CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Jeffrey S. Asai

Project Number
J0501

Project Title
Got Fizz? What Factors Affect Chemical Reaction Rate?

Abstract

Objectives/Goals
My objective was to learn how temperature, concentration, and particle size affect the chemical reation rate of Alka-Seltzer and water.

Methods/Materials
Bayer Alka-Seltzer was added to water and the reaction was timed. To see how temperature affected the chemical reation rate, one whole tablet of Alka-Seltzer was placed in 100 mls of water at various temperatures (6, 25, 50, 75, and 100^0 C). To see how particle size affected the rate, one tablet (either whole, crushed into large particles, small particles, and powder) was placed in 100 mls of water at 16^0 C. To see how concentration affected the rate, one whole tablet was placed into various volumes of water (25, 50, 100, 200, and 400 mls). Three trials were done for each category.

Results
The higher the temperature, the smaller the particle size, and the lower the concentration, the faster the chemical reaction.

Conclusions/Discussion
The factors temperature, concentration, and particle size altered the chemical reaction rate of Alka-Seltzer and water. The higher the temperature, the faster the reaction because the molecules move around faster and therefore there are more collisions between the reactants. The smaller the particle size, the faster the reaction because there is more surface area for the reactants to collide with each other. It was expected that the higher the concentration the faster the reaction would occur, but the results showed that the higher the concentration the slower the reaction.

Summary Statement
The factors temperature, particle size, and concentration were tested and found to all affect the chemical reaction rate of Alka-Seltzer and water.

Help Received
My parents helped edit my written work, print the pictures, and format the graphs.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Jacob A. Bartholomew

Project Number
J0502

Project Title
Effect of Temperature on Crystal Growth

Abstract

Objectives/Goals
This experiment examines how the rate of cooling and surrounding temperature affect crystal growth in identical saturated salt (sodium chloride) solutions. My hypothesis is if one solution is cooled in a refrigerator and one in a non-drafty room temperature area, then the one that cools more slowly in the room temperature will grow larger.

Methods/Materials
Salt crystals were grown in two different conditions: room temperature and refrigerated. Two crystals were in room temperature cooling down and were kept at room temperature during crystal growth for twelve days. Two other crystals cooled down in the refrigerator and were kept at a refrigerated temperature during crystal growth for twelve days.

Results
My hypothesis was supported by this experiment: the room temperature crystals grew larger than the refrigerated crystals. The crystals in room temperature grew larger and stronger because they cooled more slowly, while the refrigerated crystals grew and then collapsed after three days. In addition, the room temperature crystals were stronger than the refrigerated crystals and could tolerate the movement and handling during their measurements.

Conclusions/Discussion
Different rates of cooling and different surrounding solution temperatures do affect salt (sodium chloride) crystal growth in identical saturated salt solutions. The room temperature crystals that formed were stronger and grew larger overall than the refrigerated crystals. This was because the room temperature solutions cooled at a slower rate, which gave the salt crystal seeds time to form stronger, more durable crystals. Also, the room temperature solutions evaporated at a faster rate, which left behind more salt deposits on the rock salt seeds. In the first three days, the refrigerated crystals were somewhat larger than the room temperature crystals. This might have been because salt solubility in cold temperature is lower than that at hot temperatures, and more salt was available to form larger crystals at a faster rate. The refrigerated crystals collapsed because they formed too fast and were very fragile. Also, the faster cooling rate of the refrigerated solutions gave the crystals less time to form strong crystals.

Summary Statement
This experiment examines how the rate of cooling and surrounding temperature affects crystal growth in identical saturated sodium chloride solutions.

Help Received
Mother helped with display format and helping with before and after pictures of crystals. Neighbor taught me how to use Excel to compute and graph crystal data.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Matthew B. Bicakci

Project Number
J0503

Project Title
Temperature: Hot or Cold: Exothermic and Endothermic Chemical Reactions

Abstract

Objectives/Goals
Do exothermic & endothermic chemical reactions have an affect on temperature of the reactants (chemicals)?

Methods/Materials
5 glass beakers; 1 graduated cylinder; 1 glass-STIRRING rod; 1 small spoon; 1 digital lab thermometer; 1 pint of distilled water; 14 grams of calcium chloride; 14 grams of sodium hydro carbonate; 14 grams of ammonium nitrate; 28 milliliters of concentrated sulfuric acid; safety goggles; surgical gloves.

Results
Temperatures (Celsius)

Names of Solutions	30 sec.	1 min.	1.5 min.	2min.	2.5 min	3 min.	3.5 min	4 min	4.5 min	5 min
Water Only (Control)*										
Water + Calcium Sulfate										
Water + Sodium Bicarbonate										
Water + Ammonium Nitrate										
Water + Sulfuric Acid										

All temperatures are measured in Celsius
*= The #water only# box has the one control temperature

Conclusions/Discussion
My experiment showed which chemicals were endo/exothermic but also the severity if the reaction. Some were weaker than others. From the results, you can guess which of the reactions was the most powerful. My hypothesis was correct, but not completely. As I said before there are different severities of the reactions. I did not even think about that while I was writing my hypothesis. I would like to point out something that may need adjusting for future scientists: There is only one chemical that produces an endothermic reaction with water. That is the chemical, Sodium Bicarbonate (baking soda). I think that the experiment should have included at least one more endothermic-reacting chemical.

Summary Statement
Learning if exothermic and endothermic chemical reactions produce or take in heat.

Help Received
Mother ordered chemicals online.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Michael J. Froboese

Project Number
J0504

Project Title
Vitamin C vs. The Elements

Abstract

Objectives/Goals
There are many ways to store your orange juice. When storing your orange juice you want to make sure that it stays fresh and preserves the Vitamin C content. You want to store your orange juice the way that is healthiest for you so that you don#t get Vitamin C deficiency. The researcher is doing this project so you know the best way to store your orange juice to preserve Vitamin C.

Methods/Materials
The researcher will be exposing the orange juice to different environmental elements. The types of conditions the researcher will test on the orange juice are boiling, freezing, sitting at room temperature exposed to air, and exposing it to light. The researcher will perform my experiments by making a Vitamin C indicator solution. The researcher will test each condition sample and see if the Vitamin C content decreases. The researcher will add the indicator solution to each sample of orange juice and the researcher will record my results.

Results
After the researcher performed the experiment, The researcher found that the hypothesis, #If storing Orange Juice properly provides your body with more Vitamin C, then storing properly in the refrigerator is better than other storing techniques.# to be correct.

Conclusions/Discussion
These results told the researcher that drinking fresh squeezed refrigerated orange juice provides you body with the most Vitamin C.

Summary Statement
The researcher tested to see if exposing orange juice to different environmental elements will change the Vitamin C content.

Help Received
Mom helped with testing samples

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Chase D. Hagen

Project Number
J0505

Project Title
Qualitative Analysis of Cations, Anions, Unknowns

Abstract

Objectives/Goals
To qualitatively analyze cations, anions and unknown solutions.

Methods/Materials
Materials are solutions of cations, anions, unknown solutions and individual group reagents.

Results
The coloration of the precipitates confirm the presence of certain cations or anions.

Conclusions/Discussion
By the color of the precipitate, one can identify a certain cation or anion that was present in the solution.
Example: a red colored precipitate confirms the presense of Iron (Fe(2+)) ions.

Summary Statement
To identify the presence of an ion in a solution.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Christopher S. Hayward

Project Number
J0506

Project Title
Vigorous Volts

Abstract

Objectives/Goals
The objective is to determine which electrolyte, white vinegar or saturated salt-water, when used in a crown of cups with copper and zinc, will conduct the most electricity.

Methods/Materials
A crown of cups was made by placing five plastic cups in a U-shape, with strips of zinc and copper inserted into each cup. Eight test clips were attached to both ends of four segments of red primary wire. The zinc and copper strips in the cups were connected alternately with the test clips. The quantity of electricity conducted by each electrolyte, white vinegar and saturated salt-water, was measured with a mini-VOM Multi-Tester by connecting the positive test lead of the Multi-Tester to the ending zinc strip in the crown of cups, and the negative test lead to the ending copper strip. This method was repeated three times.

Results
The white household vinegar produced more direct current than the saturated salt-water in each of the three trials.

Conclusions/Discussion
An effective electrolyte contains water, which has a high concentration of ions. When the ions dissociate, energy is produced. A higher concentration of ions makes them dissociate more, which produces more energy. White household vinegar is about 95% water, while saturated salt-water is approximately 70% water. Finding an electrolyte to create a super-powerful, long-lasting battery should be an important goal for inventors and scientists because, for one, the batteries could be used in electric cars. An average combustion engine car uses a gallon of gasoline every 17 miles, while a solar-powered electric car can run for 165 miles on one gallon of gas. Wider usage of these cars could contribute to reducing global-warming.

Summary Statement
This project is about electrolyte comparison and battery development.

Help Received
Mother helped type report and format graphs.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Leo S. Horvath

Project Number
J0507

Project Title
Different Temperature Effects on Growing Sugar Crystals

Abstract

Objectives/Goals
What are different temperatures affects on growing sugar crystals?

Methods/Materials
I made a saturated sugar solution by boiling 9 cups of sugar and 3 cups of water. This was transferred to glass jars and set in different temperature environments. Observations were made daily for one week to check on crystal growth in the jar and on a string hanging in the solution.

Results
The jar in the freezer did not grow crystals, but was clearly not frozen. The jar in the fridge only had crystals on the surface of the water and on the bottom of the jar. The jar at room temperature had crystals on the surface, the bottom, and on the string.

Conclusions/Discussion
The optimum temperature for growing sugar crystals is room temperature. The water evaporates best from the sugar solution at room temperature.

Summary Statement
My project is about how different temperatures affect the growth of sugar crystals

Help Received
My mother helped boil the sugar solution and pour the hot liquid into the jars

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Ben J. Kaiser

Project Number
J0508

Project Title
Equilibrium and Le Chatelier's Principle

Abstract

Objectives/Goals
The purpose of this experiment is to demonstrate Le Chatelier's Principle through various equilibrium equations dealing with concentration and temperature.

Methods/Materials
The first three sub-experiments test the effects on concentration on a system in equilibrium through the use of HCL and other stresses. The final sub-experiment deals wigh concentration and temperature on complex cobalt ions.

Conclusions/Discussion
Varified Le Chatelier's principles.

Summary Statement
If a system in equilibrium is disturbed by a stress, it will shift in order to counterbalace the system again.

Help Received
Worked at Ribet Academy's Chemistry Lab

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Thomas M. Kwak

Project Number
J0509

Project Title
Sunlight's Degradative Effects on Chlorine in Water

Abstract

Objectives/Goals
My goal was to find if sunlight played a role in the loss of parts per million in the chlorine sample.

Methods/Materials
I had to label three flasks and three pipettes. After taking samples from each bottle I put them into the flasks and added potassium iodide and acetic acid to create the color. After titrating each flask, I found the amount of ppm (parts per million) inside each sample, and kept titrating each sample every thirty minutes.

To keep it short, I used chlorine mixed with distilled water, a twenty-five milliliter burette, burette clamp, burette stand, thermometer, funnel, potassium iodide, acetic acid, sodium thiosulfate, and starch. Also I used a teaspoon, a clock, a notebook, a calculator, a pen, a cup, two droppers, a bulb, one roll of aluminumn foil, four two-liter bottles, three erlenmeyer flasks, three ten millimeter pipettes, a refridgerator, string, a table, and tape.

Results
Bottle A, which was fully exposed, had lost the most parts per million during my experiment. Bottle B, which was foiled next to Bottle A, had lost barely any parts per million during the experiment. Bottle C, the bottle in the refridgerator, lost the least amount during the whole experiment.

Conclusions/Discussion
The sunlight does effect the chlorine's parts per million when the chlorine is fully exposed to the sunlight for a period of time.

Summary Statement
My project is showing if sunlight will effect the parts per million of chlorine when it is exposed to the sun.

Help Received
Dad supervised.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Kristi A. Littleton

Project Number
J0510

Project Title
Elastic Plastic

Abstract

Objectives/Goals
My science fair project, titled Elastic Plastic, tests the strength of plastics made from a mixture of milk and an acid. The goal of my project was to find out which acid will produce the strongest plastic and why.

Methods/Materials
I used three different types of acid to make the plastic: lemon juice, orange juice, and vinegar. I made the plastic and then I formed the plastic into small spheres. I took these spheres after cooling them for a certain amount of time and I placed them on a scale. I used a butter knife to apply a force perpendicular to the plastic. I calculated how much force it took to break the plastic by recording the amount of mass as read from the scale when the plastic broke.

Results
After testing this I discovered that the plastic made using lemon juice was the strongest followed by vinegar, and then orange juice.

Conclusions/Discussion
Conclusion:
My hypothesis was that the Lemon Juice would produce the strongest plastic because it has a lower pH than the other two acidic liquids and it could therefore produce a stronger chemical reaction. My hypothesis was supported because the plastic created using lemon juice required more pressure to break than the other two plastics.

Discussion:
These are interesting results because they show that acids with a higher pH (lemon juice) make stronger plastics. This is most likely true since there is a higher concentration of hydrogen ions in lemon juice than the other acids, so it is able to form more chemical bonds. Since the lemon juice plastic has more bonds, its molecules can form polymers of more complex patterns, which fortify the substance. This information could be used in the real world when manufacturers are constructing plastics. Using this information they could vary the strength and durability of their products depending on what materials they use to make their products.

Summary Statement
The strength of plastics made from a mixture of milk and different acids.

Help Received
Father suggested using a scale to measure pressure; Mother helped cut and paste papers onto the display board.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Donald H. Livingston

Project Number
J0511

Project Title
Are Nails the Culprit?

Abstract

Objectives/Goals
This project is a two-part sequel to last year#s project, which showed that copper levels in my mountain house water were unsafe. The first part#s purpose is to see if the utility had kept their promise to lower copper levels. The second part is to see if nails discovered pounded into the copper pipes are why the copper levels always peaked after running water for 60 seconds.

Methods/Materials
Part One: Measure pH and copper levels in water samples taken every 20 seconds for 5 minutes. Repeat the next month. Take peak copper level water samples (60 seconds) on following visits to measure acidity and copper levels until utility fixes problem.
Part Two: Test how nails affect copper corrosion by putting different types of nails into copper pipe segments with water from the mountain house. Take daily pH and copper level samples for 7 days. Also do calculations to see if nails are one minute away from faucet.

Results
Part One: Peak copper levels declined from 3 ppm in August to less than 0.5 ppm in October after the utility district began treating the water.
Part Two: The bronze nail increased the corrosion, but the aluminum, electroplated, steel, hot dipped, and house nail all decreased the copper levels inside the tubes

Conclusions/Discussion
Part One: The utility finally kept its promise and reduced copper levels.
Part Two: The discovered steel nails were not the copper corrosion culprits, but they did distort the copper tests with iron oxide. Only bronze nails increased copper corrosion.

Summary Statement
This project is about understanding what causes elevated copper levels in household tap water.

Help Received
My science teacher suggested I test several types of nails. My mother helped me figure out how to organize the project report and board. My dad helped solve technical problems that arose in creating my graphs. My brother taught me how to make the water flow calculations.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Alfredo Lorenzo, Jr.

Project Number
J0512

Project Title
Which Do Crystals Prefer? Hot or Cold?

Abstract

Objectives/Goals
The purpose of my project is to discover in what temperature a crystal grows best. I wanted to learn how different temperatures affect crystalization. I believed that a crystal would grow best in the heat.

Methods/Materials
I began by gathering all my materials: three containers, one bag of crystal growing powder, water and googles. I added a rock to the center of each container. I placed some of the powder in each container but saved some as "seeds". I boiled water and then poured some into each container and stirred until the powder completely dissolved. Then I added an equal amount of "seeds" on and around the rocks. Each container had its own thermometer and was placed in its designated area; near a chimney, in a refrigerator and on the kitchen counter.

Results
In three monts of observing the crystals, I noticed that the crystal in the heat had no moisture and had stopped growing. Little crystals on the edge of the container started chipping. In comparison the crystal in the cold grew more slowly but continued to grow unlike the crystal grown in the heat.

Conclusions/Discussion
This leads me to believe that the heat made the crystalization accelerate but consumed all the moisture so the crystal stopped growing. It kept on growing in the cold because the cold temperature preserved the moisture in the atmosphere surrounding the crystal container. My results show I was only partially correct.

Summary Statement
What are the affects of temperature on crystals?

Help Received
Mother helped paste papers, take pictures, and handle the boiling water.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Roejandel L. Martin

Project Number
J0513

Project Title
Smoke Buster

Abstract

Objectives/Goals
My goal was to determine if vinegar (acetic acid) can eliminate smoke.

Methods/Materials
I used a neutralization reaction of ash by the addition of vinegar. This neutralization of smoke was accomplished by spraying vinegar into an improvised smoke chamber.

Results
Chemical and physical changes were observed in the neutralization of ash by the addition of vinegar. Smoke disappeared after 2 minutes of spraying small quantities into the smoke chamber.

Conclusions/Discussion
Vinegar (acetic acid) can eliminate smoke through an acid-base reaction.

Summary Statement
This project tests vinegar (acetic acid) in an acid -base reaction to eliminate smoke.

Help Received
father helped construct chamber.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Shamik Mascharak

Project Number
J0514

Project Title
Antioxidants in Tea: A Green Defense?

Abstract

Objectives/Goals
To determine (a)if tea (green and black) contains the polyphenol type of antioxidants, namely, epicatechin, epigallocatechin, epicatechin gallate, and epigallocatechin gallate, (b)which method of brewing (cold brew and hot brew) will yield the most antioxidants, and (c)if green tea extracts and capsules are good sources of these polyphenols.

Methods/Materials
Two techniques of analytical chemistry namely, High Pressure Liquid Chromatography (HPLC) and Mass Spectrometry have been utilized to identify the four polyphenols in tea. A batch of 2 g of tea was brewed in 100 mL of water either at room temperature (cold brew,4 h) or at boiling temperature (hot brew,5 min). The tea was then filtered and 20 microL of it was injected into a C18 Alltima Rocket column (Spectra Physics HPLC instrument, isocratic elution with 87:13 acetonitrile:water; 285 nm detection). The peaks of the chromatogram were identified by matching their retention times with those of authentic samples. The identity of the compound associated with each peak was also checked by running its mass spectrum and identifying its molecular weight (Waters Micromass instrument). The relative amounts of the four polyphenols in hot tea brewed for different periods of time were also measured. Diluted samples of the green tea extracts and capsules as well as Sobe green tea were also analyzed.

Results
My results showed that (a)both green and black tea contain significant amounts of all the four polyphenols, (b)hot brewing yields more polyphenols (and caffeine)with time but causes considerably more decomposition of the polyphenols, (c)cold brewing, although a slow process, provides more intact polyphenols, (d)green tea extracts and capsules are both excellent sources of these polyphenols, and (e)Sobe tea contains very little amounts of the polyphenols.

Conclusions/Discussion
The conclusions of my project are (a)tea is a good source of the polyphenol class of antioxidants, (b)a quick hot brew (or steeping) of tea leaves is the best way to leach significant amounts of the polyphenols in tea without much caffeine, and (c)tea extracts are excellent sources of polyphenols. Reactive Oxygen Species (ROS) such as superoxide, peroxide and hydroxyl radicals cause serious damage to cellular components (DNA,membrane lipids and proteins)in aerobes. Since antioxidants destroy ROS, it is evident that tea is indeed a Green Defense.

Summary Statement
Using HPLC and mass spectrometry, I determined the presence of four polyphenol type of antioxidants in green and black tea.

Help Received
I performed the experiments at the laboratory of Prof. Glenn Millhauser (of UCSC) under the supervision of Mira Patel, a graduate student. Mr. Rod Atchley, my science teacher corrected my research report. My father, Pradip Mascharak, helped me in procuring the materials.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Quenten A. Millhauser

Project Number
J0515

Project Title
The Effects of Monochromatic Radiation on the Decomposition Rate of H(2)O(2)

Abstract

Objectives/Goals
The objective of this project is to find out an effective method to decrease the amount of environmental pollution that happens from improper use of hydrogen peroxide.

Methods/Materials
The whole procedure took place in a dark room in order to get the best results from the experiment. The colors used in this experiment were red, yellow, green, blue and purple. According to the measurments, the average numbers for every color calculated and converted to graphs to see the effects of light spectrums to the decomposition of hydrogen peroxide.

Results
Red light decomposed hydrogen peroxide more than the other colors. The least effective light spectrum on decomposition was violet.

Conclusions/Discussion
Our research showed us that the decomposition rate of H2O2 is inversely propotional to the light wavelength

Summary Statement
It was about watching H2O2 decompose with different colored lights of the light spectrum.

Help Received
My teacher helped me with project, he was my sponsor and helped me with it. He went over the grammar of my research paper. My principal and teacher went over the scientific part of my research paper. My teacher's friend checked the computer part of my research paper. Last my teacher's wife supported me.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Dylan E. Moore

Project Number
J0516

Project Title
How Does the pH Level of a Fruit Affect Its Electric Current When It Is Made into a Voltaic Cell?

Abstract

Objectives/Goals
When a copper wire and a zinc nail are inserted into a fruit, electric current can be measured with a voltammeter flowing between the metals. The goal of my experiment was to determine if the pH level of a fruit affects the amount of electric current that fruit produces in this arrangment. My hypothesis was that the more acidic the pH of the fruit the more electric current it would produce.

Methods/Materials
To do my experiment I used various fruits including a pumpkin, persimmon, apple, bannana, orange, lemon and potato. I used distilled water as a control because it has a neutral pH. I created a voltaic cell by inserting a zinc nail and a copper wire into each fruit, one at a time and measured the electric current by compleating the circuit with a voltammeter. Because there was a surge of current at the beginning I also recorded the surge level. After measuring the current, I took out the metal and washed it, then I cut the fruit and then measured the pH level with litmus paper. Because I couldn't get a wide enough range from aquarium litmus paper, I used red cabbage to make litmus paper that could read a wider range of pH level. I repeated the experiment three times.

Results
I found that more acidic fruit, such as lemon, did produce more current than fruit with a near neutral pH. Distilled water produced no current. I also found pumpkin with a pH around ten produced a current similar to the more acidic fruits.

Conclusions/Discussion
Research on the voltaic cell showed that two reactions, oxidation and reduction are happening at the same time when the two metals are in the fruit juice, this is called redox for short. Because of the nature of the metals the zinc recives excess electrons and the copper loses electrons. This makes a potental difference between the two and the electrons flow from high concentration to low concentration causing a reading in the voltammeter. Low pH and high pH both caused more current because the farther from pH 7, which is neutral, the juice is the more reactive it is with metals.
There were other factors such as salt that could not be measured in this experiment but affected the results.

Summary Statement
My project compared the pH of different fruits and the current they produced when made into voltaic cells to see if the pH level affected the amount of electric current.

Help Received
My parents helped me cut and cook the cabbage, my teacher told me I could make litmus paper with red cabbage and my parents supervised the experiment.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Brooke J. Rothschild-Mancinelli

Project Number
J0517

Project Title
The Effect of Salt on the Boiling Temperature of Water at Different Altitudes

Abstract

Objectives/Goals
My objective is to determine if at higher elevations the difference between the temperature of the boiling point of distilled water and salt water changes.

Methods/Materials
My results showed that as the elevation increased, the difference between the boiling point of the salt water and the plain water became greater.I went to different altitudes and boiled different molarities of salt water. I knew that at an increase in altitude, the boiling temperature went down. I went to four different elevations: 10, 687, 2,396, and 4,294 meters. At each of these elevations, I boiled a 0, 1, 2 and 4 molar solution of sodium chloride and measured the boiling point temperature with two kinds of thermometers. At each altitude, I repeated this experiment three times so I could replicate the data. In my results I saw that, as I hypothesized, with an increase in altitude the boiling point temperature increases.

Results
My results showed that as the elevation increased, the difference between the boiling point of the salt water and the plain water became greater.

Conclusions/Discussion
I conclude that the difference between the boiling point temperature of salt and plain water increases with altitude. These results have implications for where we might search for life in brine pockets beneath the surface of Mars, where water exists below its triple point on the surface of the planet.

Summary Statement
Seeing if when salt water and distilled water is boiled at different altitudes would the difference in the temperatures change.

Help Received
My dad helped me conduct the experiments by holding the ciggarette lighters and the beakers and arranged for my airfare. My mom helped me format the graphs.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Cassandra L. Saldivar

Project Number
J0518

Project Title
Sweet 'n Sour Soda Power

Abstract

Objectives/Goals
The purpose of this experiment is to see which of several substances has the most acidity by measuring CO(2) production when mixed with baking soda. My hypothesis is that vinegar will be the most acidic.

Methods/Materials
Materials: 1 qt. water, 2 oz. white vinegar (only 5 mL. will be used in each test; diluted in 1 part vinegar and 3 parts distilled water 1:4 dilution); 2 oz. each Pepsi and Bottled lemon juice (diluted same as vinegar); Orange juice 2 oz. (undiluted; when experiment is done, divide results by 4); Saturated solution baking soda and distilled water; 2 10 mL capacity test tubes; 1 25 mL capacity test tube; Plastic tubing and valve; Reaction chamber (jar with L-shaped brace attached via screw to lid); Rubber band; *apple juice, tomato juice, and coffee were also tested but produced no CO(2) reaction

Methods:I constructed a device that measures acidity of substances efficiently and accurately by making a gas trap. To do this, a test tube was inverted in a bowl of water, ensuring no gas bubbles got inside. Substances were poured into the two 10ml test tubes; these were attached to the L-shaped brace on the jar lid with the rubber band. The lid was screwed on and the tubing was fed into the gas trap, then the jar was inverted. The baking soda and acid were mixed in a sealed environment. The CO(2) produced caused displacement of the water in the test tube, allowing volume of gas to be measured. The more acidic a substance, the more CO(2) produced; therefore a bigger water displacement occurred.

Results
In this experiment, vinegar reacted most strongly out of all the acids tested. After this came Lemon Juice, Pepsi, and Orange Juice, in that order (as mentioned before coffee, tomato juice, and apple juice produced no reaction). The averages (measured in CO(2) produced) are listed:
Orange Juice: 2.821; Pepsi: 6.225; Lemon juice: 19.65; Vinegar: 24.35

Conclusions/Discussion
In conclusion, my hypothesis that vinegar is the most acidic is correct. The results were questioned because on certain information sources (internet) it states that Lemon Juice is more acidic than white vinegar, therefore questioning my method. To clarify this issue, the pH of the acids were tested in my dad's laboratory using a pH meter. The pH results correspond to the measurements of this project, so my method is correct.
Here are the pH measurements: Vinegar 2.52; Lemon Juice 2.62; Orange Juice 3.94

Summary Statement
The new method developed in this project shows that the acidity of a liquid can be determined by the amount of CO(2) produced in a baking soda-acid reaction.

Help Received
Dad helped build reaction chamber and test pH, Mom helped preparing backboard.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Alisa Smith

Project Number
J0519

Project Title
Temperature and a PEM Fuel Cell Model Car

Abstract

Objectives/Goals
I wanted to see if temperature effected how fast a fuel cell model car would run.

Methods/Materials
I used heaters and opened windows to make my garage the appropriate temperature. Once the temperature was right, I used a solar panel and a light to make hydrogen for my fuel cell. I then set my car up on a 3 meter track and recorded its speed for each trial.

Results
My car was clearly slowest in the coldest temperature, but in the medium and hottest temperatures the car's average speed was so close that it is impossible to tell which one really was going faster.

Conclusions/Discussion
My hypothesis was correct in the sense that my car was slowest in the coldest temperature, but I can't be entirely sure about the other two temperatures. In other words, the average speed for the medium and hot temperatures were so incredibly close that I am not able to tell which one would really go faster in the future. In the medium temperature, the speed stayed pretty steady but in the hottest, the speeds were really jumpy! The fastest speed for the hot was faster than the fastest speed for the medium, but the hot temperature's slowest speed was also slower than the medium's! My hypothesis was partly correct, but it was also partly unanswered.

Summary Statement
My project tests how temperature effects a Proton Electron Membrane fuel cell model car's speed.

Help Received
My grandpa set the model car on the track for me so I could actually time the car, my dad taught me how to make graphs on the computer, and my mom helped me arrange my project on the board.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Avery L. Smith

Project Number
J0520

Project Title
SuperGlue Girl Part Deux! Will Adding a Substance during Cyanoacrylate Fuming Create a "One Step" Fuming Process?

Abstract

Objectives/Goals
The objective is to determine if adding a substance during the cyanoacrylate fuming process will make a latent print appear in color. Latent print labs now fume latent prints using the cyanoacrylate fuming process and apply color to the latent print after fuming for preservation and identification. My goal is to eliminate the step of adding color to a latent print after fuming by adding a substance during the process of fuming creating a "One Step" fuming process. I believe it would be a value to the forensic latent print field.

Methods/Materials
The experiments involved cyanoacrylate (superglue) fuming acrylic key chains that had been prepared with a latent thumb print from the same subject. Nine different substance test groups were set up and tested (Sodium Silicate, Barium Carbonate, DMSO, Invisible Ink, Phenolpthalein, Iodine, Barium Sulfate, Cobalt Carbonate Hydrate, and Pink Highlighter Fluid). Each key chain was fumed with the assigned test substance added to the superglue during the cyanoacrylate latent print fuming process. The key chains then were examined for fingerprint points (dots , hooks, ridge endings, islands, and bifurcations), visible clarity, black light clarity and overall sample quality under a black light with magnifying glass in a black box and with a magnifying glass alone. A sample latent print key chain was fumed using the regular cyanoacrylate fuming process to compare to also. All results were charted on observation sheets and on a spreadsheet for a graph. The sample quality score for the three tests in each group were then averaged for an overall sample quality score.

Results
The tests proved my hypothesis false. Cobalt Carbonate Hydrate did enhance the visibility of the latent print the most, but none of the prints appeared in color, therefore I have not created a "One Step" fuming process. Pink Highlighter, which I tested last year, was a very close second.

Conclusions/Discussion
My conclusion is that adding Cobalt Carbonate Hydrate did not create a "One Step" fuming process. I am still determined to find a substance that will make a latent print show up in color during Cyanoacrylate Fuming. I believe with further research on substances and testing, a "One Step" Cyanoacrylate Fuming process will be possible. I am very interested in forensic science and hope to work with a latent print lab on my next science fair project.

Summary Statement
My project is an attempt at creating a "One Step" Cyanoacrylate Fuming process by adding a substance during fuming to make the latent print appear in color, therefore eliminating the process of adding color to a latent print after fuming.

Help Received
Jeremy & Cari Smith (parents) for for watching me fume and providing supplies. My grandparents (all of you) for helping with supplies and equipment. Lloyd Thomas, Seattle Latent Prints for your interest and interview. Craig Cooper ,Pasadena Police for interviews. Ann Punter, Cognet for interview.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Jake D. Snyder

Project Number
J0521

Project Title
Toxic Treats: The Pollution Within

Abstract

Objectives/Goals
The purpose of this experiment was to determine if a notable amount of lead could be detected in candy samples and wrappers. The reason I am seeking the presence of lead dust on wrappers or lead compounds in the candies is an attempt to see how high levels of lead are in candies purchased in local stores. I wanted to compare the acceptable lead level limits and the testing results to determine if there were correlations from certain ingredients to lead levels.

Methods/Materials
This was done by using the patented Lead Inspector lead test kit to first swab the candy wrapper and recording the results onto a graph. The next step was to place each candy into a muffin tin and soak them individually for four hours with whiter vinegar to allow for the lead to leach into the mixture, making it available to test. The process of dipping and testing was repeated 14 hours later to allow for further leaching to occur.

Results
My hypothesis was confirmed by the results of my experiment. Twenty-eight of the forty-one candies tested positive for lead poisoning. The lead levels varied from one sample to the next, with some testing as low as two parts-per million, and some testing as high as fifty parts-per-million.
I also discovered that candies created with ingredients such as chili or tamarind sauce repeatedly tested with a positive lead presence. From the twenty-eight candies that tested positive for lead, fourteen had chili as a chief ingredient.

Conclusions/Discussion
My science fair experiment has proven that lead poisoning in the candy and wrappers I tested are fairly common, and these candies should be avoided. Twenty-eight candies tested positive for some level of lead, and out of the twenty-eight lead-positive candies, fourteen, or 68% of the twenty-eight of the candies were chili based. All of the candies that tested positive exceeded the FDA's toxcity minimum of 0.5 lead parts per million. Information from this project indicates that consumers of these candies are ingesting toxic levels that could lead to physical or cognitive debilitation.

Summary Statement
Multiple lead tests of store-bought candies were conducted to determine the presence of lead levels on both the packaging and in the candy.

Help Received
Mother purchased lead testing kit.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Joel A. Trushinski

Project Number
J0522

Project Title
I'm Melting

Abstract

Objectives/Goals
The main purpose of this experiment #I#m Melting# is to find a substance that would melt ice just as fast as salt, yet at the same time not harm any vegetation or concrete. Salt, which is commonly used to melt ice at a fast rate, is effective but harms vegetation and concrete. If a substance is found through this experiment that is more effective and safer than salt, then people could save money on concrete repair and replacing dead plants.

Methods/Materials
The experiment was performed over a 2 ½ hour period. First, 8 blocks of ice were put on separate blocks of concrete with a rose laid next to each (roses are very sensitive to change). The substances were put onto the blocks of ice and observations were taken every 15 minutes or so. The independent variable of this experiment was the different substances that were put onto each of the ice blocks. These substances were Epson salt, citric acid, magnesium chloride, calcium chloride acetate, aluminum chloride, and sodium sulfate. The observations were taken over time (dependant variable).

Results
Through testing of the different substances it was learned that salt is an exceptional substance to use on ice because it melts ice straight through to the bottom of the block. However salt only melts ice where it is applied directly. This means that much more salt is needed and the more salt that is added to the ice the more devastating the results to the concrete and vegetation. Another important discovery was that calcium chloride acetate was fast at melting the ice block, but the rose next to it turned black on the tips and began splitting apart. Also, the concrete the ice was sitting on had erosion on the surface and a white slippery residue was left behind after the ice had melted.Some substances like flour that are powdery will increase the speed of melting however they only are thermal conductors and they don#t dissolve with the ice to lower the freezing point.

Conclusions/Discussion
The experiment was limited to small ice blocks with only a volume of 13½ inches cubed and only 2.5 ml of each substance was used. If this experiment were to be continued in the future, the next step that could be taken would be to perform this experiment on a larger scale using much more of each substance and a much larger surface area of ice. Also, more substances should be added, increasing the information gained.

Summary Statement
This project is about finding a substance that melts ice quickly and is still safe for vegetation and concrete, unlike salt.

Help Received
Father supervised while I applied substances; Also Father helped take notes while I did experiment.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Ryan G. Yoo

Project Number
J0523

Project Title
Fruit Batteries: Do They Work?

Abstract

Objectives/Goals
A fruit battery works because some fruits contain citric acid. This acid participates in chemical reactions that make electrons flow, thus creating electricity. However, these fruit batteries have very little voltage, probably less than one volt. Most fruits have very little electrical current (amperage).

Methods/Materials
1. Gather the materials including: fruits (mango, grapefruit, lime, kiwi, lemon, granny smith apple, nectarine, persimmon, pineapple, tangerine, banana, and grape), the volt/ amp meter, 15 strips of copper, 15 strips of aluminum, pH paper.
2. Test the voltage of each fruit and record data using the multimeter.
3. Compare the data and determine the fruit with most wattage.
4. Measure the acidity of each fruit.
5. Check if there is a correlation.

Results
Fruits do not make very good batteries because they generate very low power. They are not an appropriate alternative to AA Batteries. For example, 603,000 mangos, would be needed to light a 60W light bulb for approximately 4 days, this would easily fill a house. It would take about 30,000 mangos to light a Game Boy Color, enough to fill a small bedroom.

Conclusions/Discussion
The experiment showed us that fruit batteries will never really be useful. The hypothesis was wrong because there really is no correlation between the pH of a fruit and the wattage it produces. The significance of the results is that pH really doesn#t matter for determining the energy produced.

Summary Statement
My project investigates fruits with more acidity will have more voltage and amperage.

Help Received
Mother bought materials

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Rachele M. Lazo

Project Number
J0598

Project Title
How Does the Number of Marshmallows Burned under a Container of Water Affect the Change in the Water's Temperature?

Abstract

Objectives/Goals
My project was to determine the effect of the number of marshmallows being burned under under a container of water to the change in the water's temperature.

Methods/Materials
Different numbers of marshmallows were burned. One, two, and three marshamallows were tested. Each number of marshmallows was tested five times. The change in temperature for the water was measured in degrees Celsius using a thermometer.

Results
In this experiment, as the number of marshamllows burned under a container of water increased, the change in the water's temperature increased.When the number of marshamallows was increased from one to two to three, the change in the water's temperature increased from 3.6 to 6.6 to 9.4 degrees Celsius.

Conclusions/Discussion
My conclusion is that the more marshamllows being burned under a container of water, the greater change in the water's temperature. This is due to a reaction. The more marshamllows being burned under a container of water means there are more calories being burned. The more calories in the marshmallows means there are more chemical energy. When the marshamllow is burned, its chemical energy is converted ito heat energy. This heat is what is used to raise the temperature of the water. The more heat that is produced leads to a greater temperature change.

Summary Statement
This project investigates the relationship between the number of marshmallows burned under a container of water and the change in the water's temperature.

Help Received
Teacher loaned some materials; Parents took pictures while doing project; Teacher looked over drafts of report.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Tavit Marokosian

Project Number
J0599

Project Title
Polarimetry and Hydrolysis of Sucrose

Abstract

Objectives/Goals
My Project is to measure and compare the rate of Hydrolysis of Sucrose catalyzed by Hydrochloric Acid (HCl) and Invertase Enzyme using a Polarimetric Technique.

Methods/Materials
T Shaped tube was uncapped, the ends of the tube were fitted with two circular glasses and glued to create the sample tube, Then the caps themselves were fitted with the circular polarizers,and screwed back to the tube. Styrofoam Protractor was glued to the front cap. Four metal clamps were used to mount the polarimeter and the laser light. The two Polarimters were identical except for the T tube, linear polarizers, flashlight, and two circular Styrofoam mounted with a protractor, fitted within each other.
Experiment (A) hydrolysis of Sucrose by HCl, 20 g of sucrose and 35-ml of water was mixed and the optical rotation was measured, 10-ml of HCI was poured in the sample tube, and the optical rotation was measured for the next sixty minutes, every five minutes for the Polarimeter with Circular Polarizer and Laser Light and every 2 minutes for 26 minutes for the Polarimeter with Linear Polarizer and Yellow Light. The experiment was repeated two more times with each polarimeter.
Experiment (B) Hydrolysis of Sucrose by Invertase Enzyme, 20 g of sucrose and 50 ml of water was mixed and pored in the sample tube of the polarimeter. 8.75 g of active dry yeast was placed in 1 liter 0.1M of Baking Soda and incubated to 40°C for 24 hours. Next, the yeast solution was centrifuged for about five minutes, 1ml of the supernatant was collected and diluted 1/10 dilution and poured in sample tube of the polarimeter. Then the optical rotation was measured for the next sixty minutes, every five minutes (Both Polarimeters). The experiment was repeated two more times with each polarimeter.

Results
The Hydrolysis of Sucrose catalyzed by HCl was much faster than Hydrolysis of Sucrose catalyzed by the Invertase Enzyme. The end time for HCl where Sucrose was completely hydrolyzed into Glucose and Fructose was approximately 24-30 minutes, for the enzyme the end time was much 18 hours.

Conclusions/Discussion
My results agreed with my Hypothesis and showed that the Hydrolysis of Sucrose by HCl was much faster than Invertase Enzyme. There was not a measurable difference between the circular and linear polarizers, but the wavelength of the laser pointer (550) being longer than the yellow light (498) caused a delay in the reaction rate for both experiments.

Summary Statement
My Project is to see whether Hydrochloric Acid or Invertase Enzyme will Hydrolyze Sucrose, using a Polarimeter.

Help Received
Father helped understand concepts and drove me to stores.