical Analysis Systems, Inc. provided beakers, capillary tubes and the use of an analytical balance.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Nadim Islam

Project Number
J0516

Project Title
Stop Freezing! Effects of Different Substances on the Freezing Point of Water

Abstract

Objectives/Goals
The purpose of this experiment was to determine the effects of different substances on the freezing point of water (melting point). The freezing point of water is the temperature point at which water changes from a liquid to a solid state. This is also the same as the melting point for pure water. I hypothesized that anything dissolved in water can decrease the freezing point of water.

Methods/Materials
The substances that were used in this experiment were salt, sugar, vinegar, lemon juice, etc. Different amounts of salt, sugar, flour and baking soda were dissolved in 200 ml. of water and different amounts of milk, vinegar, lemon juice, and alcohol were mixed with water up to 200 ml. I used water without any substances as a control. Finally, I put them in the freezer and checked on them every 10 minutes. The results were recorded on the logbook and computer.

Results
In my experiment, I saw that salt made the most difference on the freezing point of water.The more salt I added, the more the freezing temperature lowered. I used a control, because I needed something to compare the freezing time of water with salt. Plain water was the best choice because it did not have any foreign substance in it.
In this project there was a linear relation between the amount of solid substance (salt, sugar, and baking soda) that is added and the freezing time.

Conclusions/Discussion
As stated in my hypothesis, I believed that anything dissolved in water decreases the freezing point of water. The experimental data supported my hypothesis, indicating that when you add something into water it always decreases the freezing point. This means that the substances in the water make it freeze slower.
Through my experiments, I learned how different substances affect the freezing point of water differently. In addition, I understood the terms #variable and control# much better.

Summary Statement
Different substances have different effects on the freezing point of water.

Help Received
My dad and mom helped me get the materials. Mr. Karatas, my science teacher, taught me how to draw graphs; Used computer classes at Magnolia Science Academy; Ms. George, my English teacher, checked grammer mistakes in the report.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Michelle E. Jaconette

Project Number
J0517

Project Title
pH: It's to DYE for!

Abstract

Objectives/Goals
My project was to determine the optimum pH for dyeing 100% cotton cellulose fabric using fiber reactive dyes. I believe that the high pH dye solutions will produce results with a more intense color on the fabric than the low pH dye solutions.

Methods/Materials
54 cups of dye solution were prepared. There were six colors of dye and the solutions for each color ranged from pH 5 to pH 13. The low pH solutions were made using distilled vinegar and water and the high pH solutions were made using sodium carbonate dissolved in water. The pH of each solution was tested with litmus paper before adding a measured amount of dichlorotriazine dye powder. 54 squares of 100% cotton cellulose fabric were cut and labeled, then soaked for five hours in each of the dye solutions. Then the squares were rinsed individually in tap water, then run through a washing machine using a mild detergent. They were then air dried, mounted and compared for color intensity, both qualitatively and quantitatively. It was important for me to wear latex gloves and safety goggles becuase sodium carbonate is toxic.

Results
The optimum pH solution for dyeing 100% cellulose cotton fabric is pH 12. The higher pH solutions produced the most intense colors on the fabric, and the lower pH solutions produced uniformly less intense colors on the fabric.

Conclusions/Discussion
My results show that the chemical reaction taking place between the dye and the fabric is enhanced at a high pH and suppressed at a low pH. The reaction that takes place is that a nucleophilic cellulosate anion attacks the carbon to which one of the chlorine atoms in the dichlorotriazine dye is attached. After the chlorine atom is displaced, a covalent bond results between the dye and the fiber.

Summary Statement
My project is about studying pH as a variable in the efficacy of fiber reactive dyes.

Help Received
My mom helped by cutting out and labeling numerous cotton fabric squares. My dad helped by teaching me how to make data tables and graphs using Microsoft Excel on the computer. My teacher helped by supplying me with the fiber reactive dyes and the sodium carbonate.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
John J. Kim

Project Number
J0518

Project Title
Measuring CO(2) with Kernels of Millet

Abstract

Objectives/Goals
My project was to determine what temperaure has the most down-up motions of kernels of millets. I anticipated the down-up millet motion would have more frequency as the temperature of the carbonated water decreases.

Methods/Materials
12 Lemon Lime Seltzer sodas with 1C, 6C, and 22C temperature
3 beakers
36 kernels of mille
A thermometer
A stop watch

Results
Throughout these experiments there are three results useful in our practical life. First, you know which temperature is the best for drinking carbonated water to feel fresh. Second, you can figure out which material is a good conductor or a poor conductor. Finally, you can determine the roughness of any materials that can be very hard with your eyes.

Conclusions/Discussion
In my data obtained from the three different temperatures which are 1C, 6C, and 22C, the 6C carbonated water has shown the most frequent down-up motions of millets. By looking at the data, the 6C carbonated water has the most active action of carbon dioxide than the others. I guess the reason is that the optimal heat exchange between one glass of 6C carbonated water and the air at the room temperature (25C) contributes to the greatest emission of carbon dioxide in the three cases.

Instead of using kernels of millet, I used a metal bead and a marble to see which one would have the most carbon dioxide produce on its surface. In the beginning, a large amount of carbon dioxide sticks more to the metal bead, but after a while, the metal bead produces less amount of carbon dioxide than at the beginning and on the surface of marble.

In another experiment I found that among plastic bead, metal bead, millet, and marble, the plastic bead had the most long-lasting down-up motions.

I also sanded a kernel of millet to make it rough, and put both of the harsh and original kernels of millet in the carbonated water. As a result, the rough one has more bubbles at the surface than the original one.

Summary Statement
I found that the 6C temperature carbonated water has the best activation of carbon dioxide or the most down-up motions of millets.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Danny J. Lee

Project Number
J0519

Project Title
Coral: Disguised or Bona Fide: The Chemical Analysis of Authentic and Artificial Red Coral

Abstract

Objectives/Goals
Which chemicals and methods can identify real coral from counterfeit ones?
Which solvent can remove the artificial colors from coral efficiently?
Which synthetic dyes and conditions can colorize white coral effectively?

Methods/Materials
Experiment A: (1) Test of the reactions of coral with acetone, alcohol, ammonia, NaOH, Drano, HCl, vinegar, phosphoric acid, and NaCl with 81 different coral samples. (2) Test of density on eight different coral samples with a graduated cylinder, electric scale, and calculator.
Experiment B: (1) Test of the reactions of coral with different concentrations of HCl using balloon and lime solution methods. (2) Same test but in a reduced amount of solution.
Experiment C: Test of the removal of artificial dyes from coral with bleach, hydrogen peroxide, Simple Green cleaner, stain remover, paint remover, Gel Gloss cleaner, and Goo Gone cleaner.
Experiment D: (1) Test of the colorization of coral with base, acid, disperse, direct, and KMNO(4) synthetic dyes in room temperature. (2) Same test but in heated temperature. (3) Test of the colorization of coral with red base dyes in various NaOH solution concentrations in heated temperature for different time periods.

Results
Experiment A and B: Genuine coral reacted with HCl to produce CO(2), which filled up the balloon and reacted with a lime solution to form white limestone. Also, the density of real coral was 2.72 g/ml.
Experiment C: Bleach was the best artificial color removing solvent that did not destroy coral#s texture.
Experiment D: A synthetic red basic dye in a 15% NaOH solution colorized the white coral effectively in a heated condition for thirty minutes.

Conclusions/Discussion
The experiments show that real coral reacts with HCl in concentrations of 40% and above to form CO(2) efficiently, and a 10% HCl solution can react with coral and will not cause mass reduction. Also, bleach is the best color removing solvent, and a 15% NaOH in a synthetic basic red dye is the best color enhancing solution. It is important to understand the properties of coral, so people can identify counterfeit coral sold in the market and avoid financial losses. The various chemicals applied in the experiments can help chemists analyze coral (calcium carbonate) more in depths and find new uses of this compound. Marine biologists can also use this information to further research for more knowledge of coral's commercial uses.

Summary Statement
Using different chemicals and chemical methods, experiments were done to identify real red coral from fake ones, to remove the artificial color, and to find dyes that can enhance inexpensive white coral#s color into a valuable red color.

Help Received
Mrs. Williams for her guidance and instructions. My dad for his essential advice and tips. My mom for gathering supplies.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Abigail R. Leven

Project Number
J0520

Project Title
What Factors Affect Vitamin C in Liquids?

Abstract

Objectives/Goals
To determine if the level of Vitamin C in juices is affected by conditions such as refrigeration, sunlight, microwaving or freshly squeezed.

Methods/Materials
I took one half cup of distilled water and put a Vitamin C tablet in it which was 125 milligrams. I split it into four cups and added a teaspoon of starch solution to each cup. Then I put iodine into each cup, counting the number of drops it took to turn a blue black color and calculated the average of the four. I did this same procedure with four juices, but before adding the iodine, I either refrigerated them, microwaved them, left them in the sun, or had them freshly squeezed. Using a mathematical formula I calculated the amount of Vitamin C in each liquid. Materials included: distilled water, Vitamin C tablets, iodine, an eyedropper, starch solution, freshly squeezed orange juice, store-bought orange juice, lemonade, cranberry juice, lemons and cranberries.

Results
The freshly squeezed orange juice left in the refrigerator for five days had the most Vitamin C in it overall. The freshly squeezed cranberry juice had the least amount of vitamin C in it overall. The condition which produced the most amount of Vitamin C in the store-bought orange juice and the lemonade was the microwaving for one minute.

Conclusions/Discussion
My hypothesis was that the freshly squeezed orange juice would have the most amount of Vitamin C in it. However, my data showed that the freshly squeezed orange juice that was refrigerated for five days had the most Vitamin C. It apears that evaporation occurs while refrigerating as well as microwaving. When the liquid evaporates there is a higher concentration of Vitamin C.

Summary Statement
I tested a variety of juices using the titration method to determine how various conditions affect the amount of Vitamin C in those liquids.

Help Received
My father took me to the market and the pharmacy to buy the materials; My mother helped in the kitchen with cleaning up.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Nathan Malefyt; Griffin Whitehead

Project Number
J0521

Project Title
How Does the Amount of CO(2) Gas Compare to the Amount of CO(2) Solid after the Sample Has Completely Sublimed?

Abstract

Objectives/Goals
From a known mass of solid CO2 (dry ice), what is the volume of CO2 gas produced when the sample has completely sublimed? How does the measured volume compare to the volume predicted by the ideal gas law?

Methods/Materials
We took ten different samples of solid CO2 (dry ice) of different known masses. After weighing each sample we placed them in our reaction vessel one at a time and waited for them to completly sublime. Once they had completly sublimed we measured the ammount of gas by seeing how much water was displaced by the CO2. We recorded and graphed the results and compared the gas ammounts from our given solid to the predictions of the ideal gas law.

Results
Our results were plotted on two graphs, one comparing the ammount of grams of dry ice to the liters of gas produced, and the other comparing the grams of dry ice to the moles of CO2 gas. Using the method known as the least squares fit for liner functions we ploted a straight line on our grams of CO2 to moles graph.

Conclusions/Discussion
From our limited results we have found that the ammount of CO2 gas produced by the dry ice is proportionatly the same with all masses. We had many minor adjustments we made to get accurate results. The ideal gas law gives a very accurate prediction of our results in our expiriment with the ideal gas CO2.

Summary Statement
We measured the volume of CO2 gas given off by various wieghts of dry ice, and evaluated those data points using the ideal gas law equation (PV=nRT) to calculate the molecular wheight of CO2.

Help Received
Nathan's father helped us in using the equipment and helped us better understand the science behind our expiriment.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Shamik Mascharak

Project Number
J0522

Project Title
Are Copper Pipes a Significant Source of Copper in Drinking Water?

Abstract

Objectives/Goals
The goal of this project was to determine the extent of copper contamination in drinking water due to the use of copper pipes. Also, the effect of the acidity of water on the amount of leached copper was examined.

Methods/Materials
Materials: Copper pipes, new and old, PVC pipes, Brass pipes, all 6 inch long, plugged at one end; Copper reagent from Hach Co. (CuVer reagent); Color comparator; Color wheel; Sample holder (Hach Co.); pH paper; Safety Glass.
First, the pipes were numbered and placed on the rack. Then they were filled with tap water (pH 6) and water of pH 4 and 3 (by adding nitric acid). Every 2-3 days, 5 mL aliquots of the water samples were taken out. each sample was mixed with a pillow of the CuVer reagent and shaken. The intensity of the purple color thus generated was then compared with the purple hue on the Hach color wheel. Since the intensity of the purple color is proportional to the concentration of copper in the water sample, the amount of copper leached out after a certain period of time was directly determined from this experiment.

Results
The results demonstrated that copper did leach out of the copper pipes and acidic water enhanced the rate of leaching. Old copper pipes showed more contamination than the new pipes while brass pipes showed moderate amounts of copper in the water.

Conclusions/Discussion
The amount of copper in drinking water does increase to a significant level (above the EPA standard of 0.3 ppm) upon standing in copper pipes overnight. The concentration of copper goes up with days and hence water should be drained especially after no usage of the faucets for a long time (like vacations). Such problems will be more prominent in houses with old copper pipes. Excess copper could cause gastrointestinal disturbances, nausea and other physical disorders. People with Wilson's disease would be especially susecptible.

Summary Statement
My project is about how copper is leached out of copper pipes and contaminate our drinking water.

Help Received
My dad, Pradip Mascharak, helped me in getting the chemicals, the pipes, and the Hach Kit. My sister, Smita, helped me in making the graphs.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Seth G. McFarland

Project Number
J0523

Project Title
Solar Electrolysis for Hydrogen Production

Abstract

Objectives/Goals
To determine if I could successfully produce hydrogen gas from water using solar electrolysis and what variable increases the production of hydrogen during electrolysis.

Methods/Materials
I built an electrolyser with copper plates as electrodes. I timed each test for 5 minutes and collected the hydrogen and oxygen in two inverted graduated cylinders. I then measured the hydrogen. I tested variables of the concentration of electrolyte, temperature and voltage. To decrease voltage I covered the solar panel with aluminum foil.

Results
I found the lowest voltage tests (5 volts) always produced an amount of hydrogen so small I could not measure it. The next voltage tests (10 volts) produced 0.5 ml of hydrogen at the coldest temperature with the highest two electrolyte concentration. No hydrogen was produced at the middle temperature, while 0.5 milliliter was produced at the highest temperature with the highest two electrolyte concentrations. The 15 volt tests produced from 1 milliliter of hydrogen at the coldest and lowest electrolyte concentration test to 2 milliliters on the warmest and highest electrolyte concentration test.

Conclusions/Discussion
I have concluded that the warmer the water, the stronger the electrolyte concentration and the higher the voltage, the more hydrogen will be produced. Voltage seems to be the most important factor in my tests.

Summary Statement
To find how to produce the greatest quantity of hydrogen with solar electrolysis for a clean fuel source.

Help Received
none

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Meenakshi T. Mukherjee

Project Number
J0524

Project Title
The Effect of Curcumin on Metal Ions

Abstract

Objectives/Goals

Curcumin found in the common curry spice, turmeric, is thought to help in Alzheimer"s Disease (AD). Plaques are formed in the brain that causes AD. Curcumin may reduce these plaques by directly removing them, or by reducing their formation. To form these plaques metal ions are needed. Curcumin may remove these metal ions so it reduces plaque formation. My question was to investigate what effect curcumin has on different metal ions.

HYPOTHESIS: New curcumin-metal ion complexes will form and I will be able to isolate them. All four (copper, zinc, iron and manganese) metals will form a 1:1 (curcumin to metal ion) as well as a 2:1 (curcumin to metal ion) complexes.

Methods/Materials

MATERIALS: Curcumin, zinc acetate, copper (II) acetate hydrate, iron (II) acetate, manganese (II) acetate tetrhydrate, ethyl alcohol, Vials, Spatula, Analytical balance, Water Bath, TLC sheets, Parafilm, Centrifuge.

METHODS: Curcumin and metal ion salts were dissolved in ethyl alcohol. The metal ion solution was then added to the curcumin solution. All eight different mixtures were then put into the water bath at 37 oC. The complexes were then isolated, washed and dried and used for analysis. I had two variables: 1) different metal ions 2) different concentrations of curcumin. Different concentrations were mixed together with a 1:1 ratio of curcumin to metal ions and a 2:1 ratio to see what the effect of the curcumin would be. My sample size was eight. I isolated the complexes and got their weight, This was used to calculate the yield of the complexes that were collected. These complexes were analyzed using mass spectrometry in order to get their molecular weight.

Results

I found that all four metal ions formed complexes and there was a clear precipitate. The colors varied and I was able to isolate them. Mass spectra of all the complexes revealed the presence of curcumin and metal ions in them. Copper and Iron had a tendency to form a 2:1 complex in the 1:1 experiment. In the 2:1 experiment they formed both a 1:1 and 2:1 complex. Zinc and manganese had a tendency to form 1:1 complexes with curcumin.

Conclusions/Discussion

My conclusion is that curcumin has an ability to form strong complexes with metal ions It created a complex with all the metal ions we studied which we were then able to isolate. Since it is known that curcumin enters the brain it is possible that it may help in AD by getting rid of excess metal ions.

Summary Statement

Curcumin, a house-hold asian spice can remove excess metal ions from the brain and help Alzheimer's disease

Help Received

Used lab equipment at University of California-Irvine under supervision of Dr. Mukherjee (my dad) and Ms. Daphne Collins

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Haylee C. Murrow

Project Number
J0525

Project Title
To Rust or Not To Rust

Abstract

Objectives/Goals
My experiment is to determine which type of metal is most rust-resistant after being exposed to different liquids. I think the aluminum will be the most rust-resistant because it appears strong and smooth as if it has a coating on it that will protect it from rust.

Methods/Materials
For my experiment I used a measuring cup, spoon, 24 test tubes, test tube tray, tap water, salt, vinegar, club soda, markers, tape, 6 pencils, four 8 inch pieces of steel, iron, copper, silver, zinc, and aluminum, camera, photo paper, journal, and a pen. First, I mixed one tablespoon of salt with one cup of tap water. Then I arranged four rows of six test tubes each, in the test tube tray and labeled it. I poured three tablespoons of water into each test tube of row one, three tablespoons of salt water into each test tube in row two, three tablespoons of vinegar into each test tube in row three, and three tablespoons of club soda into each test tube in row four. Next, I wrapped four pieces each of steel, iron, copper, silver, zinc, and aluminum around their own individual pencils, and labeled them with tape and markers. Every two days for ten days, I examined the metals and the liquids they were in. I took pictures and recorded the changes.

Results
The iron was the only metal to form rust, which is known as "iron oxide". The iron formed the most rust in the club soda. The silver was affected the most by vinegar. The steel formed salt crystals at the top of the wire and on the pencil in salt water. All the liquids with steel in them evaporated. The steel itself showed the least amount of change of all the metals. The copper formed a green oxide which helped to protect it from further corrosion. The zinc had different amounts of corrosion in all liquids. The piece in vinegar broke in half. The aluminum had very little change in water and salt water.

Conclusions/Discussion
My conclusion is that five out of six metals were rust-resistant, but did form other types of corrosion. Iron was the only metal to form "Rust". The type of liquid the metal is in does control the rate of corrosion. Steel was the least affected by all four liquids.

Summary Statement
To determine which tupe of metal is most rust resistant when exposed to various liquids.

Help Received
My Dad helped me find different types of metal, my sister helped me format the graphs, my Mom drove me everywhere for supplies and checked my report

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Adam E. Nunziato

Project Number
J0526

Project Title
Calories Really Count

Abstract

Objectives/Goals
The goal of my experiment was to build a calorimeter to measure the number of calories in selected snacks. For the experiment, I selected (1) Cheetos Puffs, (2) Pringles Potato Chips, (3) Planters# Cocktail Peanuts, and (4) Blue Diamond Almonds.

Methods/Materials
I measured calories by burning food in a homemade calorimeter. I measured the temperature of the water. I burned the food then took the temperature after the food was burned. I also measured the temperature of the metal parts of the calorimeter.
MATERIALS

Six 5.5 ounce apple juice cans Mortar and Pistil
· Tin Foil Fuel Tablets
Thermometer Cheetos Puffs
Clamps Pringles Potato Chips,
Holding Stand Planters# Peanuts
Burner Made out of a Tea Strainer Blue Diamond Almonds
!Grill Made out of a Coat Hanger

Results
Planters Peanuts were way over the amount that were stated.
Frito Lay Cheetos were less that the stated amount.
Blue Diamonds Almonds were healthier than stated on the back.
Pringles Potato Chips were only two calories more than stated.

Conclusions/Discussion
Some of my results showed that there were fewer calories than was stated on the labels. This was because excess heat was escaping. I also discovered that the peanuts label was the most inaccurate. The peanuts contained 101 more calories than listed.

Summary Statement
Measuring calories to see if certain food labels are correct.

Help Received
My dad helped me burn food safely and my mom helped me put the board together.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Aurora L. Ostrom

Project Number
J0527

Project Title
How Fast Do Hydrogen Ions Diffuse through Water?

Abstract

Objectives/Goals
The rate at which hydrogen ions diffuse through water was determined by measuring the time it takes hydrogen ions to travel a known distance.

Methods/Materials
A concentrated acid was added to one end of a PVC pipe filled with deionized water and cut to a known length. The arrival of the hydrogen ions on the other end of the pipe was detected by a pH electrode. Three experiments for each of three different lengths of PVC pipe (0.9144, 1.219, and 1.524 meters) were conducted using (35%) nitric acid and then with (35%) hydrochloric acid.

Results
The hydrogen ions were found to diffuse quickly through water as stated in the hypothesis. However, a plot of the results showed that the rate was exponentially dependent upon the length of the pipe. Furthermore, a comparison of the results from each acid showed that the rates were not the same as the hypothesis predicted.

Conclusions/Discussion
The differnce in diffusion rates between the nitric acid and the hydrochloric acid is probably due to interactions between the hydrogen ion and the anion in each acid.

Summary Statement
This project will determine the rate at which hydrogen ions diffuse through water by measuring the time it takes concentrated acids to diffuse through water in known lengths of PVC pipe using a pH electrode as the detector.

Help Received
For safety reasons, Father handled concentrated acids during experiments. Borrowed chemistry supplies from Navy research lab and received training on pH meter.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
John Carlo C. Pasco

Project Number
J0528

Project Title
The Future is Now! Pee-ure Water

Abstract

Objectives/Goals
The purpose of my science fair experiment was to help the people who might plan a manned trip to Mars. It is intended to find the best way to recycle urine so the astronauts would be able to have water without costing the space station a lot of money and cargo weight.
I discovered I could recycle urine by the natural processes of evaporation, condensation & transpiration.

Methods/Materials
Funnel urine collected over a 3-week period (2 gallons) into a glass flask and place a rubber stopper into it. Connect the flask to a condensing tube, and the tube to another flask with an arm extending from it. Attach a rubber tube to another flask. Place the flask with the urine on a hot plate and let it boil. After about 10 minutes, H2O will collect in the flasks. Place this H2O in a test tube to keep it in a safe place and repeat the boiling process. Feed 1/4 of the urine to green bean plants to cause the transpiration process. Feed 1/4 of the evaporated & condensed urine to the 2nd set of plants so they can transpire this H2O, too. Place the different waters in their respective clear plastic cups to compare the clarity (& odors) of the samples.

Results
On a scale of 1 to 10 (1 = dirtiest sample compared to drinking water and 10 being the clearest), "evaporation & condensation" scored a 7, "transpiration" = 4, & "evaporation, condensation & transpiration" = 1. The "evaporation & condensation" was the simplest & most efficient. The transpiration was successful, but produced less than a ml of water. I did not produce enough evaporated & condensed water to feed to the plants so the "evaporation, condensation, & transpiration" did not work.

Conclusions/Discussion
My hypothesis that the "Evaporation, Condensation & Transpiration" would score highest was incorrect. It scored a 1. No H2O was produced because I did not feed it enough "evaporated & condensed" H2O. I only fed it 5 ml of "evaporated & condensed" H2O. Had I used 750 ml of evaporated and condensed H2O like I did with the pure urine, I probably would have received at least some H2O. I think the problem lay in the amount of H2O I collected when I was evaporating & condensing urine.
The reason the plants were not able to transpire properly is due to time constraints. If I had more time, I could have evaporated and condensed more water, thus giving the plants more sustenance to transpire.

Summary Statement
The purpose of my project is to determine the best way to recycle urine into water.

Help Received
Mom - board layout, typing, purchase of seeds and soil. Mr. Minton - use of lab equipment at Holy Family School. Chancey Kelly - assisted during recycling process

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Rachel J. Phalan

Project Number
J0529

Project Title
Nitrogen: The Gas of the Future

Abstract

Objectives/Goals
This project was to see which gas could keep a balloon inflated the longest; Nitrogen, Helium or Compressed Air. This project was chosen to test Costco's advertisement that Nitrogen keeps tires inflated the longest. Costco also stated that Nitrogen increases the life of your tire, "it is safer and you get a smoother ride"!

Methods/Materials
Latex ballons were purchased in three different colors (purple, red and blue) to determine if color would not be a factor. 3 balloons of each color were filled with Nitrogen, Helium and Compressed Air. This produced three colors filled with Nitrogen gas, three filled with Helium and three filled with Compressed Air. Next, each set of balloons based on its gas was mounted on a white poster board. Visual observations and height measurements were taken of each balloon. The preliminary testing was used to detemine the best measurement of testing. Helium was found to be a poor gas as it deflated quickly. Therefore, in subsequent testing, Helium was not included. The final testing took place over a four week period.

Results
Testing proved that Nitrogen was a better gas in keeping the balloons inflated at their fullest level as measured by the height measurements. Compressed Air was not bad but did deflate at a faster rate. Helium was found to be a very poor gas in these circumstances as a long lasting gas in balloons.

Conclusions/Discussion
Costco's advertisement claims proved to be true. Nitrogen gas was found to be the best gas for inflating balloons.

Summary Statement
This project was to determine which gas could keep a balloon inflated the longest; Nitrogen, Compressed Air or Helium.

Help Received
Dad drove me to Costco & Party City to fill balloons, helped in constructing the project & test methodology; Mom helped to proof-read my report; Ms Gross, my science teacher, provided proof-reading and direction; Costco Tire Center filled balloons with Nitrogen and Compressed Air.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Jocelyn H. Reist

Project Number
J0530

Project Title
Destruction of Natural Pigments by the Interaction of UV Light and Oxygen

Abstract

Objectives/Goals
This project's goal was to find out if laying fabric on grass increases fading of a stain by the sun. The idea came from my grandma who said this was a custom in her country. Because of the low UV index during the winter, I had to use artifical UV light in a lab. I hypothesized that oxygen coming from the grass could interact with UV light from the sun and form ozone, a powerful oxidizing agent. Oxidation is an important process of fading, especially for plant pigments.

Methods/Materials
(1)Prepare fabric samples and dye white cloth with red wine (2)Make 4 trays, 2 with holes for gas inflow/outflow [trays A/B] (3)Mount 2 samples [cards with one square of every fabric color and stained fabric] onto trays A/B and one onto trays C/D (4)Attach nitrogen tank to tray A and oxygen tank to tray B (5)Fill trays C/D with oxygen and seal with cellophane and rubber bands (6)15 hours later take one sample out of trays A/B and remove sample from tray C (7)After 24 hours remove remaining samples from tray A, B, and D (8)Scan samples into computer using a color scanner (9)Upload images into Adobe Photoshop and use histogram function to record average luminosity and plot the results
Materials: UV light, plastic trays, green, blue, red, black, and white fabric (100% cotton), red wine, cellophane wrap, oxygen and nitrogen gas.

Results
Fading was increased for the stained samples that were in the sealed oxygen trays compared to samples exposed to continuous oxygen or nitrogen flow. The differences were observed after 15 and 24 hours of UV light exposure. The black fabric showed a small amount of fading which did not seem to be affected by the conditions.

Conclusions/Discussion
The stained fabric sujected to sealed oxygen and UV light showed the most fading. I had hypothesized that this is because ozone was able to build up in this tray and oxidize the wine stain along with the effects of the UV light. Less fading was seen with the continuous flow of oxygen because ozone did not have a chance to build up. Nitrogen is inert so any fading was most likely due to the UV light itself. For the black fabric, the condition did not appear to matter suggesting that the fading was also due to the UV light. My grandma's stain trick on the grass may work because UV light from the sun causes the formation of ozone near the grass, which increases fading of the stain.

Summary Statement
My project is about how pigments in a stain are removed through the interaction of ultraviolet light and oxygen.

Help Received
I used lab equipment at the Long Beach Veteran Affairs Hospital under the supervision of Dr. Christopher Reist.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Avikar S. Saini

Project Number
J0531

Project Title
When Salt Meets Ice

Abstract

Objectives/Goals
My objective for this project is to learn why salt melts ice and how it melts it.

Methods/Materials
For my project I need:
Excess, NaCl, KCl, AlCl3, Ice
18 Clear Bowls and Glasses
6 Spoons
Mortar
Gloves

Results
My results showed that the NaCl melted the ice the fastest followed by AlCl3, KCl, Chalk, Sugar, and finally standard.

Conclusions/Discussion
My hypothesis proved partially right. I was correct about the salts melting the ice at about the same rate but I was incorrect about the salt and sugar. I went back and did some research on my project and I learned that chalk has some salt in it and that sugar is a covalent bond like water. A covalent bond shares electrons instead of transffering them like ionic bonds.

Summary Statement
My project is about how and why salt melts ice.

Help Received
Dad, Sisters, and Mother helped make results more accurate.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Evan G. Slovak

Project Number
J0532

Project Title
Ahh, It Burns!

Abstract

Objectives/Goals
The goal of my project was to see how differnt metals are affected by varying pH's.

Methods/Materials
Sodium hydroxide, hydrochloric acid, lemon juice, water, vinegar, copper, zinc, aluminum, triple beam balance, and goggles.

Results
Varying pH's do affect metals but the type of solution and pH level determines the ammount.

Conclusions/Discussion
Sodium hydroxide affected the metals the most.

Summary Statement
How different metals are affected by varying pH's.

Help Received
Used lab equipment of Marywood Country Day School

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Erica Lynn Soultanian

Project Number
J0533

Project Title
Natural Dyes

Abstract

Objectives/Goals
My Question that I am testing is if natural fruit and vegetable dyed fabric will retain its original color when washed with todays detergents.

Methods/Materials
To test my experiment I did 3 trial and 3 tests. My first one I did is one in the washing machine with detergent. Another, in the washing machine with no detergent. Finally, I did one in the sink with no detergent. I did each of my tests three times for each fabric.
1 L 250 mL onion skins (5 cups)# 1 L 250 mL beets (5 cups)
1 L 250 mL blueberries (5 cups)
1 L 250 mL raspberries (5 cups)
100 cotton % quilters broadcloth 2.7432 meters (3 yards)
4 medium/ large pots # All Free and Clear detergent
Washing machine # Water # Strainer # Salt
White Vinegar # Pot Holders # Scissors
Measuring cups # 4 big bowls
4 stirring spoons # Knife # Cutting board

Results
When I washed the fabric I found that some of the dyes washed out completely, while others changed colors. The only dye that held completely was the onion skins. When I washed the other fabrics in the washing machine the colors either went out completely or changed color. When I hand washed the fabric mainly all of the dyes stayed mostly the same. The washing machine trials with and without turned out almost the same. The detergent seemed to even out the color a little bit, while the trials without detergent seemed to make the color spread unevenly.

Conclusions/Discussion
My hypothesis was incorrect because the color fixative did not make the color hold in the fabric. The answer to my question is yes and no because one of the colors stayed and the others didn#t. This could be that the color pigment level in the onion skins had something in it that helped it keep its color longer. Another possible explanation could be that there was a reaction to the PH levels in the dye with the detergent and water in the washing machine. When I washed my fabric in the washing machine I found that it changed or lost its color. When I hand washed my fabric I found that it stayed the same color. This could be because the constant movement of the fabric in the washing machine caused it to lose its original

Summary Statement
In my project I washed fabric with natural dyes to see if they would retain their original color.

Help Received
Mother helped me make dyes

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Evan S. Stanford

Project Number
J0534

Project Title
What Type of Fuel Has the Greatest Energy per Unit Mass?

Abstract

Objectives/Goals
The purpose of my project was to determine which fuel had the greatest energy density. I hypothesized that gasoline would have the greatest energy density because it is used commonly in many forms of transportation.

Methods/Materials
In my experiment I used a home-made calorimeter to measure the energy of combustion for paraffin wax, gasoline, vegetable oil, diesel, sterno, and wood. A calorimeter is a device used to determine the amount of energy given off during a chemical reaction by measuring the change in temperature of water surrounding a reaction crucible. I recorded the starting temperature of the water and the mass of the fuel that I placed in the calorimeter. The fuel was lit and oxygen was circulated through the container. I sealed the crucible and placed it into a large bucket of water. After twenty minutes I stopped the experiment and measured the change in temperature of the water and the change in mass of the fuel. With this information I calculated the total energy released and the energy density of each fuel.

Results
My experiment showed that paraffin wax had the greatest energy density of the six fuels I tested, while wood had the lowest energy density.

Conclusions/Discussion
My conclusion did not support my hypothesis, although gasoline did have the second greatest energy density. This experiment shows that there is a significant difference between various fuels and suggests that in the future wax may become a more vital source of energy.

Summary Statement
This project used a calorimeter to determine the energy densities of six different fuels.

Help Received
My science teacher suggested using a calorimeter, my father helped acquire the supplies for the calorimeter and helped supervise all gasoline testings, and my mother proofread my papers and purchased the backboard.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)

Nikki A. Teran; Andrew L. Zellman

Project Number

J0535

Project Title

An Ionic Inquiry Yields Saline Solutions: How Four Salts Affect Electrical Conductivity

Abstract

Objectives/Goals

The objective of our project is to determine which of four different salt species in solution is the best conductor of electricity. We devised this experiment because we want to build a Tesla Coil that uses a saltwater tank capacitor. Most coil builders use sodium chloride in the tank. Our current experiment, on ionic species and electrical conductivity (EC), provides us with the first information we need.

Methods/Materials

Based on our prior research, we believed that divalent salts would be more conductive than the monovalent salts. During our research we also learned that solution EC is affected by temperature and concentration, which we carefully controlled.

We tested four salt solutions, two divalent and two monovalent: calcium chloride (CaCl2), sodium sulfate (Na2SO4), sodium chloride (NaCl) and sodium bicarbonate (NaHCO3). We began each replicate with 0.1 molar (0.1M) solution of each salt and then made serial dilutions at 0.01M and 0.001M. We made 5 replicates of each salt at each of the three concentrations. Prior to measuring the replicate EC values, we calibrated the EC meter each time with two standard solutions (12.88mS and 1.413mS). We recorded the EC and temperature of each replicate for 1 min. or until the EC readings stabilized.

Results

Based on the experimental results, we ranked the salts from highest to lowest average EC values as: CaCl2, Na2SO4, NaCl, and NaHCO3. The small range and standard deviation values showed there was relatively little variation between each of the replicate values.

Conclusions/Discussion

Our project data supported our hypothesis that the divalent salts, CaCl2 and Na2SO4, would have higher EC values than the monovalent salts, NaCl and NaHCO3. CaCl2 had the highest EC value at 0.1M of all the salts we tested. NaCl had higher EC values than NaHCO3 at all three concentrations. Also, each salt solution showed a slightly different relationship between concentration and conductivity.

So, if we want to build a good saltwater capacitor for our Tesla Coil, we should use CaCl2 instead of NaCl in the tank. If we were more cautious and did not want to potentially burn down the city, then we would use NaHCO3, a poor conductor, in the capacitor. We would like to test the salts at higher concentrations and also test some other salt species, especially a trivalent salt, such as aluminum chloride (AlCl3).

Summary Statement

Our project shows that calcium chloride should be better than sodium chloride when used in salt water tank capacitors based on its higher EC value at equimolar concentrations.

Help Received

Danny Armanino helped with our project narrative and timeline. Mrs. Ingrid Erich allowed us to use the Ukiah High School Chemistry Lab. Alpha Analytical supplied us with salt solutions. Our parents helped us gather materials and put together our display board.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Brittany V. Worcester

Project Number
J0536

Project Title
Redheads, Blondes, or Brunettes?

Abstract

Objectives/Goals
The objective is to see which color hair lightens fastest under the sun and under an ultraviolet bulb.

Methods/Materials
Six different colors of hair were used. Four of the colors were natural hair and two were synthetic. The natural hair colors were black, light brown, red, and dark brown. The synthetic colors of hair were red and blonde. The pieces of hair were 18.5 mm long. To make the UV box wood, nails, and hinges were used. A UV bulb was put in and an electric cord was used to plug the bulb in. The hair was put on a cardboard box cover with drawer sticky paper on it, when it was out in the sun. Clothespins were used to secure the hair and string was used to tie it together. A color chart was used to compare the hair colors to their original color.

Results
Red natural hair lightens fastest under the sun. It lightened two shades. No hair colors changed under the ultraviolet bulb. The next hair color to lighten was the synthetic red hair in the sun. It also lightened two shades. Then the light brown hair lightened one shade. The synthetic blonde hair was last and it lightened one shade as well. The black and dark brown hair didn't lighten any.

Conclusions/Discussion
The conclsion was that red natural hair lightens fastest in the sun. The ultraviolet rays do not lighten hair, so the sun's rays must be stronger and have other elements in them.

Summary Statement
This project was done to see which color hair lightens fastest under the sun and under an ultraviolet bulb.

Help Received
Grandmother helped take hair in and out of the sun and turn UV bulb on and off if I was unavailable.

CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Brent M. Yamada

Project Number
J0537

Project Title
Fuels and Their Efficiency to Produce Energy

Abstract

Objectives/Goals
My project was to evaluate and test four different fuels - parrafin wax, ethanol, propane, and white gas (similar to gasoline) - to determine which is most efficientin producing heat and energy.

Methods/Materials
Four different fuels were used to heat water in a flask. By measuring the temperature change, and the amount of fuel burned, I calculated the amount of energy produced in kilojoules/gram. Using mathematical sequences, I calculated the heat of combustion and their efficiency in producing energy for all four fuels.

Results
Parrafin wax had the highest heat of combustion and efficiency, followed by ethanol, then propane, and white gas finished last.

Conclusions/Discussion
I conclude from my results that parrafin wax was the most efficient of all four fuels. Because of its efficiency, its clean burning properties, andits safety in storage, it could have more widespread applicates in the future.

Summary Statement
Four common fuels (parrafin wax, ethanol, propane, & white gas) were burned to determine their efficiency in producing energy and parrafin wax was the most efficient.

Help Received
My parents purchased all necessary lab equipment, office supplies, and took me to the library.