



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Dana L. Adcock	Project Number J0601
Project Title Sugar, Salt, Ice, and Everything Nice	
Abstract Objectives/Goals (abbreviated version) My project, Sugar, Salt, Ice, and Everything Nice, is a second year study of freezing point depression. The purpose of this project was to see if I could use the freezing point depression formula to accurately predict the change in freezing point. I also wanted to see if different solutes (sucrose and sodium chloride) in different quantities (1, 2, 3, and 4 grams) differed in temperature change when added to water. My hypothesis was, "If I use the highest quantity (4 grams) of salt, then it will take the longest to freeze and reach the lowest temperature. If I use the least amount (1 gram) of sugar, it will freeze the fastest." Methods/Materials Using the freezing point depression formula, I calculated the change in freezing point for all of the different solutions. To get measured data, I made a solution with each amount of each solute (I also had a control group) and 10 milliliters of water in a test tube, and completely submerged it in a beaker that had a mixture of ice (filled to the 550 milliliter mark) and 10 grams of sodium chloride. I measured and recorded the temperature of the solution every minute for 35 minutes. I agitated the solution throughout the experiment. Results My hypothesis was correct. The lowest average temperature (-6.48 degrees Celsius) occurred with 4 grams of sodium chloride. The solution with 1 gram of sucrose was completely frozen by the end of each trial. The sodium chloride did not freeze in any of the trials. This makes sense because the predicted change in freezing point for the sodium chloride was significantly larger than with the sucrose. For example, the predicted change in freezing point for 4 grams of sucrose was approximately -2.17 while the predicted change in freezing point for 4 grams of sodium chloride was approximately -25.44. Conclusions/Discussion In conclusion, sucrose and sodium chloride can both be used as the solute in freezing point depression, however sodium chloride is more effective than sucrose (especially in larger quantities). My project could be improved with regards to having something more stable than the ice and salt mixture to surround the solution and eliminating the outlier that brought up my average for the 1 gram of sodium chloride solutions. Also, some of the crystal lattices in the ice surrounding the solution could have been tighter or looser than others. This project was a valuable learning experience for me.	
Summary Statement In my science fair project, I tested freezing point depression.	
Help Received Mrs. Englund (science teacher) supplied equipment and a few references	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Joeyta Banerjee	Project Number J0602
Project Title Investigation of Glucose and Sucrose Using the Enzyme Invertase	
Abstract Objectives/Goals In my project, I was testing the glucose and sucrose concentrations of commonly eaten foods. Methods/Materials In the first part of my project, I tested the activity of invertase by finding the linear time point. I used a sucrose solution and glucose test strips in order to find the linear time point, which I found to be thirty minutes. Using this information and Glucose Test Strips, I began testing the glucose and sucrose concentration of the food samples. First I tested the glucose, and then using the Invertase I tested the sucrose. I repeated each test three times. I used Diastix Glucose test strips, Invertase, and several food samples. Results In my project, I learned that honey and lactose-free milk have the highest glucose concentration and that sweet potato has the highest sucrose concentration. I also learned that chicken, milk, almond milk, and almond butter have the least glucose concentration and that chicken, milk, honey, and lactose free milk have the least sucrose concentration. Conclusions/Discussion I found that my hypothesis was partially correct because chicken did have the least glucose and sucrose concentrations, but ice cream did not have the highest.	
Summary Statement In my project I tested the glucose and sucrose concentration in commonly eaten foods using the enzyme invertase.	
Help Received Dr. Uzma Khan was the qualified scientist for my project. My parents and sister helped me assemble the board.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Joshua Batres	Project Number J0603
Project Title Coin Batteries: Which Is a Better Electrolyte Solution, Acid or Base, According to Their Voltages?	
Objectives/Goals This project is about which electrolyte solution is better, acid or base. I used an example of acid which is vinegar and an example of base which is baking soda. Then I made a coin battery from an English penny and a piece of zinc.	
Abstract	
Methods/Materials Materials: an English coin, pieces of tissue paper, vinegar, baking soda, tap water, clothespin(paperclip), a PH meter, a multimeter Procedure: 1.Dissolve 2g of baking soda into 1/3 cup of water. Take 1/2 cup of vinegar into a cup. Cut two pieces of tissue paper and wet one of them with vinegar and another one with baking soda solution. 2:Measure the PH of the liquids. Place the papers between an English penny and a piece of zinc. Hold them with a clothespin or a paperclip. Connect wires to the metals and measure electricity of the battery. 3:Change the piece of tissue to another one. Before change it, wash the metals with water. 4:Repeat this procedure 3 times.	
Results average PH of the liquids: vinegar: 2.2 baking soda: 7.7 average voltages of the battery: vinegar batteries: 0.98v baking soda batteries: 0.83v	
Conclusions/Discussion Vinegar is an acid and baking soda is a base. Results show that an acidic electrolyte solution gives me a higher voltages than a basic electrolyte solution. Both of them worked as electrolyte solution of batteries. Because acidic electrolyte solution gave me a higher voltage than baking soda, I can say that an acidic electrolyte solution is better than a basic electrolyte solution.	
Summary Statement This project is about electrolyte solutions of batteries.	
Help Received My brother helped me to wash my batterie`s metals.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) John Beshara	Project Number J0604
Project Title Carbonation Countdown	
Objectives/Goals To investigate whether temperature will affect the reaction rate and affect how fast an Alka Seltzer tablet will dissolve in water.	
Abstract	
Methods/Materials Materials: Clear measuring glass cup, Alka Seltzer tablets, Thermometer, Hot and cold water, Stopwatch, Pen and paper (to record results). Procedure: In a clear glass cup put 240 ml of room temperature water and measure its temperature. Put an alka Seltzer tablet in the cup and calculate the time needed for it to completely dissolve. Repeat this step 2 times and calculate the average time. Do all these steps again using boiled water one time and ice water the other time. Record all data in a table for further analysis	
Results When we used the room temperature water (22 C), the average time for the tablet to dissolve was 28.3 seconds. When using the boiled water (90 C), the average time was 19.3 seconds. Finally upon using the cold water (4 C), the average time was 52 seconds. The time needed for the tablet to completely dissolve was very short in the case of the boiled water. On the other hand the tablets dissolved in the cold water took the longest time. This means the higher the water temperature the faster the reaction and the shorter the time needed to completely dissolve the tablets.	
Conclusions/Discussion Raising the temperature increases the reaction rate and made the tablets dissolve faster. Raising the temperature increased the rate at which the bicarbonate reacts with the acid in the Alka Seltzer. Particles can only react when they collide. At higher temperatures, particles collide more frequently and with greater intensity resulting in speeding up the reaction rate. Increasing the temperature causes also some of the lower speed molecules to move faster. The result is more molecules with high enough kinetic energy to complete the reaction and produce the final products. Thus there are two effects of increasing temperature: greater collision intensity and more frequent collisions. That is why the time the tablet took to dissolve in the boiled water was the smallest and that of the cold water was the longest.	
Summary Statement To see the effect of temperature on the rate of the reaction.	
Help Received Mother bought materials, took the pictures and supervised the process.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Max P. Brown	Project Number J0605
Project Title Shield the Steel: Protection from the Advancement of Rust	
Abstract Objectives/Goals My objective is to find the most effective substance which would shield carbon steel from the accumulation of rust due to corrosion. I believe motor oil will be the most effective coating on carbon steel to resist corrosion compared to lemon juice, honey, Coke Cola, Barricade, WD-40, polyurethane and canola oil. Methods/Materials Three steel samples were coated with each substance (independent variable), sprayed with a 10% saline solution every 48 hours for 14 days (control variables). The area of non-corroded steel calculated the percentage of protected steel. Rust Color Value (RCV), rust based on shades of color within a sample area, quantified the total amount of corrosion (dependent variable) which demonstrated the accumulation of rust. Results Motor oil, polyurethane and canola oil all provided 0% protection against corrosion. Of the former three substances motor oil with RCV of 192 was the least effective substance compared to polyurethane with RCV of 181 and canola oil with an RCV of 151. Honey, however, not only was the most effective shield providing 95% protection but also measured an RCV of 13. My control sample provided 0% protection with an RCV of 159. In addition to rust colors a black color appeared on 3 samples, lemon, Coke Cola, and honey, inhibiting corrosion. Conclusions/Discussion My conclusion is motor oil not only failed to repel water containing threatening oxygen atoms but actually accumulated more rust than the control sample with no substance at all. Although my hypothesis was proven wrong I found honey to be the most effective substance shielding steel against corrosion. This may provide a new additive in steel manufacturing which may result in safer structures and minimizing cost for all people. Honey is organic and not toxic to the environment. Replacing toxic additives with "green" additives reduces harm to people as well as the environment.	
Summary Statement This project investigates the most effective substance protecting steel from the accumulation of rust.	
Help Received Mr. Pannell helped understand scientific method, Dad helped with materials and setting up experiment, Mom helped organize board and edit final report	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Robin C. Cho	Project Number J0606
Project Title Voltage Vitality	
Abstract Objectives/Goals The Objective of this project is to see if more voltage will increase battery shelf life. My hypothesis is that the batteries with the larger voltage will last longer than a battery with the smaller voltage. Methods/Materials I used a type of battery called the Voltaic pile. I built two kinds of voltaic piles: a 1.5 volt and an 3 volt. The battery is built of pennies after 1982, cardboard, electrical tape, and 16 AWG solid wire. I tested each battery for 4 days, and measured the current voltage and voltage lost. I took the averages and found the averages lost per day for two types of batteries: a 1.5 volt and an 3. Results I found that The 1.5 battery lost was about 0.2946 and 3 volt lost about 0.4304 about 0.1 difference. So the two batteries loses about the same amount of voltage a day. Conclusions/Discussion In conclusion, my hypothesis was correct. The 3 volt battery lasted longer than the 1.5 volt battery. I found that the 1.5 volt lost 0.2946 compared to the 3 volt battery, 0.4304, The reason why it lasted longer is because the two batteries had about the same amount of decrease in voltage a day. So the batteries with more voltage will last longer than batteries with less voltage, but too much voltage could damage the appliance.	
Summary Statement The Project is to see if a difference in voltage will affect the battery's life in a shelf.	
Help Received Mom helped get materials. Mrs. Jones supervised my project. Mrs. Owen helped me put the board together	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Natalie S. Dimes	Project Number J0607
Project Title Fry and Reuse	
Objectives/Goals The purpose of this experiment is to find the most effective type of fruit peel that lowers the oxidation of oil. Once this is discovered, the frying oil will be able to be reused more than twice and lower the chance for oxidation. This would allow for the reuse of frying oil for multiple times and for longer periods. This benefits human health and takes advantage of unused fruit peels, instead of throwing them away.	
Abstract Twenty five grams of each type of peel was measured to be added to the same volume of frying oil before heating. The peels were then fried for 15 minutes and then removed from the oil which was left to cool down. The same steps were repeated with the used oil again twice. This process of frying was then done again with French fries and peels and with French fries alone. Finally, the oil by itself was heated 15 minutes each time as well. The temperature was 160°C+2 during all the heating steps. All steps of the experiment were done three times for accuracy. Samples were taken from each frying trial in addition to a sample of the unheated oil. The samples were tested in a lab using the UV absorption method at 230nm which tests the amount of conjugated dienes formed.	
Methods/Materials # 37 L Vegetable oil, # 4 similar frying pots, # 7200g French fries, # 75g Pomegranate peels, # 75g Orange peels, # 75g Lemon peels, # Deep fry thermometer, # Measuring cup, # 1 knife, # 1 cutting board, # Paper towels, # Masks, # stove, # Funnel, # spectrophotometer, # Marker, # Scale, # Big Spoon, # Thermometer, # Gloves, # Kim wipes, # Small pipettes, # Cuvette, # Pieter, # Graduated pipettes, # Air source with tube and a pipette tip at the end, # 75 Glass testing tubes with caps.	
Results The results showed that the absorption decreased in most cases by reusing the oil except in the 3rd with heated oil alone and in the presence of the pomegranate peels. The absorption was less with no additions of peels of potato which indicates that all the additions had some conjugated dienes also.	
Conclusions/Discussion It is recommended to use the pomegranate peels while frying in order for the oil to be reused more times while remaining healthy. If not, then orange would be useful as well. lemon peels are efficient if you fewer times.	
Summary Statement My project is about how we can reuse oil while at the same time keeping its oxidation level low	
Help Received Mother fried the French fries with me; Teacher and Dr. Borthy helped in doing my experiment	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Oliver Fredericksen; Jesse Ruediger	Project Number J0608
Project Title Wanna Burn Some Calories?	
Abstract Objectives/Goals The objective for this project is to find which food product out of a KFC bite, an almond, a crouton, a McDonalds patty, and a marshmallow can produce the greatest amount of energy, or calories. We also want to find how the different food products differentiate between each other, and why which ones had a higher production of energy than others. We want to find how processed food products and all natural food products have a difference of energy production as well. Methods/Materials For testing, we first poured 1/2 cup of water into the small can and put the food product we would test (cut down to the size of an almond), and put the thermometer into the water. We then stuck the lighter through the hole near the bottom of the jug, and began burning. We would burn for 3 minutes, and write down the start temperature and the end. Results The almond produced an average temperature increase of 41 deg C, producing the greatest amount of energy. The crouton produced an average temperature increase of 12.75 deg C, producing the smallest amount of energy. The marshmallow produced the 4th most amount of energy, with an increase of 18.5 deg C. The KFC chicken bite came in 3rd place, with an average increase of 19.5 deg C. The McDonalds patty created the 2nd most amount of energy, with an increase of 21.5 deg C. Conclusions/Discussion We found that our hypothesis was almost backwards, because the almond actually produced the highest amount of energy. We think this because when the food products are all cut down to the size of the smallest food product, in this case the almond, it cuts the energy that it would produce in its normal size.	
Summary Statement This project is based off of calorimetry, and we want to find which food product out of 8 different food items can produce the greatest amount of energy.	
Help Received Father helped construct the calorimeter	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Anusha Ghosh	Project Number J0609
Project Title Hydraulic Fracturing Using Sea Water	
Objectives/Goals The purpose of this experiment was to explore the possibility of replacing fresh water with sea water to create an effective hydraulic fracturing fluid. Hydraulic fracturing extracts oil and natural gas from rock formations deep under the earth's crust using millions of gallons of fresh water. Using sea water to replace fresh water will lessen the impact of hydraulic fracturing on the environment. My hypothesis was: Sea water can be used as effectively as fresh water for hydraulic fracturing by varying the amount of gellant.	
Abstract Methods/Materials Besides water and sand, there are 3 main ingredients of hydraulic fracturing fluid - guar gum, which is a gellant and makes the fluid viscous, boric acid, which is a cross linker that supports the viscosity of the fluid so that the sand can stay suspended, and baking soda, which adjusts the pH of the fluid so that the cross linker can work. In my first experiment I made hydraulic fracturing fluid using tap water, first by varying the amount of guar gum between 1, 1.25, and 1.5 grams, and then varying the amount of baking soda between 0.1, 0.15, and 0.2 grams. In my second experiment I created hydraulic fracturing fluid using untreated sea water by varying the amount of guar gum between 1.25, 1.35, and 1.45 grams. Then I used sea water treated with calcium chloride and bleach, and found that along with varying the guar gum between 1.25, 1.35, and 1.45 grams, I also had to vary the amount of baking soda between 0.1, 0.15, and 0.2 grams.	
Results In the first experiment I found that 1.25 grams of guar gum, 0.15 grams of baking soda, and 0.08 grams of boric acid produces the best viscosity for fracturing fluid made with tap water. In the second experiment I found that 1.45 grams of guar gum, 0.15 grams of baking soda, and 0.08 grams of boric acid produces the same level of viscosity in untreated sea water as in tap water. However, for treated sea water, the best combination is 1.5 grams of guar gum, 0.08 grams of boric acid, and 0.35 grams of baking soda.	
Conclusions/Discussion Sea water can be made as viscous as tap water by increasing the amount of gellant and, as a result, can be used as effectively as tap water for hydraulic fracturing. Therefore the first part of the hypothesis was proven. However, the second part of the hypothesis was partly proven because baking soda also had to be adjusted in addition to varying the amount of gellant.	
Summary Statement My project explores the possibility of using sea water for hydraulic fracturing.	
Help Received Father helped me complete my experiments; Dr. Lewis Norman and Ryan Carlyle answered questions and helped me through difficulties in the project.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Bronwyn Gilfillan; Pooja Patel	Project Number J0610
Project Title Soda Bottle Generator	
Abstract Objectives/Goals Our project was to see if what soda will get a higher energy output Root Beer, Pepsi, or Sprite. Methods/Materials We used soda and potassium hydroxide for the mixture. We used 9 bottles to put the mixture in. A multimeter to measure the electricity. Electrode which we used to connect with the multimeter to get an output. Results Our results were that Pepsi got the most energy output because of the citric and phosphrites acid Conclusions/Discussion With this expirement we can get energy using only soda and potassium hydroxide.	
Summary Statement We wanted to see what soda made the most energy?	
Help Received My partners mom helped make the chemical mixture for safety hazards	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) <p align="center">Ashwin M. Gupta</p>	Project Number <p align="center">J0611</p>
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Project Title
Basic or Acidic: The pH Lab

Abstract

Objectives/Goals
 The pH scale is used to measure acidity of an object. Acidity is measured with pH paper which turns red in acidic and blue in basic/alkaline solutions. My objective is to create pH paper using red cabbage juice, which is naturally pH sensitive due to a pigment called flavin. If my pH paper works then I hypothesize that baking soda will have the highest acidity and milk will have the lowest acidity.

Methods/Materials
Materials
 # Red Cabbage # Lab Filter Paper # Acid test items: Lemon juice, vinegar, soda. Orange juice, banana, black coffee, milk, saliva, pure water, salt water, baking soda, soapy water
Procedure
 1. Slice cabbage at 1 inch intervals 2. Place leaves in a cooking pot and cover with water 3. Cook on medium heat for ½ hour 4. Allow cabbage to cool than pour the liquid into a bowl using a strainer 5. Soak 5 sheets of filter paper in the solution for about ½ hour 6. While sheets dry cut them into strips 7. pH paper is now complete. 8. Test acidic solutions on it. My experiment has 2 trials for each solution. The measurements I intend to take are the intensity of the color of the paper which indicates the pH level of the substance.

Results

ITEM	PREDICTION	RESULT
Lemon Juice	Acidic	Most Acidic
Vinegar	Basic	Acidic
Soda	Acidic	Acidic
Orange Juice	Acidic	Acidic
Black Coffee	Basic	Unknown (Failed to get result due to dark color)
Milk	Most Basic	Neutral
Saliva	Acidic	Neutral/possible basic
Banana	Basic	Basic
Pure Water	Neutral	Neutral
Salt Water	Acidic	Most Basic
Soapy Water	Acidic	Basic
Baking Soda	Most Acidic	Basic

Conclusions/Discussion

Summary Statement
 My project is about the pH scale, and measuring the acidity of various substances we encounter in our daily lives.

Help Received
 Father helped me prepare cabbage juice solution that involves boiling water.



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Ebony L. Held	Project Number J0612
Project Title The Power of Fruit	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The initial objective of my experiment was to find out which fruit or fruit/liquid mixture can charge my iPhone faster. After failing many times, my objective evolved into a more specific purpose. This was to figure out if it is possible to charge a phone using fruit at all.</p> <p>Methods/Materials My first list of materials included an apple, a pear, an orange, ginger ale, sprite, a phone charger and an iPhone. I cut a hole on the top of the fruit and poured the different liquids in the hole. I then inserted a penny and the phone charger. For the second part of the experiment I obtained a multimeter, copper wire, nails, alligator clips, pliers and a variety of different fruits. I built wet cell batteries with the fruit. I connected, measured the voltage and tested the phone and charger with different combinations and quantities of fruit.</p> <p>Results My attempts to charge the phone with only the fruit and soda were unsuccessful. My phone did not turn on. However, by triggering a chemical reaction within the fruit by inserting both the copper wire and the zinc coated nail into the acid already present in the fruit juice, it is possible to create energy. By making and connecting the wet cell batteries I was able to create and maintain a stable electric current which measured at its highest point 14.2 volts. Even at its highest voltage, the fruit batteries were not capable of powering up my phone.</p> <p>Conclusions/Discussion Opposed to the popular belief that it is easy to charge an iPhone with a piece of fruit, it is much more complicated that it seems. Fruit alone does not contain electricity; this is why you cannot charge anything with it. On the other hand, the cell batteries did contain electricity according to the multimeter. After countless hours of testing different variations and quantities of fruit, I was still unable to bring my phone to turn on when I connected the charger. It is very disappointing when you don't achieve the results you are looking for, but it is another lesson learned.</p>	
Summary Statement This project studies fruit's capability to produce electricity to power a common electronic device, a cell phone.	
Help Received Mother helped take pictures, sister video taped, dad helped cut wire.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Madeline Hoisington; Anna Wheat	Project Number J0613
Project Title Where Have All the Shells Gone?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this science fair project is to see what ocean acidification does to the marine environment and marine creatures with shells.</p> <p>Methods/Materials The materials used to conduct this experiment were 15 ml beakers, 10% HCl, concentrated seawater, MQ H₂O, pH meter, small snail shells, sand dollars, scale, oven drier, droppers, and parafilm. The shells were in the 8 different solutions for 3 weeks. Every week, we took the shells out of the solutions, oven dried them, weighed them, and returned them to the appropriate solution.</p> <p>Results There were 8 solutions with 2 samples of each type of shell. Over the course of three weeks we found the following results. For the MQ H₂O with a pH level of 6.50 there was a -2.99% of change. The straight seawater had a pH level of 8.09, there was a 2.19% of change. For the sample that would be the water in year 2100 with a pH level of 7.60 there was a -1.26% of change. Then for the sample with a pH level of 7.16 there was a -1.31% of change. Also the sample that had a pH level of 6.66 there was a -5.44% of change. The next sample had a pH level of 5.75 there was a -5.44% of change. For the sample with a pH level of 3.90, that resembled coca cola, there was a -21.78% of change. The last sample had a pH level of 1.29 there was a -28.39% of change.</p> <p>Conclusions/Discussion As expected, the more acidic the solutions got, the more the shells dissolved. Knowing that the condition of each shell could have changed the results, we tried to get shells of the same look, weight, and condition. The experiment ended like we thought it would, but held some surprises. In the beginning of the experiment, some of the shells gained weight. We thought it was the shape of the shell but it is just the acidity of the water. The more basic the water is, the more the shells can strengthen.</p>	
Summary Statement This project is about how ocean acidification is affecting the marine environment.	
Help Received Used lab equipment at Hartnell College under the supervision of Nancy Wheat	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) McKenna A. Holzworth	Project Number J0614
Project Title Luminol Reaction Times	
Abstract Objectives/Goals The objective of my project is to determine if temperature affects the chemical reaction of luminol. Methods/Materials In my project I used a third cup of water and a spoon to mix the reaction. I also used a third milliliter perborate mixture, a third milliliter luminol, and a few copper sulfate crystals. Once the water and chemicals were mixed together I used a stopwatch to measure the amount of time the reaction lasted in different temperatures. Results The chemical luminol has a longer reaction time in colder temperatures. The experiment lasted an average of 46.6 seconds in 3 degrees Celsius. The warmer chemical reaction, about 73 degrees Celsius only lasted an average of 2.6 seconds. Conclusions/Discussion My conclusion is that a lower temperature makes the chemical reaction with luminol last a longer period of time than the warmer experiment.	
Summary Statement My project tests the affect that temperature has on the chemical reaction with luminol.	
Help Received My science fair teacher helped me set up my board by cutting and gluing papers for me. I had a couple of students in my class assist me by stirring chemicals, while I started the stopwatch and took pictures.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Kaylee J. Hopkins	Project Number J0615
Project Title Gas: Which Beverages Release the Most Gas and How Does It Affect the Stomach?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To see which beverage would release the most gas and how it would affect the stomach.</p> <p>Methods/Materials EXPERIMENTAL METHOD: 1) Pour equal amounts of beverages in each plastic bottle. 2) Mix 2 tsp. of vinegar in each bottle to represent stomach acid. 3) Blow up balloons first to stretch them out, so they will be easier to expand. 4) Put the open end of the balloon over the opening of each plastic bottle. 5) Place each plastic bottle on the heating pad. 6) Watch the balloons as they heat, and document which balloon is expanding the most. 7) Pick which beverage or beverages cause the balloon to expand the most.</p> <p>Results RESULTS: The coke made the balloon expand the most. The orange juice expanded slightly and the water and milk didn't expand at all.</p> <p>Conclusions/Discussion CONCLUSION: My hypothesis was half right. The coke did blow up the balloon first and the biggest like my hypothesis said, but so did the orange juice. The orange juice only blew up the balloon slightly. The coke blew up the balloon, because it has carbonation in it which is carbon dioxide, and the gas bubbles are being released outside the coke into the balloon. The orange juice only blew up slightly because of the sugar breakdown releasing a little bit of gas. Milk and water did not blow up the balloon because neither one contains any gas and is easily broken down in the stomach, unless your lactose-intolerant and then the milk will have problems breaking down.</p>	
Summary Statement Which beverage will release the most gas and how it affects the stomach.	
Help Received My mom helped me with typing, internet research, and providing her opinion on my board.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Kye C. Hurley	Project Number J0616
Project Title Gummy Growing	
Objectives/Goals The purpose of my science project is to test out different liquids and find out which one will make a gummy worm grow the most when the worm is submersed for several hours. Based on some background research, I personally think that distilled water will make the gummy worm grow the most due to the decreased amount of solutes - impurities in water, such as salt, and the effect of osmosis.	
Abstract	
Methods/Materials Materials - Gummy worms; Liquids: tap water, ocean water, distilled water, orange juice, sugar water(6.25%), concentrated sugar water(50%), salt water(6.25%), concentrated salt water(50%), and juice squeeze soda; Tupper ware containers; Tape measure; Kitchen Scale Methods - a) Mark each container 1-9; b) Place 2 cups of liquids in each container; c) Sort each gummy worm by color and weight; d) Choose the clear and red 10 gram gummy worms that were 3 # inches long, ¼ inches wide, and 3/8 inches high; e) Place gummy worms at the same time in each container; f) Keep gummy worms in solution for 8-9 hours; g) Take out each gummy worm and record time; h) Measure and weigh each worm; i) Put gummy worms back in liquid for additional 47 hours; j) Measure and weigh each worm again	
Results My results turned out as I predicted. The gummy worm in the distilled water grew the most in weight and volume. The gummy worm grew to 29 grams and 2.1 inches in volume on the first measurement (after 9 hours). On the second measurement (56 hours) it was 81 grams and 8.2 inches in volume. I also got the gummy worm in concentrated salt water to shrink. On the first measurement it weighed 7 grams and was .293 inches in volume. On the second measurement it weighed 6 grams and was .152 inches in volume. My hypothesis was correct and I actually shrunk a gummy worm.	
Conclusions/Discussion According to my results the less solute in the liquid, the more the gummy worm grows. This matches my background research on osmosis and shows that most all of my liquids (minus concentrated salt water) are hypertonic, or have less solutes than the gummy worm. Alternatively, the concentrated salt water is hypotonic, or has more solutes than the gummy worm. The amount that the gummy worm grew has to do with the amount and type of solutes in the water. Based on my data salt is a stronger solute than sugar because the same amount of salt (by volume) made the gummy worm grow less and even shrink compared to the same amount of sugar.	
Summary Statement The purpose of my science project is to submerge gummy worms in different liquids and find out which liquid will make a gummy worm grow the most.	
Help Received Father helped measure and create poster.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Zian M. Ibrahim	Project Number J0617
Project Title Electrolyte Challenge: Comparing the Electrolytes of Sports Beverages vs. Fruit Juices	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To investigate whether or not sports drinks such as Gatorade and PowerAde have more electrolytes than orange juice (freshly squeezed) and Coconut Water. My hypothesis was that either PowerAde or Gatorade will have more electrolytes compared to Orange Juice or Coconut Water because more and more TV commercials these days promoting these sports drinks as the only source of replenishment of electrolytes after heavy work out, playing sports, or strenuous exercise</p> <p>Methods/Materials This experiment compared several beverages such as tap water, distilled water (dH₂O), PowerAde, Gatorade, Orange juice, and Coconut water to observe which one has the most electrolytes. I made conductance sensor using a scissor, drinking straw, and two pieces of copper wire and assemble the conductance measuring circuit by attaching the battery clip to the 9 V battery and alligator clips to connect the Multimeter, battery, and conductance sensor. I measured the DCA (direct current) from Multimeter when the conduction sensor was used in different bowls of beverages with three trial runs and recorded the results. Measured current were converted to Conductance by dividing the Ave. current by 9V.</p> <p>Results Both Orange juice and Coconut water had higher Conductance compared to the sports drinks such as Gatorade & PowerAde and other beverages.</p> <p>Conclusions/Discussion My Hypothesis proved wrong. From the result it shows that both freshly squeezed Orange juice and Coconut water have higher conductance which indicates that both have the higher amount of electrolytes compared to both PowerAde & Gatorade. Between Orange juice and Coconut water, Coconut water has more electrolytes. Thus, Orange juice and/or Coconut water could be used instead of the sports drinks to replenish the electrolytes for dehydration.</p>	
Summary Statement This experiment compared several beverages and showed which one has the highest amount of electrolytes.	
Help Received I received help from my father, Sajjad Ibrahim for setting up the Multimeter and the terminal conductance measurements.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Phoebe Y. Kim	Project Number J0618
Project Title I Found My Oxygen	
Abstract Objectives/Goals The purpose of the experiment was to test how changing the temperature of water affected the concentration of dissolved oxygen in the water, and also see how global warming affected ocean life. It was expected that water with more heat would hold less oxygen due to the greater amount of heat energy causing the molecules to move faster and pushing out oxygen. Methods/Materials In the experiment, five different water temperature groups ranging from 5°C-8°C were tested for their concentrations of dissolved oxygen. Each group had ten water samples of which five were aerated and five were not. Manganous Sulphate Solution, Alkali-Azide Reagent, Sulphuric Acid Solution, and starch indicator were mixed into the water in sequence. Titration was then used to find the dissolved oxygen concentration of the water. Results The average concentration of dissolved oxygen for the group with the coldest water was 4.89mg/L without aeration and 9.15mg/L with aeration while the group with the warmest water had an average dissolved oxygen concentration of 0.87mg/L without aeration and 1.65mg/L with aeration. Conclusions/Discussion The results of the experiment supported the hypothesis, but also lead to thoughts on environmental issues. Global warming has been a major problem nowadays and has also caused oceans to become warmer. The results of this experiment displayed another way that global warming has negatively affected the world. Due to the oceans now being warmer, there is less oxygen for ocean life. In conclusion, as the temperature of water increases, the dissolved oxygen concentration decreases.	
Summary Statement This project is about how water temperature affects the concentration of dissolved oxygen in the water.	
Help Received Mother bought materials; Mother took pictures; Experiment was performed under the supervision of Mother	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Seungjune Lee	Project Number J0619
Project Title Effects of Temperature on Speed of Electrolysis of Water to Hydrogen Gas and Oxygen Gas	
Abstract Objectives/Goals My objective was to determine how does temperature of water affect speed of electrolysis of water to hydrogen gas and oxygen gas. Methods/Materials Mass of water disappeared from 100 grams of water and 2 grams of potassium nitrate at 25°C after 5 minutes of electrolysis. Then, mass of water evaporated from 100 grams of water and 2 grams of potassium nitrate at 25 degrees Celsius after 5 minutes without electrolysis. Lastly, mass of water evaporated was subtracted from mass of water disappeared after electrolysis in order to calculate mass of water turned into hydrogen gas and oxygen gas due to electrolysis. Identical experiment was conducted for water temperature of 35, 45, 55, and 65 degrees Celsius. And whole sequence was repeated 4 times more. Results The average mass of water turned into hydrogen gas and oxygen gas for temperatures 25, 35, 45, 55, and 65 degrees Celsius was 0.20g, 0.42g, 0.66g, 1.34g, and 2.04g. For every single trial, the mass of water turned into hydrogen gas and oxygen gas after 5 minutes of electrolysis was greater when the temperature of the water was higher. Conclusions/Discussion A conclusion can be drawn from results from my experiment that the higher the temperature of water is, the faster the speed of electrolysis is. This information about general relationship between temperature and electrolysis provides more efficient way to use electrolysis than before in various areas.	
Summary Statement This project determines the relationship between temperature and electrolysis.	
Help Received My science teacher, Mrs. Martin, provided me potassium nitrate and equipments. And my dad bought me all materials.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Marcus X.S. Luebke	Project Number J0620
Project Title Running on Water: Optimizing Hydrogen and Oxygen Production from Water to Power Cars	
Objectives/Goals The objective of this research is to maximize hydrogen production via optimization of water electrolysis and see if I can create a design to continuously produce enough hydrogen fuel to run a car as an alternative to gasoline.	
Abstract Methods/Materials I measured hydrogen production by adjusting variables that affected production rate and production efficiency (voltage, type of current, plate distance, number of plates, and/or electrolytes in the water).	
Results Results that helped find the optimum production rate: <ul style="list-style-type: none">- The closer the plates are together, the higher the rate and efficiency.- More plates produced more gas in a better-than-linear fashion.- DC current is better than AC current rate-wise.- Increasing power increases rate but decreases efficiency above 1.48 volts.- Electrolytes: Table salt (NaCl) decreases production rate but adding sodium-carbonate (Na₂CO₃) increases rate and efficiency because it encourages the electro-chemistry without participating in it. <p>By applying all the optimization results I showed that I could produce enough hydrogen real-time (goal was 714 mL/min) to run a car with a reasonable number of batteries and plates.</p>	
Conclusions/Discussion My results supported my hypothesis and indicate that hydrogen is potentially a good alternative to gasoline for running cars as it is more efficient as a fuel, can be produced rapidly enough from water (using electricity from batteries) to not require storage, and is clean for the environment.	
Summary Statement This project optimized the splitting of water for use as a fuel to run cars.	
Help Received My Dad helped me get materials and be safe, my Mom helped me with reviewing slides, my Grandma and Stanford University Professor Chidsey helped me understand the chemistry of what was occurring in my experiments.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Raveena K. Mahal	Project Number J0621
Project Title CO(2) Wonders	
Objectives/Goals Abstract Have you ever wondered why Alka-Seltzer Original tablets produce those little bubbles when they're dropped into water? Well, those little bubbles are called carbon dioxide and the purpose of this experiment was to find out if increasing the amount of Alka-Seltzer Original tablets would also increase how much carbon dioxide is being produced. In my research, I found out that the active ingredient in Alka-Seltzer Original is sodium bicarbonate. It produces carbon dioxide when added to the water. My hypothesis was that increasing the amount of tablets would increase how much carbon dioxide is being produced. In my experiment I first made the apparatus with a graduated cylinder and a cup. Then, I dropped one Alka-Seltzer Original tablet into the cup and measured the amount of carbon dioxide produced with the graduated cylinder. Next, I repeated this process, while increasing the amount of tablets. Finally, I concluded that my hypothesis was correct; increasing the amount of Alka-Seltzer Original tablets would increase the amount of carbon dioxide being produced.	
Summary Statement In this project, I learned that more carbon dioxide was being produced as I increased the amount of Alka-Seltzer Original tablets.	
Help Received Dad helped set up tubing for apparatus. Mom took me to store to buy supplies.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Taylor R.K. Matsu	Project Number J0622
Project Title What's in the Beef?	
Objectives/Goals My project was to determine if the measured fat extracted from ground beef will be less than what is published on the label.	
Abstract Methods/Materials Purchase packages of ground beef, lean ground beef, extra lean ground beef from three different stores. Form a 4 oz patty of each grade. Place patty in a pot, measure 16 oz of water and add. Boil meat for two minutes using a spoon to break up the meat. Place pot in refrigerator for 4 hours to cool. Weigh plastic container for extracted fat and record mass in grams. Extract/skim off fat into plastic container. Weigh container of fat in grams and record the mass. Repeat the procedure 3 times for each type of ground beef (9 samples) and determine the % of fat in each patty (divide the fat weight in grams by the patty weight in grams x 100)	
Results The average % of fat extracted from extra lean (90/10) was 7-8%, lean(85/15) was 12% and regular (80/20) was 15-19%. Each type from 3 different stores were less than the published label and all similar in results except for regular ground beef. One store showed 4% higher in results than the others.	
Conclusions/Discussion Results showed extra lean ground beef has significantly less fat than standard ground beef making it a healthier choice. The % of fat are guidelines for the consumer. Experiment showed that the fat content was not always what was contained on the label but it was consistently shown to be lower than the packaged label.	
Summary Statement The amount of fat extracted from ground beef will be less than the published commercial label on the package.	
Help Received Mother purchased the 3 types of ground beef and supervised the boiling of the meat.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Eliza P. Neeley	Project Number J0623
Project Title Just Beat It: Would Lowering the pH in Egg Whites Affect the Volume of Foam Produced by Beating?	
Objectives/Goals I wanted to discover if lowering the pH in egg whites affects the foam produced by beating the egg whites. My hypothesis was if I lower the pH of egg whites, by adding lemon juice, then the eggs will foam with a greater volume. The more lemon juice added, the more foam will be produced.	
Abstract Methods/Materials I treated equal amounts of egg whites (2 fl oz) with the control (water) or lemon juice. I beat the egg whites at the same speed and for the same period of time. I then measured the volume of foam and recorded the pH of each of the egg white trials. I used eggs, lemon juice, an electric egg beater, water, various measuring cups and beakers, a pH meter, and a stop watch.	
Results The average volume of the egg whites after the first control (adding one tsp. of water) was 1.91 cups, and their pH was 9.06. The average volume of the egg whites after adding one teaspoon of lemon juice was 2.16 cups, and their average pH was 8.45. The average volume of the egg whites after the second control (adding two tsp. of water) was 1.83 cups, and their average pH was 9.13. The average volume of the egg whites after adding two teaspoons of lemon juice was 2.33 cups, and their average pH was 6.33.	
Conclusions/Discussion In this experiment, I found that lowering the pH in egg whites does affect the foam produced by beating the egg whites. Lemon juice lowers the pH in egg whites, and increasing the amount of lemon juice added increased the volume of foam that was produced. Based on the data collected, my hypothesis appeared to be correct. Adding one teaspoon of lemon juice led to more foam than the control, and adding two teaspoons increased the volume further.	
Summary Statement This project was created to determine if lowering the pH in egg whites would affect the volume of foam produced by beating the egg whites.	
Help Received I used the the lab and pH meter at Trefethen Vineyards in Napa, under the supervision of my dad, Zeke Neeley. My mom read over the science board papers to make sure they were grammatically correct.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Amy C. Nguyen	Project Number J0624
Project Title It's the Acid	
Objectives/Goals My objective was to determine how ocean acidification, the increase in the oceans' acidity, effects marine life.	
Abstract Methods/Materials In my experiment, I divided 9 jars into groups of 3 to satisfy three classifications of basic with a pH about 8, neutral with a ph of about 7, and acidic with a pH of about 6. Each jar contained 1 ounce of quarter-sized mussel shell fragments. I created my own solutions where 3 buckets were assigned either basic, neutral, or acidic and started out with an equal amount of tap water and Instant Ocean Sea Salt. They were then titrated by either adding baking soda to raise the pH or vinegar to decrease the pH. The solutions were read using pH indicator strips. Each bucket's solution was transferred into their 3 jars. The 9 jars remained undisturbed for 3 weeks; 3 weeks later, the jars were drained, reweighed and observed.	
Results I found that the shells fragments in jars A, B, and C with a pH of 8 did not decrease in weight or change appearance, and therefore all the shell fragments weighed 1 ounce. The shells in the neutral jars D, E, and F also has no deterioration in weight, but the shells in all 3 jars had a slight discoloration. The shell fragments in acidic G and I weighted 0.9 oz., and Jar H weighted 0.8 oz. The mussel shells in the acidic jars obtained a subtle white cast and discoloration.	
Conclusions/Discussion As a result, ocean acidification causes the shells of mussels degrade in weight and can affect their stability. The shells immersed in the basic and neutral solutions (pH of 8 and 7) had no diversity in terms of weight, remaining at 1 ounce. The shells in acidic jars G, H, and I did meet differentiation with weight of 0.8 and 0.9. Although the difference is not significant, in years the shells would have been consumed and in unhealthy conditions.	
Summary Statement My intensions in my project was to explore if there was an impact on the mussel shell fragments due to the acidity of the solutions' pH.	
Help Received Teacher let me borrow pipette; Neighbor let me borrow digital scale and help drain jars; High school teachers helped calibrate pH meter, failed, and lent me pH strips; Sister helped take pictures.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Ana R. Quintos	Project Number J0625
Project Title Investigating the Effect of the Initial Temperature on Hand Warmer (Sodium Acetate) Reaction	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to find the ideal initial temperature (-8, 8, 20, or 40° C) of a reusable hand warmer to produce a more efficient hand warmer (longer lasting and greater heat generation). My goal is to prove that 40°C is the best initial temperature.</p> <p>Methods/Materials To do this experiment, I first put the hand warmers into water baths to get the desired temperature (-8, 8, 20, or 40°C). After activating the hand warmer, I measured its temperature (using an infrared thermometer) in specific time intervals for 1 hour and 30 minutes. My independent variables were the initial temperatures, and the dependent variable was the heat production of the hand warmers. My controlled variables included: the hand warmers, the time intervals of measuring the temperature, and the duration of time.</p> <p>Results The results show that the 40°C initial temperature helped to generate a longer lasting heated hand warmer. On average, the temperature drops (from the peak temperatures) of the 40°C was 12°C, 20°C was 19.2°C, 8°C was 16.2°C, and the -8°C was 13.4°C. The average peak temperatures of the activated hand warmers were: 54.3°C for 40°C, 51.8°C for 20°C, 47.8°C for 8°C, and 39.2°C for -8°C.</p> <p>Conclusions/Discussion In conclusion, I found that the 40°C initial temperature was ideal for a longer lasting hand warmer, proving that my hypothesis was partially correct. The reason for this was I also found that the -8°C produced a larger amount of heat generation than the 40°C.</p>	
Summary Statement My project is finding the best initial temperature for an efficient heat generating hand warmer when activated.	
Help Received My mother helped type report.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Jacob R. Salners	Project Number J0626
Project Title Illuminating Electrolytes: A Study of Electrolyte Levels in Sports Drinks	
Objectives/Goals The experiment is being preformed to see which drink would provide the best electrolyte replacement for people doing physical activity. The hypothesis is "If various liquids are tested for electrolytes through strength of conductivity, then Vitamin Water will have the highest conductivity."	
Abstract	
Methods/Materials Materials: Multimeter [setting at 2 mA] Plastic Drinking Straw 8" lengths of 20 gauge copper wire 9-Volt Battery cup of Gatorade, cup of PowerAde, cup of Vitamin Water Zero, cup of Vitamin Water, cup of Orange Juice, cup of Bottled Water Distilled Water for washing the apparatus between uses. Procedure: Step one: Pour the amount [1 cup] of each electrolyte containing liquid into a separate plastic cup. Step two: Wrap each length of wire around the straw at opposite sides and connect to battery and multimeter. Step three: Immerse the straw and copper wire apparatus in each solution for 90 seconds to stabilize conductivity reading.	
Results The results are as follows: at the base line water had a conductivity of .003 Siemens, followed by orange juice with a value of .020 Siemens. After that was Vitamin Water Zero with a .028 Siemen conductivity. Power Ade was next in the running with a.061 Siemens conductivity, then Gatorade with a Siemen reading of .084, and in first place by a landslide was Vitamin Water with a Siemen rating of .181.	
Conclusions/Discussion According to the data collected, the hypothesis was supported. It is supported by the data that all of the sports drinks had more electrolytes that the control. Some problems that occurred with this project were that the data on the multimeter fluctuated a few numbers at a time as the apparatus or the solution moved slightly so what was done is readings were taken at 30 sec. intervals. If I were to do this project again I would have done the evaporation method so that I could find the content of each electrolyte.	
Summary Statement This project is about using the scientific method to test the electrolyte levels in various sports drinks.	
Help Received dad helped glue things down to the board	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Jonah P. Tenenbaum	Project Number J0627
Project Title How Low Can You Go?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to analyze why salt is used to melt ice on roads and determine how salt lowers the freezing point of water and to prove the hypothesis: If water is mixed with salt, then it will freeze at a lower temperature than water without salt.</p> <p>Methods/Materials Three plastic cups were filled with 8 ounces of distilled water and different concentrations of sea salt. The control held only one cup of distilled water, while the other two cups had 1 or 2 tbsps of salt dissolved into them. All three cups were placed in the freezer and then the temperatures of each cup were measured by a food thermometer and recorded at timed intervals of 20 minutes until ice formed and the temperatures were stable. The data from three trials were averaged.</p> <p>Results The cup with 2 tbsp of salt froze at the lowest temperature with an average 14.7°F, the water with 1 tbsp of salt froze at an average temperature of 22.5°, and fresh water froze at an average temperature of 30.6°F. As shown by the data, the water with 2 tbsp of salt froze at the lowest temperature, the water with 1 tbsp of salt froze in the middle, and the fresh water froze at the highest temperature.</p> <p>Conclusions/Discussion According to the data collected, the hypothesis appears to be supported. The water did freeze at a lower temperature when salt was added to it in all three trials. The experiment supports the real life application of using salt to prevent and/or clear ice on roads, because salt lowers the freezing point of ice below the temperature of the surrounding area.</p>	
Summary Statement My project investigates why salt melts the ice on roads and/or prevents it from forming by lowering the freezing temperature of the water.	
Help Received My parents bought supplies, revised the document and the board. Mr. Joseph (my science teacher) gave me ideas for edits.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Andrew K. Tuinstra	Project Number J0628
Project Title Soaking in Soda: Good for Pennies, Bad for Teeth	
Abstract Objectives/Goals To determine which soda, if any, will clean the tarnish and corrosion off of a penny after a week of soaking in the beverage. If the sodas can remove corrosion, I will infer from the results which soda is most likely to harm your teeth's enamel. Methods/Materials Methods- The first step in my experiment was to choose similarly worn, and corroded pennies to test. I selected six pennies for each soda. One to use as a #control# penny to compare the results to, and five to test in the soda. Since the difference in corrosion levels between the pennies was a variable that couldn't eliminate, I tried to select pennies that were very similar to the #control# penny to reduce the variable as much as possible. The second step was to label plastic cups with the name of the soda and to fill each cup with exactly 4 oz. of that soda. I placed a control penny for each soda in front of each row, and placed a penny in each cup. I soaked the pennies for one week in the sodas. At the end of the week, I removed the pennies from the cups and rinsed them off with water. I grouped the pennies by soda and compared them to the control penny for each soda. I ranked the pennies to determine how much each had been cleaned. I was then able to determine which sodas had the greatest effect, on average. Materials- corroded pennies, 20 different carbonated beverages, 100 plastic cups, measuring cup. Results With the exception of water, which was my control beverage, all of the other sodas cleaned of some corrosion on the pennies teste4d. The soda that seemed to remove the least amount of corrosion was A&W Root Beer. The sodas that removed the most amount of corrosion were Dr. Pepper and Pepsi. Conclusions/Discussion I could infer from the results that these sodas would likely wear away the enamel of your teeth him a similar way that they removed the corrosion from pennies. Although the pennies in my experiment soaked in the sodas for a week, I had observed that remains on your teeth for even a short period of time can start having an effect on your enamel. Therefore, it is best to brush your teeth as soon after drinking any of these sodas. All of these sodas tested removed some level of corrosion from the pennies, and can wear away the enamel of your teeth. Therefore, the safest beverage to select to protect your teeth is water.	
Summary Statement Are the ingredients in different types of soda powerful enough to clean off a corroded penny (and likewise harm the enamel of your teeth as well)?	
Help Received Father helped print and mount paper on board.	



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Haidyn N. Washburn	Project Number J0629
Project Title The Leaching of Phthalates from Polyethylene Terephthalate Bottles into Water	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment is to see if harmful chemical phthalates leach out of polyethylene terephthalate bottles into drinking water.</p> <p>Methods/Materials 2 flats of water bottles were purchased from a store. Due to unknown storage of water I had 2 control variables: store bought water and well water were poured into 1 liter glass bottles. Independent variables were plastic bottles filled with store bought water and plastic bottles emptied of the store bought water and refilled with well water. 8 bottles per variable were then exposed to 144 degrees in a sauna 2 hours a day for 14 days. 8 bottles per variable were left in the sun for 14 days. After exposure all liquids were poured into glass bottles and taken to lab for ultrasonic extraction and Gas Chromatography/Mass Spectrometry.</p> <p>Results After analysis of the well water control tests using the GC/MS, sample one had zero phthalates in the water and sample two had .90466 ppb phthalates in the water. After analysis of the well water exposed to heat using the GC/MS, samples one and two had zero phthalates, sample three had 1.32083 ppb, and sample four had 1.71226 ppb phthalates in the water. After analysis of the well water exposed to sun using the GC/MS, one had 2.58315 ppb, sample two had 1.96569 ppb, sample three had 1.34942 ppb, and sample four had 1.71226 ppb phthalates in the water. After analysis of the store bought water control tests using the GC/MS, sample one had 1.48591 ppb and sample two had 0.90294 ppb phthalates in the water. After analysis of the store bought water sample exposed to heat using the GC/MS, samples one and two had zero phthalates, sample three had 1.58953 ppb phthalates, and sample four had 0.84735 ppb phthalates in the water. After analysis of the store bought water sample exposed to sun using the GC/MS, spectrometry sample one had 1.08912 ppb phthalates, sample two had zero phthalates, sample three had 2.89470 ppb, and sample four had 0.81811 ppb phthalates in the water.</p> <p>Conclusions/Discussion These results are disturbing because the phthalate found was Dimethyl Phthalate. This chemical is found in pesticides, bug repellent and rocket fuel. It can harm the reproductive systems in both males and females and is classified as a teratogen by the National Toxicology Program.</p>	
Summary Statement To determine if harmful, chemical phthalates are leaching out of recyclable plastic water bottles into our drinking water.	
Help Received Mother took photos; Dr. Leonard Fong supervised my testing and allowed me to work at APPL Labs	