



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Avigael M. Aizenman	Project Number J0501
Project Title Investigating Mass Reduction in Pennies: Pennies and Acids	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was seeing how different Acids affect a pennies mass; this was done in order to verify the impact of acid rain.</p> <p>Methods/Materials Pennies were put in water (control) and three different acidic liquids for five weeks. Their mass was weighed weekly.</p> <p>Results The pennies in the water, lemon juice and vinegar did not have any significant changes. The pennies in the hydrochloric acid lost eighty three percent mass within five weeks!</p> <p>Conclusions/Discussion Hydrochloric acid has dramatic damaging effects on matter, dissolving more than three quarters of a pennies mass in about a month. In contrast, liquids like water, lemon juice and vinegar have very little effect. This study proves that much more attention should be devoted to reducing acid rain.</p>	
Summary Statement My project was seeing how different acids affect a pennies mass; this was done in order to verify the impact of acid rain.	
Help Received Mrs.Kilkenny helped/supervised my project; my dad taught me how to use Excel; I used lab Equipment from Mission Hill Middle School borrowed from Sherri Kilkenny; My board was looked over by Nancy Sheriden, the Women coordinating the Santa Cruz Science Fair.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Tess E. Armstrong	Project Number J0502
Project Title Succor or Sucker?	
Abstract Objectives/Goals This experiment was to determine if over-the-counter antacids were actually basic! The medicines chosen were name brand (no generics), original-strength products that listed relief of heartburn/acid indigestion as their first indication for use. Methods/Materials The five products tested were: Roloids, Pepto-Bismol, Mylanta, Maalox, and Tums. All products were tested using both a digital pH meter and pH test paper. Care was taken to assure both equal volume and therapeutic dose. The tablets were broken-up, dissolved in water, stirred, and filtered. The liquids were shaken well and filtered. The resulting filtrate was pH tested. Results The pH testing showed following: Roloids: 8.58, Pepto-Bismol: 4.55, Mylanta: 7.96, Maalox: 7.82, Tums: 7.95 Conclusions/Discussion The active ingredients were reviewed to determine the difference in acidity between Pepto-Bismol and the others. The active ingredient in Pepto-Bismol is bismuth subsalicylate which, like salicylic acid, lowers the pH. I concluded that not all over-the-counter antacids are basic. This indicates that symptoms of heartburn/acid indigestion can be relieved by a product that is an acid. I have done research to understand how and why these products work as well as the actions and effectiveness of other pharmaceutical treatment options for heartburn. Come by and see what I discovered!	
Summary Statement To determine if there is a connection between the pH of over-the-counter antacids and their effectiveness in treating heartburn.	
Help Received Mother taught me how to use pH meter.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Linley Barba	Project Number J0503
Project Title Immensity of the Density: Does the Type of Fat Used in Soap-Making Affect the Density of the Finished Product?	
Abstract Objectives/Goals My objective was to learn to make soap using different types of fats; I assumed that the solidity of the type of fat used would determine the density of the finished soap. Methods/Materials I made 2 batches each of soap using 6 types of fat, and identical materials (stove, saucepan, stir sticks, scale, graduated beaker, salt solution, lye solution, water, strainer). After allowing all the soaps to dry for the same amount of time, I did 3 trials on each cake of soap to test for density, using water displacement to calculate the irregular soaps' volume, and a digital scale to find their mass. I calculated density ($D=M \div V$) for each and charted my results. Results The soaps all came out looking, smelling, feeling, and lathering similarly. I had assumed such different seeming fats would yield very different soaps. After all the tests were completed, the Crisco soap proved to be densest by a small margin, and the almond oil soap the least dense. Conclusions/Discussion I concluded that maybe saturation or hydrogenation were also important factors in soap's density, not just the observable solidity of the fat, and that perhaps something about saponification chemically evened out the apparent differences in the lipids used.	
Summary Statement This project aimed to find out if the density of soap is affected by the type of fat used to make it.	
Help Received Grandfather helped calculate density; mother proofread, supervised use of stove in soap-making, shared ideas about display.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Flora E. Barbash	Project Number J0504
Project Title Harmful Mineral Deposits of India?	
Objectives/Goals The objective is to determine weather the colorful, imported slate we have from India which has an oily metallic residue, will have any harmful or negative effects on our freshwater pond.	
Abstract Methods/Materials Different colored mineral specimens from the slate, in equal amounts were first pulverized, then combined into individual beakers filled with pond water (the experiment), distilled water (used as a control factor) and ocean water (for curiosity), then tests were performed to measurer Ph, Alkalinity, Hardness, Nitrite and Nitrate. In addition, 15 other mineral identification tests were undertaken, including the flame, bead and hydrochloric acid tests. While doing these tests, I researched minerals and had four interviews with professional geologists and a fisheries biologist..	
Results There were no negative chemical reactions exhibited throughout the water-testing period. Instead, the chemical levels varied to points of harmful qualities going up, then to harmful qualities going down, allowing the water to be neutral for most of the experiment/process. The other tests, except for the bead test proving there is iron present, were inconclusive as to what the minerals might be.	
Conclusions/Discussion India is 11,000 miles away, making it difficult for local geologists to guess/identify what the exact components are in the slate without knowing the specific location of its origin. My thorough research has shown that the area is rich in petroleum (oil, coal) and metals (including lead, zinc, copper and iron) confirming my previous observations as to what the substances in the slate might be. I learned that since some minerals are toxic chemicals, there is a strong possibility these could be poisonous to our pond life. Without further extensive equipment and research about minerals, it is difficult to determine what specific substances are in the slate.	
Summary Statement In my project, I researched minerals and performed 17 tests on the main color deposits throughout the slatr imported from India, to determine if it could harm our pond.	
Help Received Mr LaBolle helped with testing in lab, mother helped organize backboard and drove me to library to do research, father helped with computer.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Patricia Bender; Paul W. Howard Mullan	Project Number J0505
Project Title Acidity in Sodas	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of our experiment was to see if there is a relationship between acidity in sodas and carbohydrates. Our next question was to see if caffeine influenced pH.</p> <p>Methods/Materials Materials: 2 or more cans/bottles of 27 discrete types of soda 0-14 litmus paper 50 ml beakers We recorded the number of grams of carbohydrates and sugars listed on each container of soda. We used a 40 ml sample of each soda immediately after opening. We submerged litmus paper in the sample for 10 seconds and then matched it to a chart to determine the pH. Duplicate sodas were purchased after 30 days and the process repeated to verify the data.</p> <p>Results The pH of the sodas and water we tested ranged from 2 to 7. There was not a relationship between carbohydrates and pH or caffeine and pH.</p> <p>Conclusions/Discussion We learned a great deal about pH, citric acid, phosphoric acid, carbonic acid, caffeine and sugars creating carbohydrates as we tried to understand the soda's ingredients and tested component ingredients' pH. Variables other than carbohydrates such as grapefruit flavors and citric acid seemed to lower the pH but multiple brands would need to be tested to verify this. Our hypothesis that sodas with more carbohydrates would be more acidic was wrong. Caffeine did not seem to affect pH. Patricia thought diet sodas would be less acidic, but the ones we tested all had a pH of 3 or 4 which was in the middle of the range. Paul's initial hypothesis about root beers being slightly basic was wrong although he was right that they are less acidic than other sodas. We concluded that carbohydrates were not a significant factor in determining the pH of sodas. We learned that carbonic acid is formed in solution when sodas are infused with carbon dioxide. Carbonic acid (H₂CO₃) is a weak colorless acid formed by the solution of carbon dioxide and water. Our conclusion is that sodas are acidic because CO₂ is added. A possible source of error in our project revolved around the litmus paper. We tried several brands and found one to be more reliable than another, so we had to redo trials that had been completed with substandard litmus. If we were to redo this project, we would use a pH meter for more precise measurements.</p>	
Summary Statement Our project was to determine if the amount of carbohydrates in various brands of soda predicted their acidity.	
Help Received Paul's dad supervised the muriatic acid extension, Paul's mom took pictures and helped type, and our teacher helped us with background research to better understand pH and carbohydrates.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Gary W. Berwick, III	Project Number J0506
Project Title Masses of Gasses: What Veggies Create and Antacids Deflate	
Objectives/Goals My project is based on the chemical reaction that is created when mixing acids (vinegar) and bases (baking soda) to create gas. After measuring the amount of gas produced by the control group, I added fresh, frozen, and canned vegetables at room temperature and then heated them to 68° C to measure which created the most gas. I then used Roloids, Tums, Gas-X, and Beano over-the-counter antacids to see which decreased the greatest amount of gas.	
Abstract I combined fresh, frozen, and canned vegetables in separate 2-liter bottles and added vinegar and baking soda to create a chemical reaction. Once the mixtures were combined, I put a latex balloon over each bottle to collect the gas that was created. From there I could measure the circumference of each balloon. Using specific formulas I calculated the volume of the balloons to measure the amount of gas created. I then repeated the steps but I heated the vegetables to 68° C to see if heating the vegetables would create a different reaction. The final steps involved repeating the procedures, but adding different antacids to see which would decrease the greatest amount of gas. The process was repeated three times for each sample.	
Methods/Materials I combined fresh, frozen, and canned vegetables in separate 2-liter bottles and added vinegar and baking soda to create a chemical reaction. Once the mixtures were combined, I put a latex balloon over each bottle to collect the gas that was created. From there I could measure the circumference of each balloon. Using specific formulas I calculated the volume of the balloons to measure the amount of gas created. I then repeated the steps but I heated the vegetables to 68° C to see if heating the vegetables would create a different reaction. The final steps involved repeating the procedures, but adding different antacids to see which would decrease the greatest amount of gas. The process was repeated three times for each sample.	
Results After more than 33 trials, the control group produced an average volume of 4845.4 cm ³ . The room temperature experiments showed that canned vegetables produced the most gas with a volume of 7415.1 cm ³ . The heated vegetables showed that fresh vegetables produced the most gas with an average volume of 6877.1 cm ³ . Once I added the antacids, the results showed that Gas-X reduced the most amount of gas with an average volume of 3476.5 cm ³ .	
Conclusions/Discussion After more than 33 trials, the control group produced an average volume of 4845.4 cm ³ . The room temperature experiments showed that canned vegetables produced the most gas with a volume of 7415.1 cm ³ . The heated vegetables showed that fresh vegetables produced the most gas with an average volume of 6877.1 cm ³ . Once I added the antacids, the results showed that Gas-X reduced the most amount of gas with an average volume of 3476.5 cm ³ .	
Summary Statement My project showed the overall analysis of mixing acids and bases with vegetables to produce gas in different temperature settings and the effectiveness of antacids in decreasing the chemical reaction of that gas.	
Help Received My mother helped me type my report.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Nikhil Bhambi	Project Number J0507
Project Title Catalase: Beware, Ions Are Sneaking Around	
Abstract Objectives/Goals My objective was to see how different ions affect the enzymatic decomposition of hydrogen peroxide. Throughout the course of my research, I had formulated a hypothesis that the addition of ions will impede the reaction of oxygen production because the ions can distort the catalase making the enzyme inactive and of no further function. Methods/Materials First dilute 3% hydrogen peroxide (0.88 molar concentration) into 0.4% hydrogen peroxide(0.11 molar concentration) by mixing 13.5 ml of 3% hydrogen peroxide into 110 ml of distilled water. Next make a stock solution of all three salts (sodium chloride, calcium chloride, aluminum chloride) at the concentration of 0.05 moles and 0.025 moles. In order to make a buffer, you put sodium phosphate and potassium in 100ml of distilled water. Then dissolve 220mg of catalase into 10ml of distilled water. Put 1ml of the catalase in a clean sample bottle and 4ml of distilled water along with 10ml of hydrogen peroxide solution (control). Seal the sample bottle with the oxygen sensor and observe and record your results. For the reactant testing (sodium chloride, aluminum chloride, calcium chloride) add the 3ml stock solutions along with the control; however add 1ml of distilled water and 3ml of the PH buffer. Results As I measured the oxygen production of the salt ions I noticed that calcium chloride's last average reading had the greatest gap of all the salts compared to the control (2.6%). However this was at 0.025 moles so I immediately realized that this gap was quite small and could be potentially increased. After I tested the salts at 0.05 moles I saw the same results as before except with sodium chloride I noticed an immediate leap in inhibition from 1.4% to 2.4%. So we can interpret from the results that calcium chloride had the greatest inhibition effect of all three salts. Conclusions/Discussion Due to the test results it appears that of the three salts, calcium chloride completely inhibited the decomposition of hydrogen peroxide. Although the other salts did inhibit the production of oxygen and water, calcium chloride had inhibited it at the highest rate. With these results I can see that these salt ions can help with the accumulation of hydrogen peroxide which can be the start of many illnesses to come.	
Summary Statement Interestingly the non-competitive nature of the salt ions had distorted the catalase enzyme so it	
Help Received Parental help in guidance of the experiment	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Daphne Chien	Project Number J0508
Project Title What's the Flow?	
Abstract Objectives/Goals The problem was, How did changing different methods of crude oil affect its viscosity outcome? It was originally hypothesized that the method of adding hot water with oil would make the viscosity of crude oil lower and be able to come out with an easier flow, rather than adding detergent, cold water, or oil by itself. This was hypothesized because hot water contains heat, and heat could have made the oil looser, and so it could flow more easily. Methods/Materials Four different methods were tested with crude oil to make it able to be pumped more easily. The oil pumped was measured with a graduated cylinder in milliliters. The experiment started by adding gravel and vegetable oil. For each method, the amount added to the oil varied. The methods of adding cold water, hot water, and detergent were tested, each for 5 trails. Data along observations were recorded. Results The results and the observations made did not support the hypothesis. The detergent mixed with oil was the method that pumped the most amount of oil recovered. Conclusions/Discussion Information gathered from this experiment expands the knowledge about the many ways in which oil's viscosity may be lowered. Since crude oil is located between thick layers of sandstone and sedimentary rock, it becomes very difficult to pump for the oil that is stuck deep down.	
Summary Statement My project is about testing different methods to lower the viscosity of crude oil.	
Help Received Mother and friends helped to look and buy the materials.	



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Daniel Dimont	Project Number J0509
Project Title Is Your Water Really Pure?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine whether or not the Brita Water Filter makes significant improvements in the pH, total hardness, total dissolved solids, free chlorine, total chlorine, and total alkalinity of tap, mineral, spring, sparkling, and distilled water.</p> <p>Methods/Materials In total, eight pH, total hardness, total dissolved solids, total chlorine, free chlorine, and total alkalinity trials were conducted on tap, mineral, spring, sparkling, and distilled water. For total chlorine, free chlorine, and total alkalinity the waters were tested using four Hach Aquacheck strips before and after the filter. For Total Dissolved Solids, a TDS meter was used four times before and after the filter. For total hardness and pH two strips(trials) were used before and after the filter. Also for total hardness and pH, two trials were done using pH indicator drops and hardness reagent and titrant drops before and after the filter. The results for total hardness and pH with the two different testing devices were combined to make an average just like the other indicators were. The five Brita Water Filter cartridges(one for each water) were all soaked in distilled water for 15 minutes before being placed into the filter. Then, 650 mL of distilled water was run through the filter three times in order to prepare it.</p> <p>Results Tap water was found to have improved the most out of all the waters after being purified through the Brita. Tap waters hardness dropped from 281.25 ppm to 50 ppm, its total dissolved solids dropped to 286 ppm from 468 ppm, and the total chlorine was a completely removed from the tap water. Although not as much as tap water, the Brita Filter did make significant improvements in the purity of all the other waters.</p> <p>Conclusions/Discussion My results only agreed with the part of my hypothesis that predicted tap water to contain the most chlorine. However they disagreed in that distilled water did not have the most neutral pH, mineral water did, mineral water did not contain the most ppm of total hardness, tap water did, and the Brita Filter actually did make significant improvements in the purity of these waters. Some of my results were inconsistent which could be as a result of contamination, or that the filter didn't not always do the same thing to the pH and total alkalinity of these waters, or both.</p>	
Summary Statement My project is about testing various waters with various purification indicators before and after being run through a Brita Water Filter and measuring the differences.	
Help Received Mother helped design board; San Diego COunty Water Authority provided testing devices; Teacher helped overall with supervision, conduction, etc.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Martin R. Ermino	Project Number J0510
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Project Title
Do Different Types and Brands of Orange Juice Contain the Same Amount of Vitamin C?

Abstract

Objectives/Goals
To compare the Vitamin C amount in the different types and brands of orange juice

Methods/Materials

1. Prepare the Vitamin C indicator(Starch-Iodine).
 - a. Add 2 grams of corn starch in 200 mL of cold distilled water.
 - b. Boil the mixture fully in a glass bowl.
 - c. Add 8 mL of the starch solution and 1 mL of Tincture of Iodine to one liter of water. The color of the starch solution must turn to blue.
2. In an empty 50 mL medicine cup, pour 15 mL of vitamin C indicator.
3. With the use of a clean medicine dropper, add one drop of orange juice sample to the starch indicator and swirl the liquids. Observe and record it.
4. Continue to do #3 until the indicator turns clear.
5. Repeat all the steps above three times for each sample.
6. Compute the average number of drops it takes to change the color of the indicator from royal blue to colorless for each sample.

Materials:
Sunny D orange juice, Florida's Natural, Minute Maid, Tropicana, Langers Pure Conc., Freshly Squeezed, medicine dropper, stirring rod, Distilled water, 50 & 10 mL medicine cups, scale, corn starch, Tincture of Iodine

Results
The graph and the chart showed that the Vitamin C amount in the different types and brands of orange juice is not the same. The amount differs by types and brands. The Langers Pure Conc. with an average number of drops of 2.5 has the highest amount of Vitamin C followed by the Freshly Squeezed orange juice with a 5.7 number of drops. The different brands of orange juice did not differ much from each other. Florida's Natural and Tropicana have an average of 11.7 and 11.0 while Sunny D and Minute Maid have 10 and 9.7 drops. There is a 100% of Vitamin C in each juice except Langers Pure Concentrate which has 130%.

Conclusions/Discussion
My hypothesis is incorrect because each type and brand of orange juice contains different amounts of Vitamin C. The Langers Pure Concentrate has the highest amount of Vitamin C because it has the least number of drops. The lesser number of drops, the higher is the Vitamin C amount.

Summary Statement
My science project is to determine if different types and brands of orange juice contain the same amount of Vitamin C.

Help Received
My dad helped buy the materials. My mom helped type my report.



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Monika L. Gleim	Project Number J0511
Project Title Investigating the Effect of Different Solutions on the Elasticity of Various Fabrics	
Abstract Objectives/Goals To find out which type of detergent will weaken the fabric and cause the fabric to be point that it can't turn back to it's normal size. the other reason is to find out which detergent has the most effect on the fabrics. The fabrics are in being stretched and measured to see which detergent has the most effect. Methods/Materials The materials are 5 pieces of nylon, lycra, cotton, and polyester. 1 bottle of bleach and 1 bottle of ammonia. 1 box of salt and 1 box of baking soda. 5 jars and 10 cups of water. 2 long poles and 2 sawhorse stands. 1 ruler measured in cm and a sewing machine. 1 marker and 1 teaspoon. 2 25 pound weights and a pair of rubber gloves. A timer and 1 thermometer. Results The results were that the bleach weakened the fabric and caused it to lose it's elasticity the most and then the second detergent was the ammonia that caused the fabric to weaken on lose most of it's elasticity. Conclusions/Discussion What I learned from this project is that the bleach caused the fabric to lose most of its elasticity and that it's better to wash clothing with bleach but only white clothing.	
Summary Statement To find out which detergent weakens the fabric's elasticity.	
Help Received Moher helped get fabrics; Father helped get pole and stand.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Samuel S. Habib	Project Number J0512
Project Title Vitamin C Content: Analysis of Food (Fruit and Vegetable Juices) by Titration	
Abstract Objectives/Goals Which fruit juices and vegetable juices contain the most amount of vitamin C? Comparing vitamin C in fruit drinks and fresh fruit juices. Does vitamin C have any anti-oxidant properties? Does temperature affect vitamin C content? Is vitamin C sensitive to oxygen and light? Methods/Materials Titrations of Standard vitamin C with starch and iodine were first done-this was a calibration.Drops of iodine needed for the end-point(Permanent blue-black color) were recorded.Next several titrations were done to determine concentration of vitaminC in various fruit and vegetable juices. Affect of temperature on vitamin C was investigated by titrating boiled , then frozen orange juice. Anti-oxidant properties were investigated by cutting an apple in half and sprinkling crushed vitamin C tablet on one half,then observing both halves every hour, for one day, to see if the apples enzymatic surface browning was affected. Light and oxygen sensitivity were investigated by finding vitamin C content in an open container of orange juice and in a closed container of orange juice over a period of 7 days. Results The grocery bought orange juice had 24mg vit.C.The grocery bought apple juice had 75mg vit.C.This was not accurate since vit.C is usually added in processed juices. However freshly juiced orange had the most vit. C of 9mg compared to freshly juiced apple which had 3mg only.Green pepper juice had 8mg of vitamin C. Boiling orange juice almost destroyed the vitamin C content. Vitamin C sprinkled on the cut apple prevented surface browning even after one day. Vitamin C content diminished when stored in an open container. Conclusions/Discussion Orange juice does in fact have the most vitamin C.Surprisingly the green pepper juice had almost the same amount of vitamin C as orange juice. Temperature does affect vitamin C content - boling almost destroys it but freezing has little affect. Vitamin C does have anti-oxidant properties.Vitamin C is readily oxidized itself so it prevents other chemicals from being oxidized. Vitamin C is very sensitive to oxygen,light and heat.	
Summary Statement Finding vitamin C in fruit and vegetable juices and investigating its properties and sensitivity.	
Help Received Mother explained the chemistry background.Sister helped type report.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Garrett E. Hara	Project Number J0513
Project Title Making Silicon from Sand	
Objectives/Goals I hypothesized that silica (SiO ₂) molecules, or quartz, found in common beach sand, could be separated to create pure silicon (Si), a key material in computer processors. An important by-product of this experiment was hydrogen gas, a primary energy source in fuel cells.	
Abstract	
Methods/Materials This experiment consisted of two-steps: 1) heating a mixture of silica and magnesium, which created silicon and by-products; and 2) pouring the heated mixture into a solution of muriatic acid (HCl) and distilled water.	
Results The leftover magnesium reacted with the acid producing hydrogen gas and magnesium chloride (MgCl). The magnesium silicide (Mg ₂ Si) byproduct reacted with the acid to produce silane gas (SiH ₄). The SiH ₄ combusted on contact with air, which ignited the hydrogen into a flame. The magnesium oxide (MgO) byproduct dissolved and pure silicon was at the bottom of the solution with other unreacted minerals in the sand.	
Conclusions/Discussion My hypothesis was successful because pure silicon and hydrogen gas were created.	
Summary Statement To create Silicon and Hydrogen from chemical reactions involving common beach sand, magnesium, heat and hydrochloric acid.	
Help Received Teacher provided lab equipment; Father's friend supervised the project for safety; Father retrieved materials	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Kyle Ivey	Project Number J0514
Project Title Bottled Backwash: A Study of Level of Contaminants in Water Bottles	
Abstract Objectives/Goals The goal of my project was to determine if the levels of total dissolved solids increased as the level of water decreased in water bottles and as they sat over time, when test subjects drank directly from the bottles. Methods/Materials Informed consent was obtained from twelve second grade students: 7 boys and 5 girls, ranging in age from 7 to 8 years. I purchased 13 water bottles and ordered a water tester. To begin testing, I performed a baseline check of all 13 water bottles. I marked and labeled the water bottles for all twelve subjects. Subjects were instructed to drink half, to the first mark, by 1:00 p.m. I tested and recorded the levels of contaminants. Subjects were instructed to drink four-fifths, to the second mark, of the water bottle by 2:40 p.m. I tested the water bottles again, and recorded the data. I tested again at 4:50 p.m. on that day, at 3:27 p.m. three days later, and again at 4:47 p.m. four days after that. Results Levels of contaminants varied among the different subjects, and can be organized into three categories: low, moderate, and high. Test subject 8 had low levels of contaminants throughout the study. Subjects 1, 2, 7, and 10 had moderate levels of contaminants throughout the study. Subjects 3, 4, 5, 6, 9, 11, and 12 had high levels of contaminants throughout the testing. The final test, done seven days after the study began, indicated that the level of contaminants went down, indicating a reduction in total dissolved solids. Conclusions/Discussion From my study, I concluded that my hypothesis was correct. The levels of contaminants did increase as the test subjects consumed the water. The levels of contaminants continued to increase as the water sat at room temperature. However, after one week, the levels of contaminants began to drop. This indicates that the levels of total dissolved solids will multiply over time, but may eventually decrease.	
Summary Statement Measuring levels of total dissolved solids in water bottles as the water was consumed.	
Help Received Second grade students, with their teacher 's help, volunteered to participate as subjects.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Erica M. Kepski	Project Number J0515
Project Title Which Antacid Will Neutralize Gastric Acid the Best?	
Abstract Objectives/Goals The purpose of my experiment is to find out which antacid neutralizes gastric acid the best. Hydrochloric acid has similar properties to gastric acid and it was used in neutralization. Methods/Materials I tested the following products: Milk of Magnesia, Mylanta, Maalox and Alterna Gel. I selected these products because they all had different active ingredients and almost the same amount of active ingredient per 5 mL. Methyl Orange was used as indicator. To arrive at hypothesis, I tested the strengths of antacids using pH papers. Based on results of pH readings, I placed Milk of Magnesia as the best antacid, followed by Mylanta, Maalox and Alterna Gel. Experiment: 1) I added 2 drops of the indicator to 10 drops of HCl. I observed color. 2) I added 2 drops of the indicator to 10 drops of each product. I observed colors. 3) I added 10 drops of HCl to another glass, 2 drops of indicator and started adding drops of antacid until solution was neutralized (trace of orange color was detected). This step was repeated for four antacids. 4) Volume and normality of products was calculated. Results Based on calculations to neutralize 200 mL of HCl, it took on average, 400 mL of Milk of Magnesia, 820 mL of Mylanta and 1573 mL of Maalox. The results for Alterna Gel were not conclusive but it took about 1413 mL for the color to become pinkish melon. The volume was inversely proportional to the pH of the base. Normality was highest for Milk of Magnesia (6), followed by Mylanta (2.93) and Maalox (1.53). The results for Alterna Gel were inconclusive but if, my assumptions were correct, the Normality was 1.7 Conclusions/Discussion The results, for the most part, were as expected. It took the least amount of Milk of Magnesia to neutralize hydrochloric acid, followed by Mylanta and Maalox. Results for Alterna Gel were inconclusive.	
Summary Statement My project calculates volume of antacid needed to neutralize gastric acid and it calculates Normality of each antacid.	
Help Received Mother bought HCl, Methyl Orange, pipets, goggles; she helped with subject research and with some typing.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Ben E. Levy	Project Number J0516
Project Title Making Hydrogen Is a Blast!	
Abstract Objectives/Goals I studied electrolysis hoping to find a green method of making the hydrogen necessary for running hydrogen fuel cell vehicles. My objective was to find a favorable voltage and an electrolyte that conducts electricity well, so hydrogen could be produced in a homemade electrolysis apparatus equally or more efficiently with environmentally friendly solar cells compared to pollution-generating batteries. Methods/Materials Hydrogen was produced by electrolysis of water. Electricity was run through water by attaching copper wires to an energy source, and putting these leads in the water. Bubbles of hydrogen gas formed at the cathode, and oxygen bubbles formed at the anode; the gases collected under water-filled graduated cylinders placed over the leads. Recorded data included Time necessary to make 5ml of hydrogen, and Current measured during production. I varied the type and voltage of power source (6-volt and 12-volt solar cells versus batteries), electrolytes (washing soda or table salt) and gas collection method (trapping both oxygen and hydrogen versus trapping only hydrogen). Results The electrolysis circuit easily broke water into oxygen and hydrogen gases. I recorded data for 23 runs, measuring Voltage, Current and Time necessary to produce 5ml of hydrogen for each. Electrolytes, especially table salt, sped up gas production. Production was slowed by resistance from: glass graduated cylinders that partially blocked the current flow; warm water that heated the electrode wires somewhat; and deposits that formed on the positive lead (blue copper carbonate in washing soda trials, green copper oxide in salt trials). I then calculated the Work (in watt-hours) that it actually cost the system each time it produced 5ml of hydrogen. Conclusions/Discussion I found that some fast electrolysis runs wasted excessive amounts of energy, while my graph of Work versus Time showed a sweet spot where hydrogen formed reasonably quickly while energy needed for making this gas remained fairly low. The best of these optimal trials used a 6-volt battery with salt electrolyte, and the next best used a 6-volt solar cell with salt electrolyte. Clearly an efficient electrolysis system for making hydrogen has to balance speed with lower energy requirements. Although the battery set-up still has a slight advantage, the solar set-up is close enough that I believe a few refinements could make it the best choice.	
Summary Statement I adjusted voltage, electrolytes and gas collection method to produce hydrogen by environmentally friendly solar electrolysis, with a speed and energy efficiency nearly as good as those of a more polluting battery-powered electrolysis.	
Help Received My Uncle John and Grandpa Jim gave me input on building circuits. My friend Charlie Benedict helped me understand chemical reactions. Science teacher Mr. Bill Dow helped me think of ways to present my experiment. I am very grateful for their support.	



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Donald H. Livingston	Project Number J0517
Project Title Dangerous Mountain Waters	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project is to find the level of copper in the drinking water in a house in Kirkwood. There were blue stains in the sinks that raised suspicions about there being high levels of copper. The hypothesis was that the copper level in water from the Kirkwood Meadows Public Utility District rises over time if it is left sitting in copper pipes, becoming unsafe to drink after two weeks.</p> <p>Methods/Materials The hypothesis was tested in two different ways: 1. The copper level of water in the house was tested 14 different times after sitting undisturbed in the house's pipes for different amounts of time (on-site tests). 2. Water from the house was put into copper plumbing tubes to sit for two weeks (lab tests) and was tested for copper and other water facts every other day for two weeks. An at-home copper test kit and alkalinity strips were used for all tests. All tests were repeated twice.</p> <p>Results The on-site test results show that the hypothesis was wrong. The on-site water became unsafe to drink after very short periods of time (as little as 2 hours), not just after two weeks. The copper level bounced all around based on the acidity of the water, not the length of time it spent in the house pipes. The lab test results also show that the hypothesis was wrong. Copper level in the water from KMPUD did not steadily rise over time. Instead, it shot up, dropped a bit and then zoomed back down. The water in the tubes acted differently from the water in the house pipes, probably because it sat quietly, did not get new oxygen, and was not disturbed, so maybe a protective coating could form. This could also help explain why the water's copper level dropped after one week in the tube.</p> <p>Conclusions/Discussion The conclusion is that the copper level does not rise based on time, but on the pH level of the water. The well closest to the house has very acidic water and when there are not a lot of people using water at Kirkwood, the acidic water does not get mixed up with water from other wells. After hearing about the copper levels from this project, KMPUD began testing water from a sample of houses in the neighborhood to see if they were meeting the EPA standard for copper (they were not). Based on the results of these tests, KMPUD is going to begin treating the water from the one well with sodium hydroxide, which will make the water less acidic and hopefully lower the copper level of the water.</p>	
Summary Statement This project tests the level of copper in the water in a house in Kirkwood and tries to figure out if the levels are related to the amount of time the water sits in copper pipes.	
Help Received Dad helped show me how to make the charts; Mom helped me organize and edit my writing and talk to KMPUD; my science teacher gave me the idea for adding the copper tubes tests; Michael Sharp and Peter Tobacco of KMPUD explained the Kirkwood water system to me.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Isheetta H. Madeka	Project Number J0518
Project Title Oh, No! I'm Rusting!	
Abstract Objectives/Goals Which type of metal is the most resistant to vinegar: copper, aluminum, or steel? Methods/Materials Materials: The few materials I used were: <ol style="list-style-type: none">1. Bowls2. Vinegar3. Different metals: aluminum, copper, steel4. Journal/Pencil5. Computer6. Tray/Tweezers7. Scissors8. Measuring Cup Procedure: The experiment considered a few steps: <ol style="list-style-type: none">1. Cut metal strips-all 1.5 cm (w) x9.5 cm (h)2. Pour 1.5 cup vinegar in all bowls and place the metal strips, submerged into the bowls3. Leave metal strips in vinegar for 6 days; monitor metal strips# condition everyday4. Record all observations daily5. After 6 days, take the metal strips out6. Throw all unnecessary materials away7. Analyze and compare all information-create graphs Results According to the rating index, copper is less resistant than aluminum in vinegar. The steel is least resistant in vinegar as it has rusted most with the maximum rating of 10. Aluminum turns out to be the least resistant out of all metals. Conclusions/Discussion I discovered that steel, aluminum, and copper all have a layer to protect them from RUST! For example the Statue of Liberty, still standing since 1886, it has formed a bright green layer over the years. What is that? Well, the green layer is called patina. It has formed because of all the salt in the ocean, which oxidizes. To protect the copper from its rusting it forms a layer of this bright green chemical. So, if you thought the Statue of Liberty has been painted green, you are wrong! And now you know why.	
Summary Statement To find out among Copper, Aluminum, and Steel, what metal would be the most resistant to vinegar?	
Help Received Father motivated to do more research and reviewed my result/data. Mother helped to buy the materials and helped to set up the experiment .	



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Brian M. Mares	Project Number J0519
Project Title Candy or Pencils?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal in this project was to determine the presence of lead in Mexican and American candies. My hypothesis for this project was that seven out of ten Mexican candies will have leads, and American candies will have two out of ten with lead present. I think that this will be the result for Mexican candies, because out of past research, I found that about 66% of the candies did not have lead. I think that the results for American candies will be because on one little article, it claimed that some American candies also have lead.</p> <p>Methods/Materials My materials in this project were: Petri dishes, filter paper, various Mexican and American candies, Bunsen burner, centrifuge, protective glasses, test tubes, centrifuge tubes, pipettes, magnifying glass, test tube rack, vinegar, test tube clamps, and a lead testing solution named Lead Check. The method i used in this project was that i first took the candy and if the candy did not fit in the test tube, then I crushed it to the proper size. Then, I added three pipettes full of vinegar, I put on safety goggles, and grasped the test tube with the clamp. I then melted it into a fine liquid. Next, I let the solution cool, before I extracted the solution, and put it inside a centrifuge tube. I centrifuged the samples for apporoximately five minutes. Next I extracted the distillate in the middle. I then placed three dots of the sample on a Petri dish to represent the three tests. I let the solution sit for about 24 hours, before I tested it with the Test ready solution.</p> <p>Results I found out that six out of the ten Mexican candies had lead, and three of the American candies had lead. In the Mexican candy tests two out of the six candies passed all of the tests, and the rest only showed two out of the three tests passed. In the American candies only one of the three candies passed all of the tests, one passed two of the three tests, and one passed only one test.</p> <p>Conclusions/Discussion In conclusion, Mexican candy showed six out of the ten candies with lead, and American candies showed three out of ten candies with lead. The Mexican candies that showed lead in all three tests were Cherry and Strawberry Arcor frutilla. The American candy that showed lead in all three tests was the Tootsie Pop. I found out that my hypothesis was wrong because Mexican candies did not have seven out of ten with lead, and American candies did not have two of out of ten with lead.</p>	
Summary Statement This project was about testing lead in various Mexican and American candies.	
Help Received Teacher helped me with testing.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Tavit Marokosian	Project Number J0520
Project Title Catalyst Reaction Rate	
Objectives/Goals My project is to study the effect of two variables, temperature and substrate concentration on the decomposition of hydrogen peroxide into oxygen gas and water with two catalyst organic catalase and inorganic manganese dioxide (MnO ₂) and measure the rate of the reaction.	
Abstract Methods/Materials Oxygen production rate catalyzed by catalase was measured by measuring the time needed for a filter paper to float,(the filter paper was dipped into catalase enzyme solution extracted from a potato by micro-centrifugation, and dropped in a well filled with 5 ml hydrogen peroxide to a height of 1cm), different concentration of 1%, 1.5%, 2%, 2.5%, 3% H ₂ O ₂ at 25°C was used for experiment A(3 trials), and different temperatures 15°C, 25°C, 35°C, 45°C, 55°C with a 3% H ₂ O ₂ was used for experiment a (3 trials). Oxygen production by MnO ₂ was measured by a gas collecting apparatus,(a giant pencil and metal pencil holder and weight as a ring stand, shelf holder as a clamp to hold the inverted glass cylinder filled with water in a glass bowl, water bottle as a reaction vial, and tubes connected to the reaction bottle and fitted into the inverted graduated cylinder), for substrate concentration effect 20 ml H ₂ O ₂ with 1%, 1.5%, 2%, 2.5%, 3% concentrations was poured in the reaction bottle and 100mg MnO ₂ powder was added at 25°C, and the displaced volume of water by produced oxygen gas was marked on the inverted graduated cylinder every 30 second for six minutes, experiment B(3 trials). The process was repeated for different temperatures 15°C, 25°C, 35°C, 45°C, 55°C with 3% H ₂ O ₂ , experiment b (3 trials).	
Results Increased substrate concentration increased the rate of the reaction with catalase, and the increase in temperature also increased the rate of reaction until a certain point 45°C where it start to decrease and stopped at 55°C. The rate of reaction catalyzed by MnO ₂ increased with increase substrate concentration, and increase temperature.	
Conclusions/Discussion My conclusion is that my experiment agreed with my hypothesis, increase substrate concentration and temperature, increases the reaction rate of decomposition of hydrogen peroxide catalyzed by two catalyst, organic catalase and inorganic manganese dioxide. However catalase being a protein, denatured after certain point of increased temperature and changed its structure, where the active site no longer functioned for the catalytic activity to take place.	
Summary Statement My Project is to study the effect of variables, substrate concentration and temperature on the rate of reaction of the decomposition of Hydrogen Peroxide by an organic catalyst Catalase and inorganic catalyst Manganese Dioxide.	
Help Received Father helped with explanation of key terms and equipment assembly.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Montana C. Marshall	Project Number J0521
Project Title Chemical Kinetics	
Objectives/Goals Purpose This project provides evidence that heat can speed the process for chemical reaction. Hypothesis If hydrogen peroxide, water, and KI are mixed together and shaken in different temperatures of water, then the warmer the water, the faster the reaction rate.	
Abstract Methods/Materials Materials: 3% Hydrogen peroxide; 0.1 molar KI (Potassium Iodine); water; trough; burette; 2 tubes; 125 mL Erlenmeyer flask; 60 mL syringe body; stand; clamp; two beakers; a burner; ice; thermometer; timer. Procedures: 1. Set up all tubes and flasks (see diagram). 2. Fill with water until water in burette is near the zero mark. 3. Equalize pressure by moving the syringe body up and down. If there are no leaks, the water level in the burette will at first change, but then will stop. 4. Look for any bubbles in the tubes, and if there are any, make sure to get them out. 5. Fill trough with water of desired temperature. Keep a thermometer in it, and make sure to keep adding hot/cold water to keep at a constant temperature. 6. In the 125 Erlenmeyer flask combine 10 mL of 0.1 M KI, and 15 mL deionized water. 7. Add 5 mL 3% Hydrogen Peroxide to flask and quickly stopper it and start timer. 8. Place flask in trough, and start shaking it in the water as constantly as possible. 9. Record time at every 1 mL produced up to 14 mL. 10. Repeat steps 5-9 with flask in different temperatures of water.	
Results My experiment proved that the hotter the water that the chemicals were in, the faster the reaction rate.	
Conclusions/Discussion The result was that the hot water increased the rate of the reaction. The reasoning behind this is that the molecules speed up and have more collisions. Also, cold water would slow down the molecules causing less collisions. When I put the reaction in really cold water, the water level went up and down in the burette. When it was taken out, and shaken, it finally went down. This could mean that when the chemical reaction was placed in the freezing water the gas compressed and got smaller, meaning that there was less gas, and the water level rose. ne error to be fixed would be to make sure that the temperature does not vary in a test-run. Also, when the chemicals were shaken, they were shaken by hand. A magnetic stirrer would have made the results more accurate.	
Summary Statement By hooking a chemical reaction up to a burette to measure the amount of gas produced and putting this reaction in different temperatures of water, I will be able to conclude how temperature affects chemical reactions.	
Help Received Parents helped with getting materials; Ms. Garza helped with original idea; Ms. Owens helped with difficult concepts and supplying equipment.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Taylor A. Martinez	Project Number J0522
Project Title Investigating the Effect of Water Variances on Soap	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project is to determine which water type will dissolve bar soap at the fastest rate.</p> <p>Methods/Materials Four plastic containers were set-up and labeled for specific water types. Water types: room temperature (64 degrees), warm water (80 degrees), ice water (42 degrees), and salt water. One bar of Irish Spring soap was placed into each container. Two cups of the specified water type was poured into the container. Water types were monitored every one-half hour to maintain water variable. Soap weight was recorded at the end of a 3-hour trial period.</p> <p>Results The results of my investigation on the effects of water variances on soap indicated that soap dissolves at different rates depending on water type. Warm water (80 degrees) dissolved the soap at the fastest rate = approximately 22% in 3 hours. Salt water dissolved the soap at the slowest rate = approximately 6% in 3 hours.</p> <p>Conclusions/Discussion I found that my hypothesis was incorrect. My hypothesis stated that salt water would dissolve bar soap at the fastest rate and that ice water would dissolve bar soap at the slowest rate. My investigation determined that warm water dissolved at the fastest rate and salt water at the slowest rate. Based on my results, it appears that because both salt and soap are soluble in water and built somewhat alike the amount of salt already in the water inhibited the solubility of the soap.</p>	
Summary Statement Different water variances do have an effect on the dissolution rate of bar soap.	
Help Received Mother helped glue letters on board.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Shamik Mascharak	Project Number J0523
Project Title Are Vegetables Stealing Zinc from Your Diet?	
Abstract Objectives/Goals 1) Will phytic acid (an organic acid present in vegetables) form an insoluble complex with zinc? 2) Will the complex form at a certain ratio of concentration of zinc and phytic acid? At what pH? 3) Will presence of other metals like calcium influence the precipitation of zinc by phytic acid? Methods/Materials In experiment 1, I determined the concentration ratio of Zn:phytic acid required for precipitation of zinc from an aqueous solution by adding various amounts of phytic acid to a solution of zinc. In experiment 2, I tested the effects of pH on zinc precipitation by phytic acid. The pH of a mixture of 1:1 zinc:phytic acid solution was varied from pH 3 to pH 8 by the addition of KOH. In experiment 3, I tested the effect of calcium on the precipitation of zinc by phytic acid. Here, the Ca:Zn:phytic acid ratio was 5:5:0.5. A control experiment with no calcium and another with no zinc were also included. After the white precipitate of Ca/Zn-phytate formed, I filtered the reaction mixtures and checked for zinc in the filtrate by using Zincon reagent. A standard curve technique was used where I plotted the absorbance values of the blue Zincon-Zn solutions vs. concentration of zinc (in ppm) in standard solutions. This standard curve was used to determine the concentration of zinc in the unknown filtrates (after proper dilution). Results I found that when the Zn:phytic acid ratio approached 4:1, all the zinc precipitated out. The precipitation was very effective upto 1:1 ratio; excess phytic acid however redissolved the white precipitate of Zn-phytate. For precipitation of zinc-phytate, pH 5 was the most suitable pH. Finally, I found that calcium did aid precipitation of zinc by phytic acid. Conclusions/Discussion Excess intake of vegetables does hinder absorption of zinc from our diet. Also, presence of calcium increases the extent of precipitation of zinc by phytic acid.	
Summary Statement I investigated whether eating excess vegetables inhibits absorption of zinc (an essential micronutrient) from our diet.	
Help Received Allegra Eroy-Reveles, a chemistry graduate student of UCSC, helped me in making the absorbance measurements and understanding the standard curve technique with the aid of spectrophotometry.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Melissa A. Merrill	Project Number J0524
Project Title Penny Corrosion: Gastric Acid Reactions with Copper vs. Zinc-Based Coins: A Serious New Health Hazard	
Objectives/Goals The objective was to simulate gastric acid corrosion of different coins, and to assess the differences in chemical reactions and extent of corrosion (evaluated by weight loss) between copper versus zinc-based (minted since 1982) pennies.	
Abstract	
Methods/Materials 100 pre-1982 (solid brass, 95% copper) pennies, 100 post-1982 (copper plated, zinc core) pennies, and 100 lightly scratched zinc-based pennies were submerged in dilute hydrochloric acid baths simulating the gastric environment of pH 1-2. Solutions were changed twice daily and the pennies weighed daily for 7 days. Other coinage was submerged for 3 days for comparison only.	
Results All zinc-based pennies reacted immediately with the hydrochloric acid forming gas (H ₂) bubbles and a black precipitate (ZnCl ₂). Some coins were completely corroded within 2 days. The slightly scratched coins reacted faster, losing 32% of their weight by 7 days, about 50% greater than the unscratched pennies. Copper-based pennies initially lost no weight but after the second day started to develop a green solution, ultimately losing over 9% of their weight by day 7.	
Conclusions/Discussion Zinc-based pennies corroded about 3 times as fast as copper-based pennies, with slight surface scratches increasing the rate about 50% further. The zinc cores on all pennies immediately reacted with dilute HCl, even when no scratches were visible: no zinc-based penny could be considered "safe." In this experiment the availability of HCl seemed to be the limiting factor in corrosion rate. The reaction of copper-based pennies with HCl was unexpected and apparently more complex. Further analysis and research suggested that the copper reacted to form various compounds such as CuO, CuCO ₃ and CuCl ₂ , only after repeated exposure to air, with the acid and CO ₂ acting as catalysts. Therefore, copper pennies might not corrode at all in an airless stomach. However, this experiment demonstrated that the common scenario of a toddler swallowing a random penny can no longer be considered a harmless incident.	
Summary Statement Corrosion of zinc vs.copper-based pennies in dilute HCl was analysed in order to simulate the effects of a coin ingestion.	
Help Received father provided initial article leading to idea for project; parents and advisor proofread and critiqued.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Emaad K. Moinuddin	Project Number J0525
Project Title Oh Say Can You "C": Comparing Ascorbic Acid Concentrations in Different Types of Orange Juice	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project is designed to test the relative amounts of vitamin C (ascorbic acid) in different samples of orange juice. I used an iodine indicator solution to test qualitatively the amount of vitamin C in these samples by employing a redox reaction.</p> <p>Methods/Materials Materials used in this project include 2% iodine, cornstarch, test tubes, measuring spoons, medicine dropper, water (negative control), vitamin C tablets (positive control) and an assortment of orange juices with varying properties. First I made an iodine indicator solution using cornstarch, water, and iodine. I placed carefully measured amounts of indicator solution in each test tube, and added 10 drops of the orange juice being tested. I observed color changes. A lighter colored solution indicates a higher vitamin C concentration than a darker solution.</p> <p>Results My hypothesis was that fresh squeezed orange juice would have the most vitamin C, but in fact frozen orange juice with pulp had the highest ascorbic acid concentration. The juices with the lowest vitamin C concentration were the low acid juice, and the carton juice from concentrate.</p> <p>Conclusions/Discussion Since both of the low ranking orange juices did not have pulp, and the highest ranking juice did, I can conclude that "pulpier" juices have more vitamin C. The low acid juice had been stored open in the refrigerator for a week. Vitamin C decay due to oxygen exposure could be a factor in its low vitamin C content. The harmful effect of oxygen exposure is also illustrated by the reduction in vitamin C content in fresh squeezed orange juice when it is stored for a few days in the refrigerator.</p>	
Summary Statement Using an iodine and starch based redox reaction, I found that vitamin C content is higher in orange juice with pulp and with limited oxygen exposure.	
Help Received My parents provided support and guidance, and my uncle helped me to understand the chemistry concepts that I used.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Jodie C. Nakajima	Project Number J0526
Project Title What Is the Effect of pH Level on the Darkness of Dyed Fabric?	
Abstract Objectives/Goals The purpose of my experiment is to find out how the pH level affects the color of the dyed fabric. Methods/Materials I varied the pH level of each solution by adding different amounts of either ammonia or vinegar to water. Once I verified the pH level by using litmus paper, I added a fixed amount of dye powder to the solution and stirred until it was dissolved. I did this procedure for three different trials, and each trial tested nine different levels from pH 4 to pH 12. Then I soaked each piece of cotton fabric in a different cup for one hour. Afterwards, I rinsed each piece with water until it didn't bleed anymore and then let it soak for another hour. The rinsed pieces then went into the washing machine with a mild detergent. After they were all washed, I took them out and let them air-dry overnight. Results The final result was that the dyed fabric gradually got darker until pH 9, 10 and 11 and became lighter at pH 12. Conclusions/Discussion In conclusion, my results were slightly different than my hypothesis. I predicted that the color would be darker if there was more ammonia (or more alkaline) mixed with the dye powder. However, my results were that pH levels 9 through 11 had the darkest color.	
Summary Statement The purpose of my experiment is to find out how the pH level affects the color of the dyed fabric.	
Help Received Mr. Gary Tanaka, supplied me with litmus paper & was my project advisor. My main technical resources were Dr. Peter Hauser, North Carolina State U. & Dr. Paula Burch, Baylor College of Medicine, Houston TX.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Travis M. Osterback	Project Number J0527
Project Title Heat of Combustion of Various Oils	
Objectives/Goals Introduction: Veggie cars are good to drive because they run on the renewable resource - vegetable oil. My motivation for this project was to see which oil is the best for a #veggie# oil powered car. With rising gas prices and dwindling fossil fuel resources, I want to help find alternatives. I am concerned about the environment and also about what gas prices will be like when I can drive. This project will compare the heat of combustion (calories) per gram generated by ethanol and various vegetable oils. Hypothesis: The oil with the highest smoke point will have the largest heat of combustion per gram.	
Abstract Methods/Materials Materials: Chemicals # Distilled water, ethanol, corn, olive oil, almond, paraffin, grape seed; Supplies - Erlenmeyer flask, thermometer, oil burners, scale, stopwatch Procedures: 1) Calibrate the calorimeter using ethanol. 2) For each oil, determine the heat of combustion and the average time to raise the temperature of the water in the calorimeter. 3) Calculate the number of calories per gram, by dividing the heat of combustion of the oil by the number of grams of oil burned. 4) Compare heat of combustion per gram to the smoke point of the oil.	
Results Results: · The heat of combustion for ethanol was determined to be 3550 cal · The heat of combustion/gram for paraffin, olive oil, corn oil and almond oil was 9564.6 cal/g. The heat of combustion/gram for grapeseed oil was 5916.7 cal/g · The average time (minutes) it took to raise the temp. of the water 5oC was: 9.8 (almond), 4.3 (grapeseed), 3.1 (olive), 2.1 (corn), and 1.4 (paraffin) · The smoke point (oC) of the oils were as follows: 242oC (olive), 232oC (corn), 221oC (almond), 215oC (grapeseed), 201oC (paraffin)	
Conclusions/Discussion Conclusions/Discussion: 1) There seems to be no relation between smoke point & the heat of combustion; 2) all of the oils tested had the same heat of combustion except for grape seed; 3) corn oil would be the best choice for a fuel because it takes the least amount of time to heat up, and it has the second highest smoke point. Corn can be grown as a crop to make fuel and eventually eliminate the demand on our dwindling fossil fuels.	
Summary Statement This project will compare the heat of combustion (calories) per gram generated by ethanol and various vegetable oils.	
Help Received Used lab equipment at A Schmahl Science Workshop under the supervision of Ken Schmahl and Belinda Lowe-Schmahl; Jerry Kakannad assisted me with the calculations	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Leticia Ramirez	Project Number J0528
Project Title How Do Substances Mixed in Water Affect Its Evaporation Rate?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My science fair project was to put different substances into different cups or tap water, and to see which one evaporated the fastest. I thought it would be a good idea because it might be able to help some people keep the water clean instead of dirty unclean water. I got this idea because i wanted to see what substances were able to evaporate water the fastest. My main goal is to inform people how different soluts affect the water.</p> <p>Methods/Materials To see how solutes affect the evaporation rate i decided to put out graduated cylinders and put water in them. Then i added one tablespoon of substance like salt, sugar, vinegar, pepper, and one with just plane water, with no water added. And then repeat the cycle two more times.</p> <p>Results For trial one the plain water with no substance in it, evaporated the fastest with a measurment of 2.5. For trial two the plane water also evaporated the fastest with the measurment of 2.6. For trial three the plane water was able to be successful again and beat out the other substances with a measurment of 2.4. Therefor the water was able to evaporate the fastest.</p> <p>Conclusions/Discussion My hypothesis was supported because the tap water in my experiment evaporated the fastest. The data shows that the tap water evaporated faster than the salt water, sugar water, vinegar water, and the pepper water. So with no particles floating in the water, the plain tap water was able to successfully evaporate.</p>	
Summary Statement The project is about how solutes affect the evaporation rate of tap water.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Cory C. Rayden	Project Number J0529
Project Title How Efficient Is Your Fireplace Fuel?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals For my science project I wanted to determine which fireplace fuels work most efficiently to heat a room for the least amount of time, energy, and money.</p> <p>Methods/Materials For my experiment I used three fuels: natural gas, presto logs, and firewood. I then weighed each fuel and I burned them individually in a pie tin underneath a coffee can which sat on a metal grate. Inside the can was one cup of room temperature water. Next, I timed how long it took each fuel to boil the water to 100 degrees celcius. Finally, I smothered the fuels and weighed them again to see how much grams of fuel it took to boil the water.</p> <p>Results From my experiment it turned out natural gas was the most efficient, followed by presto logs, and then firewood. Yet firewood was the cheapest, followed by presto logs, and natural gas which was the most expensive.</p> <p>Conclusions/Discussion It turned out that natural gas was the most efficient fuel because it has the most complete combustion out of all three fuels, and has no leftover residues so it burns pure. I also discovered that the more efficient a fuel got, the more expensive it became.</p>	
Summary Statement The purpose of my project was to find the most efficient fireplace fuel to heat a room for the least amount of time, money, and energy.	
Help Received Dad helped with experiment and Dennis Scarla helped with research.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Georgiana M. Salant	Project Number J0530
Project Title Dangerous Jewelry: Lead, the Hidden Accessory	
Abstract Objectives/Goals Last year, I read an article in the newspaper about children's jewelry sold at popular stores containing potentially harmful levels of lead. I wondered if the costume jewelry my friends and I wore might contain lead at the levels described in the newspaper article. I decided to investigate. Methods/Materials I looked on the Internet and purchased lead test kits. I gathered samples of my jewelry, my friends' jewelry, and new jewelry I purchased at local stores. The lead test kits were expensive, and since the jewelry would be damaged by the procedures, this somewhat impacted my sample size. Still, I was able to perform 50 tests. Approximately half of the tests were performed at the minimum time (4 hours each), and approximately half of the tests were performed at a longer evaluation time (24 hours each). Each of the jewelry pieces were tested by extracting leachable lead. The extracted solution was mixed with an indicator to determine the amount of leached lead. Results According to the "Lead Inspector" lead test kit results, more than half the jewelry pieces tested positive for lead. This lead test kit only reveals the concentration of the leached lead solution and not the percent composition of lead in the jewelry. The percent composition of lead in the jewelry can be many times higher than the concentration of leached lead. Conclusions/Discussion Although the color of the metal of many of the jewelry pieces I tested was a dull, dark brown or gray, some pieces that tested positive for lead were a bright, shiny silver. Some of the positive jewelry pieces that were found to contain lead included artificial pearl bracelets and necklaces. The pieces testing positive for lead were indistinguishable in appearance from those that did not test positive for lead.	
Summary Statement This project aimed to discover whether children's costume jewelry (bracelets, necklaces, and earrings) obtained from popular jewelry stores such as "Claire's," "Target," and the "99¢ Only Store" contain lead in their composition.	
Help Received I'd like to thank my mother for her wonderful support, my science teacher for guiding me throughout my project, and my friends for donating their jewelry for testing.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Toby S. Shao	Project Number J0531
Project Title Influencing Surface Tension	
Abstract Objectives/Goals I wanted to find out if I could influence ordinary tap water to make the surface tension change, and if it did, how it would change. I tried it by adding salt, oil, detergent, and heating the water. Methods/Materials I decided to test surface tension by taking a round piece of aluminum foil and placing it on the water so that it just floats on the surface of the water. (I had read in my research that only something flat could test the surface tension, and figured out why during my experiment.) I used pennies that were made from 1985-2006, which I had figured out were 3 grams each. I stacked pennies on the floating aluminum until it sank. Then, I converted the amount of pennies it took to grams, and then converted the grams into dynes. That would be the measurement of the surface tension of the tap water itself. I used ordinary tap water as my controlled variable for this experiment. I then ran this experiment adding 1/4 teaspoon of salt and the same amount of oil and detergent (without mixing), and ran the experiment after heating the water to 60°C. Results When I applied my procedure to my variables, my results showed that tap water with no influence has an average surface tension of 12356 dynes. Tap water with 1/4 teaspoon of salt is 3432 dynes. Tap water with 1/4 teaspoon of oil is 10624 dynes. Tap water with 1/4 teaspoon of detergent is 6306 dynes, and tap water heated to 60°C is 6376 dynes. Conclusions/Discussion All the influences I tried lowered the surface tension of water. That could mean that the surface tension of water is relatively high. Out of all the influences, salt made the surface tension the lowest, which surprised me because boats float better in salt water. That proves that surface tension and the floating of boats are two different cases. When oil was added to water, it formed into round bubble like areas of oil. My conclusion for that is that oil molecules and water molecules do not cohere.	
Summary Statement I discovered that it is relatively easy to lower the surface tension of water with everyday influences such as heat, salt, detergent and oil.	
Help Received A classmate helped with the quality of visual display, parents and teachers edited reports and fixed grammatical and spelling errors.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Alisa Smith	Project Number J0532
Project Title Bleach Baby Bleach!	
Abstract Objectives/Goals My objective was to find which solution gets rid of grape juice stains the best: oxygen bleach, chlorine bleach, vinegar, or water. Methods/Materials I poured a controlled amount of purple grape juice onto 15 pieces of cotton towel, let the pieces dry, soaked them in the proper amount of each solution for 30 minutes, rinsed them for 30 seconds, squeezed the water out, and let them dry. Finally, I compared the remaining stains to a special grid scaled 1 to 10 (10 being bad and 1 being good) to see what score they got. My materials were a measuring cup, measuring dropper, undiluted chlorine bleach, oxygen bleach, apple cider vinegar, water, a cotton towel, cups, wax paper, and purple grape juice. Results Chlorine Bleach scored the best with an average score of 1. Oxygen Bleach came in second with an average score of 2.5. Vinegar came in third with an average score of 6. Water came in last with an average score of 7. Conclusions/Discussion I thought that Oxygen Bleach would do the best because it is supposed to do well with organic stains, and grape juice is organic. Instead, Oxygen Bleach came in second. Chlorine Bleach came in first-I guess that is why they use it to wash clothes. The only issue with Chlorine Bleach is that it got rid of some of the permanent marker, so unless it is diluted, it shouldn't be used with colored clothes.	
Summary Statement Out of four different solutions, I wanted to find out which one got rid of purple grape juice stains the best.	
Help Received Dad helped format report on computer, timed me, and took pictures. Mom helped me arrange display board and helped rinse.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Avery L. Smith	Project Number J0533
Project Title Superglue Girl to the Rescue! Will Adding Color during Superglue Fuming Enhance Latent Prints?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal with this project was to find out if adding color in a liquid form during fuming would enhance the visibility of latent prints using the Superglue or Cyanoacrylate Fuming Method.</p> <p>Methods/Materials Five acrylic frames were prepared with a latent print from the same subject. Five test groups were set up with a frame, 1 .07 oz tube of Super Glue (cyanoacrylate ester), 1 1ml glass dropper, 1 aluminum foil 9x8, 1 10 x 10 x 10 inch cardboard box. Test 0 was the test standard to compare other prints and was fumed using the standard Superglue Fuming technique with no color added. Test #1 was Lightstick fluid (green), #2 was Glo-It glow in the dark paint (yellow-green), #3 was Glass Stain (white), and #4 was Highlighter Ink (pink). The method of Superglue Fuming I used was heating a coffee warmer to 150°, placing Superglue with color liquid added in a foil test area on coffee warmer, placing test frame 3 inches from the coffee warmer and covering with a cardboard box for 10 minutes. Each test was examined in a black painted box, with the naked eye, and a magnifying glass with a black light attached.</p> <p>Results Test # 4 with the Highlighter Ink (pink) handprint is very visible, print lines are readable and glow with the black light. Points of identification were easy to match. Best overall print for visibility and comparison.</p> <p>Conclusions/Discussion The tests proved my hypothesis that the Glo-It glow in the dark paint would enhance the visibility of latent prints incorrect. The pink Highlighter fluid had the best results. The findings lead me to believe that the Glow-It paint was too thick of fluid to mix well with the Superglue. The Glass Stain was too runny and white might not have been the best color to use. The Lightstick fluid was a close second in visibility. I had fun doing these experiments and discovered that by adding something as simple as a hot pink highlighter will enhance the visibility of a latent print.</p>	
Summary Statement My experiment questions whether adding color in a liquid form to the Superglue during the fuming process will enhance the visibility of latent prints.	
Help Received Jeremy & Cari Smith, (Parents) helped with getting supplies and watched me fume. Cal-Draulics, Inc. (Grandma & Grandpa Johnson) For allowing me to use their work to do my experiments. Pam Smith (Grandma) for helping with supplies, and Stan Cox (Grandpa) for helping with supplies.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Gian E. Sonza	Project Number J0534
Project Title Colors to Dye For!	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To separate and identify the dyes in Skittles# using paper chromatography.</p> <p>Methods/Materials 100 sheets of chromatography paper; One skein of pure virgin wool, unbleached; 25 square feet of aluminum foil; One set (four colors, red, yellow, blue, green) of food coloring (0.3 ounces each); 500 mL of household ammonia; 475 mL of distilled white vinegar; Skittles(tm); Scissors; Stapler; Five 100 mL beakers; Five 400 mL beakers; Five test tubes (15 x 200 mm); One Ring stand; Five test tube clamps; One stirring rod; Five evaporating dishes (75 mL); One gallon of distilled water; Camera; Safety goggles; Safety gloves; One safety lab coat; Writing Implement such as a pencil; Metric Ruler; Computer.</p> <p>Conclusions/Discussion After performing this science project a number of times, I determined that my hypothesis was correct; the primary Skittle# colors, (Red and Yellow) only had one dye, while the secondary Skittle# colors, (Green, Purple, and Orange) had more than one dye. This is because secondary colors are made up by using a combination of the primary colors, thus requiring a number of different dyes. In contrast, the primary colors are made up exclusively of one color dye. Due to the boiling process necessary to Candy Chromatography, I determined that it would not be possible to use chocolate based candies, such as M&M#s#. Although some recommend using M&M#s# in this experiment, the chocolate would melt and the color coating would be absorbed, making it impossible to perform such an experiment, in my estimation.</p>	
Summary Statement To separate and identify the dyes in Skittles# using paper chromatography.	
Help Received Sister helped type report; Geeta Srivastava helped with experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Timothy D. Tang	Project Number J0535
Project Title Boiling Point Elevation	
Abstract Objectives/Goals This science experiment is being done on boiling point elevation, or the law that says adding solutes to solvent increases its boiling point. In this experiment, various amounts of different solutes will be added to water and the change in boiling point will be observed. The data will then be graphed and examined for the study of the pattern of this change. Methods/Materials Materials: 200g Sodium Chloride, 250g Potassium Chloride, 500g Potassium Carbonate, 1 Precision Thermometer, 1 scale, stove, 3 Litres Distilled Water, 1 Boiling Flask, 1 Stirring Stick, 5 Plastic Measuring Cups, 1 Potholder Procedures: Add solutes one mole (unit to describe amount of substance) at a time to water and boil the solution each time. Measure this and record results. Graph data, observe, and form conclusions. Results Adding solutes did raise the boiling point, and the more added, the higher the temperature change. Also, the boiling point elevation equation, which explains the change in temperature of a solvent when solutes are added, was proven true. Conclusions/Discussion 1. Added solutes increase the boiling point of a solvent. The hypothesis compared well with the results of the experiment. The added solutes did elevate the boiling point, as shown in the experimental data. 2. The boiling point elevation equation is true. The equation was roughly accurate in comparison to the results of the experiment, but a few of the temperatures were off by a few tenths of a degree, especially when the concentration of the solute grew. The reason could be because of impurities in solute, instrumental error, human error, etc. There is another suspected factor when the moles of solute are no longer small compared with the moles of solvent present. See details in the future research section. 3. The type of solute added does not matter. The experiment also showed that the type of solute added to the solvent did not matter. It is the molality of the substance that determines the change in boiling point. All in all, the hypothesis was fairly accurate compared to the results of the experiment	
Summary Statement This project is on boiling point elevation, which says that adding solutes to a solvent will raise its boiling point.	
Help Received Dad helped run experiment and proofread notebook. Mr. Cady, my teacher, taught me how to make a science project.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Natalia M. Vecerek	Project Number J0536
Project Title Food on Fire: Does Fat Content Affect Calorie Levels in Food?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My purpose was to discover if foods with higher fat content had more calories in them. Mainly, I wanted to carry out an experiment that had to do with something we use everyday.. energy!</p> <p>Methods/Materials I first had to build a calorimeter (out of a coffee can, an aluminum can, a cork, 4 screws, and a support rod) to measure the amount of calories in the food samples. Then, each food sample had to be weighed and lit on fire under a can of water (the initial temperature of the water was measured). The food sample was allowed to burn out. Depending on how much the temperature of the water in the can changed, I was able to determine the amount of calories in the food using the formula $Q(\text{water})=mc(\Delta)T$. $Q(\text{water})$ is the heat captured in kcalories, m is the mass of the water, c is the specific heat capacity of water (1 kcal per gram degree Celsius) and $(\Delta)T$ is the change in temperature. I used many food samples (2 popcorn kernels, 4 pine nuts of average size, 4 slivered almonds of average size, half of a large cracker, 1 average to large size Cheeto, and 2 average to small size tortilla chips).</p> <p>Results My results proved that my hypothesis (foods with higher fat content will have more calories) was not entirely true. The food samples went in this order from least to most fat: popcorn, crackers, tortilla chips, pines nuts and almonds (they tied), and Cheetos. The food samples, however, went in a different order from least calories to most calories: popcorn, crackers, tortilla chips, Cheetos, almonds, and pine nuts (this time the 2 nuts did not tie). Notice the order is not the same for both lists. Although the first three items stayed in the same order in both lists, the other three items did not. This is my evidence that fat content does not necessarily dictate the calorie levels in food.</p> <p>Conclusions/Discussion My experiment went quite well owing to the fact that my inexpensive, homemade calorimeter worked well. However, there were a couple hitches in my project. For example, many food samples did not burn throughout on the first trial and had to be tested more. Also, the project was very conservative. This is because while burning the food it is likely the burnt-out food sample still contained energy. It is also certain that some of the energy from the food sample did not transfer directly into the water, but heated the surrounding air and the aluminum can. Overall the project was a success.</p>	
Summary Statement This project is about finding the amount finding the amount of calories in different food samples and then comparing the calorie amount to the fat caontent.	
Help Received Father supervised because of fire hazard.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Alexandra T. Whorley	Project Number J0537
Project Title Orange Juice in Action: The Effects of Oxygen on Vitamin C	
Abstract	
Objectives/Goals The object is to find out if vitamin C in orange juice is affected more by the oxygen in the air if the juice is covered or uncovered.	
Methods/Materials Tested amount of vitamin C in 6 cups of orange juice by putting drops, one at a time, into a blue starch/water/iodine mixture until the color changed. Recorded the number of drops for each cup. The more drops, the less vitamin C. Averaged results for 3 covered and 3 uncovered cups. Repeated every day for 10 days. Materials: orange juice, colored iodine, 6 cups for the orange juice, 6 testing cups, measuring cup, eyedropper, water, metal pot, use of a stovetop, cornstarch, stirring spoon, permanent marker, measuring spoons, 3 cup covers, refrigerator, and container for starch solution.	
Results The covered cups had less vitamin C than the uncovered cups at the end of the experiment.	
Conclusions/Discussion My hypothesis was that the covered juice would keep its vitamin C longer than the uncovered juice because oxygen will cause the vitamin C to evaporate. The results from my experiment prove that my hypothesis was not correct. First, I learned from my research that the vitamin C does not evaporate, it actually oxidizes. Second, the covered juice didn't keep its vitamin C longer than the uncovered juice. The opposite happened. I also learned a lot about vitamin C: what destroys it, how to preserve it for longer, how your body needs it, and what it can do to keep you healthy.	
Summary Statement My project's goal was to find out whether vitamin C in orange juice was preserved longer if it's covered or uncovered.	
Help Received My family helped me as lab assistants until I was used to doing it myself. Since the only colored iodine I could find was in hollow, plastic cotton swabs, my dad helped me get the iodine out of the swabs. My mom showed me how to use Excel to make my data table.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Cody J. Wolfberg	Project Number J0538
Project Title pH Meets Electrolysis: The Test	
Abstract Objectives/Goals The objective of this project is to find out how pH affects the process of electrolysis. The experiment was performed to determine which pH level of an electrolyte (sulfuric acid) would electrolyze most efficiently. This efficiency was determined by how much hydrogen and oxygen gas was produced in a ten minute period. Methods/Materials First, distilled water and the electrolyte (sulfuric acid) were mixed until the mixture obtained a pH level of 2. The mixture was poured into the Hoffman Electrolysis Apparatus and the power source was turned on for 10 minutes. Afterwards, the hydrogen and oxygen that the apparatus captured was measured and recorded. A second trial was performed at the same pH level to ensure accuracy. The procedure was repeated with pH levels of 4 and 6. Results The mixture with a pH of 2 electrolyzed more efficiently than the other pH levels. The electrolysis process of the electrolyte with a pH level of 2 resulted in an average of 1.2 mL of hydrogen and .085 mL of oxygen produced after electrolyzing for 10 minutes. Each succeeding trial had a higher pH level and a lower concentration of sulfuric acid. The amount of hydrogen and oxygen produced during electrolysis decreased as the pH approached 6. At a pH level of 6, 0.05 mL of oxygen was produced and 0.05 mL of hydrogen was produced. Conclusions/Discussion In conclusion, an electrolyte with a pH level of 2 electrolyzes more efficiently than higher pH levels. The hypothesis proved incorrect. Lower pH levels do in fact increase the efficiency of the Hoffman Apparatus in separating the solution into hydrogen and oxygen gas. This can be applied to the future use of hydrogen gas as an important energy source.	
Summary Statement This experiment shows that the pH level of an electrolyte affects the rate of electrolysis.	
Help Received Alan Ward and John Palmer, teachers of Green Point Elementary, helped with the comprehension of concepts and general process. Prof. Robert Zoellner at Humboldt State University helped with research. Louis Armin-Hoiland, chemistry teacher at Arcata High School, provided equipment and instruction.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Kristen A. Yip	Project Number J0539
Project Title Attack of the Chili Peppers	
Abstract Objectives/Goals The objective is to determine whether chili peppers have high acidity to cause indigestion. Methods/Materials 11 different chili peppers were used, ranging from mild to very spicy. The chili peppers were crushed with a mortar and pestle to create enough liquid to measure the acidity. They were each stored in separate containers. A calibrated pH meter was used to measure the acidity. The pH meter was rinsed with distilled water after each measurement to avoid contamination of the results. Results The pH range of all the chili peppers was 4.97 to 6.17. The spiciest chili pepper, Habanero, had a pH level of 5.8 and the mildest chili pepper, Anaheim, had a pH level of 6.0. Conclusions/Discussion The chili peppers did not have high acidity. A neutral pH is 7.0 with acidity measured at values below 7.0 and the highest acidity being the smallest number such as 1. That meant that the acid in the chili peppers was not the cause for indigestion.	
Summary Statement My project is about indigestion and if the acidity in chili peppers cause it.	
Help Received Mother helped crush the chili peppers; father helped measure the pH of the peppers.	