



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Julia M. Abele	Project Number J0601
Project Title Batter Up! How Does the Amount of Time Blending the Batter and the Amount of Time Letting It Sit Impact Pancake Height?	
Objectives/Goals I conducted this experiment to see if I could make pancakes rise higher based on how long I blend the batter and how long I wait before cooking the pancakes.	
Abstract Methods/Materials I used the ingredients for Bisquick pancakes. For my first batch (my control), I blended the batter 1 minute and cooked it immediately. I blended the second and third batches of pancakes 3 and 5 minutes, respectively, and cooked them immediately. Blending for 1 minute resulted in the fluffiest pancakes. So, for the fourth and fifth batches, I blended the batter for 1 minute but waited 7 and 14 minutes, respectively, before cooking the pancakes. I measured the pancake height in millimeters, recorded my data, and repeated this process three more times.	
Results The pancakes generally rose the way I expected, though a single outlier pancake rose extremely high (20 mm!). My results showed that the least amount of blending combined with the greatest waiting time before cooking resulted in the highest pancakes, with an average height of 12.6 mm. The next highest were the control pancakes (blended 1 minute and cooked immediately), with an average height of 10.3 mm. The flattest pancakes were those blended for more than a minute, with an average height of about 7.3 mm.	
Conclusions/Discussion Blending the batter for 1 minute and waiting 14 minutes before cooking resulted in the highest, fluffiest pancakes (average height of 12.6 mm). My hypothesis was correct. The next highest were the control pancakes (average height of 10.3 mm). The flattest pancakes were those blended for more than a minute (average height of about 7.3 mm). Whenever I bake in the future, I will try to remember that patience plumps the pancakes, while over-mixing flattens them.	
Summary Statement My project studied the role of baking soda in pancakes by measuring the impact of blending and waiting time on the height of a pancake.	
Help Received My science teacher, Ms. Margeson, provided helpful advice. My mom helped me cook the pancakes. I also received advice from Mrs. Hoffmann and Mrs. Benedict.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Yasser A. Aly	Project Number J0602
Project Title Super-Cool Water and Salt Effect on Ice	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To see how super-cooling is done, and which type of salt defrosts ice the fastest.</p> <p>Methods/Materials</p> <ol style="list-style-type: none">1. Water bottles2. Ice3. Bowl4. Cups5. freezer6. knife or scissors7. Kosher, iodized, and sea salt <p>Results It turns out kosher salt is the salt that defrosts ice the fastest. Iodized is the second and sea is the least. Plain water was the lowest all together meaning salt does defrost ice faster then normal.</p> <p>Conclusions/Discussion People who's ships are frozen should use kosher salt do defrost the ice.</p>	
Summary Statement I decided to explore creating ice (super-cooling) and defrosting it (salt effect on ice).	
Help Received a scientist at UCSD gave me the idea of finding which salt defrost the fastest.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Sophia Aravanis; Jordan Stewart	Project Number J0603
Project Title Taffy Tactics	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to determine whether the amount of sugar put into taffy affects its flexibility.</p> <p>Methods/Materials Made three batches of taffy and individually tested the flexibility along a meter stick by taking each end and recording its breaking point.</p> <p>Results Out of all the batches, repeated trials with each batch concluded that the batch with more sugar had a farther breaking point, and the one with less sugar breaking sooner. Leaving a conclusion that the more sugar put into taffy, the farther it will stretch.</p> <p>Conclusions/Discussion Testing taffy with different variations of sugar put into them revealed that there was a difference in flexibility, which is the more sugar inserted into taffy, the more "stretchy" and flexible it will be. It is concluded that the amount of sugar in taffy does make a difference in flexibility.</p>	
Summary Statement As a result of testing the amount of sugar used to create taffy, we concluded that with more sugar, the taffy is more dense, and the less sugar inserted, the thinner.	
Help Received The taffy and the experiment was tested, built, and created by my partner and I.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Larisa M. Assadourian	Project Number J0604
Project Title I Love Dairy, but It Hates Me: Testing the Glucose Content of Milk and Ice Cream	
Abstract Objectives/Goals My objective or goal in this science project is to understand why people become lactose intolerant. People should also be informed about how much glucose there is in the milk they drink and the ice cream they eat. Methods/Materials First, I made the glucose liquid with 1 glucose tablet and 200mL of water. I poured 20mL of the completed liquid into the test tube. In the other test tubes, I poured the soymilk, lactose free ice cream, lactose free milk, water, and regular milk. I dipped five glucose strips in each liquid and laid them on a paper towel. To help me analyze the glucose content, I used glucose test strips. On the bag, there is a color chart that corresponds to different glucose levels. Every minute I recorded the estimated glucose amount for ten minutes using a stopwatch, and recorded the results. After completing the process, I put a drop of Lacteeze into each liquid and rolled each test tube in my hands for two minutes. Once again, I did the process of dipping and measuring. At last, I calculated my results. Results Water did not have any glucose content. The glucose solution had some content (300mg/dL). Regular milk had low glucose content (80mg/dL). Lactose free milk had much higher glucose content (590mg/dL) than regular milk. Soymilk demonstrated very low levels of glucose because it has no lactose. Lactose free ice cream had very high levels of glucose (1250mg/dL). Regular milk with one drop of lactase enzyme demonstrated a huge increase in glucose level (from 80 to 680mg/dL). Lactose free milk with one drop of lactase enzyme demonstrated a very minute increase in its high glucose level (from 580 to 670mg/dL). Soymilk with one drop of lactase enzyme demonstrated no increase in glucose level (from 15 to 40mg/dL). Similarly Lactose free ice cream with one drop of lactase enzyme demonstrated very little increase in its high glucose level (from 1060 to 1100mg/dL). Conclusions/Discussion The experiment demonstrated that lactose free dairy products have much higher glucose concentration than those in regular dairy products. The experiment also revealed that the addition of lactase enzyme to regular milk caused the glucose concentration to increase tremendously due to that fact the original lactose has broken to glucose and galactose upon reaction with the lactase enzyme.	
Summary Statement This project is about measuring the glucose concentration in different dairy products.	
Help Received I would like to thank my parents, Michael & Dr. Lena Assadourians, for buying the right materials, taking pictures while I did the procedure, and for supporting me and encouraging me to do this science experiment. I would also like to thank the scientist that I have contacted, Christina Kasparian for	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Zahra A. Aziz	Project Number J0605
Project Title The Effects of High and Low pH Levels and Sodium Citrate on Spherification for Human Health	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to determine whether changing the pH level of cherry juice, carrot juice, water, and vinegar with the addition of sodium citrate affects the ability of liquids to undergo spherification. Spherification is the process of liquids turning into semi-solid spheres using chemical bondings. My hypothesis was if I added sodium citrate to the liquids if the pH levels weren't in a rage from 5-7, it would affect the ability to undergo spherification because sodium citrate increases pH levels.</p> <p>Methods/Materials I created a solution with water and 2 grams of calcium chloride. Then, I blended cherry juice with 2 grams of sodium alginate, found the pH of the solution, and dropped the solution with a syringe into the calcium chloride bath. I repeated this with carrot juice, water, and vinegar. If spheres didn't form for any of these liquids, I blended them again with sodium alginate but kept adding sodium citrate in 0.5 gram increments until spheres formed. I found the pH levels of those liquids again after the additions of sodium citrate. I repeated all of this 2 more times for a total of 3 trials. Once the sodium alginate solution touches the calcium chloride, the sodium alginate seperates from the liquid and bonds with the calcium chloride, forming a film around the liquid and trapping it in a sphere.</p> <p>Results The liquids water and carrot juice underwent spherification without sodium citrate because the pH levels were 7 and 6. Cherry juice had a pH of 3 before sodium citrate for 3 trials and had to have an addition of 1.3 grams in average to successfully undergo spherification. After the addition, the pH was 5. Vinegar had a pH of 1 before and had to have an average addition of 3.3 grams of sodium citrate to undergo spherification. After the addition, the pH was 4.</p> <p>Conclusions/Discussion The data proved my hypothesis of sodium citrate increasing pH levels was supported. The more sodium citrate I added for cherry juice and vinegar, the higher the pH levels were. In my experiment, a way to decrease the pH levels of liquids was determined. Decreasing pH levels of liquids could help ulcer patients, children, and GI patients.</p>	
Summary Statement I explored the effect of the additon of sodium citrate on pH levels of different liquids so that spherification could occur, which has many benefits for human health.	
Help Received My science teacher helped me understand the process of spherification and my mother helped me find potential applications in the medical field for my project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Braydon A.C. Cannon	Project Number J0606
Project Title The Dehydrated Egg	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project is to determine which types of fluids will hydrate and dehydrate the membrane of an egg.</p> <p>Methods/Materials 3 eggs, vinegar, corn syrup, water, blue food dye, scale, yellow gatorade, 1 can of pepsi, yellow energy drink. Egg shells removed with vinegar soak 24-48hrs, placed 1 egg in corn syrup, placed 1 egg in blue dyed water, 1 egg not put in any fluid and observed for 2 days, then eggs were switched into the fluids and observed for another 2 days. Both eggs then placed in gatorade for 2 days and observed. Both eggs were hydrated and rehydrated again for 2 days then placed in Pepsi for 2 days. Both eggs were hydrated and dehydrated again for 2 days, then placed in yellow energy drink for 2 days. Then all 3 eggs were placed in water for 2 days and observed.</p> <p>Results When the shells were removed with vinegar the egg's membrane was exposed. When Egg 1 was placed in corn syrup, the membrane became shrivled and wrinkly. Egg 2 was not placed in water and was seen to get smaller and the membrane was becoming wrinkly too. Egg 3 was placed in water and the membrane was tight and shiny and the egg grew larger. When the eggs were put in the yellow gatorade the yellow dyed the egg's membrane. It hydrated the dehydrated egg by making grow bigger, but it dehydrated the hydrated egg. Pepsi also dyed the egg's membranes brown and the membranes were becoming weaker. When the eggs were placed in the yellow energy drink, the membranes were fizzing in the fluid and the membranes were starting to crack. Water hydrated the eggs the most and corn syrup dehydrated them the most.</p> <p>Conclusions/Discussion Repeated trials showed that corn syrup dehydrated the eggs the most and water hydrated the eggs the most. I was able to see the process of Osmosis and learned the fluids move in and out of a membrane similar to our blood cells. I learned that water hydrates the membranes but too much call swell a membrane and almost make it burst. I saw the soda and enegry drinks hydrate cells with fluid but destroy the membranes. Water is the best thing, but not too much.</p>	
Summary Statement I showed which fluids dehydrate and hydrate an egg's membrane	
Help Received My parents helped me with weighing the egg's because they were very fragile and I didn't want them to break	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Kory A. Cascadden	Project Number J0607
Project Title Flash Frozen	
Abstract Objectives/Goals The objective is to find out why boiling water freezes faster than room temperature water. Methods/Materials Materials Two identical cups (that can at least hold a cup and a half of water); One measuring cup; One freezer set to ; One stove; One pot to boil water in; One source of water; Two stopwatches for each cup; One data journal. Procedure Take your measuring cup and fill it until it is a cup full. Then pour the cup of water into your pot. Then put your pot on the stove. Turn on the stove. While you are waiting for the water to boil measure another cup of water and put it into one of your identical cups. Then set it down until the water boils. Once the water has boiled pour it into your other identical cup (make sure to burn your hands on the hot pot) (also make sure you get all of the water in the cup). Now put both of the cups in the freezer. Then start your stopwatches at the same time. Check about every 5-10 minutes to see if they have frozen yet. Once one off the cups has frozen stop the stopwatch and make sure to write down the time it took to freeze and if the water was boiled or not. Once both cups have frozen repeat the whole thing to confirm your results. Results The boiling water froze completely, first. Conclusions/Discussion I proved my hypothesis (that the room-temperature water would freeze first) wrong.	
Summary Statement I tested the Mpemba effect (the effect that states boiling water freezes faster than room temperature water), the cause for the phenomena, and how it relates to the Leidenfrost effect.	
Help Received None. I did the project by myself.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Noah M. Chak	Project Number J0608
Project Title Beware of the Bezoar	
Abstract Objectives/Goals The objective was to see how much did a seven year old boy eat to be able to form a bezoar. This project was also a test to see what would be a safe amount of gelatin a human stomach could take before clogging intestines. Methods/Materials Cardboard (to cover the bowls), Plastic measuring tools, Hydrochloric acid (1.5 molar), Digital Scale, Gummy, Bears, Glass Bowls, Water, Blender, Gloves, Timer. Timed gummy bears sitting in the HCl for four hours and then measured the mass that was left over, if any. Results The results that came out supported my hypothesis by the constant climb of gummy bears left over. According to our results there was a major increase of leftover gummies over 20 ounces. One serving of gummy bears is only one ounce. The mini snack size bags of Haribo Gummy Bears is only a half an ounce. The only outlier in the data was the fact that the weight was greater after the acid exposure in the 35 ounce bowl. I think that the water and the HCl may have been absorbed by the gummies and not broken down therefore the retained water increased the total weight. Otherwise the other smaller measurements below 20 ounces either disappeared or there was very little mass left. Conclusions/Discussion In this experiment I tested how much it takes to overwhelm the stomach and form a bezoar. I hypothesized that the more gummy bears used, the more that would be left over after going through #digestion#. The results that came out supported my hypothesis by the constant climb of gummy bears left over. According to our results there was a major increase of leftover gummies over 20 ounces. One serving of gummy bears is only one ounce. The mini snack size bags of Haribo Gummy Bears is only a half an ounce. The only outlier in the data was the fact that the weight was greater after the acid exposure in the 35 ounce bowl. I think that the water and the HCl may have been absorbed by the gummies and not broken down therefore the retained water increased the total weight.	
Summary Statement As found in my results gelatin consumption should not be over 20 ounces because it will not pass through the intestines and cause massive pain.	
Help Received I performed the experiment with Dr. Grace Kim from the Pediatric Emergency Department at Loma Linda Childrens Hospital.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Nathan Deng	Project Number J0609
Project Title Drop by Drop: Manipulating the Surface Tension of Water to Find the Best Way of Cleaning	
Objectives/Goals This project explored how temperature, surfactant, and salt would influence the surface tension of water, in order to find the best method of cleaning. I hypothesized that the best way to lower water surface tension is to manipulate, or otherwise, disrupt the intermolecular pull among the polar water molecules at or near the water-air interface. I attempted to do so by using 1) temperature to increase the kinetic energy of water molecules, 2) surfactant, (e.g. soap) to target the water molecules on the water surface, and 3) ions of Na ⁺ and Cl ⁻ to influence the hydrogen bonds between water molecules on the surface and in the bulk.	
Abstract Based on the principle of a stalagmometer, I developed a version of the drop weight method using a syringe and plastic tubing to determine the surface tension of the following liquids: aqueous solutions of sodium lauryl sulfoacetate (SLSA) at 0.01375%, 0.0275%, 0.055%, 0.1%, 0.2% and 0.5% concentration levels at 20oC, and aqueous solutions of NaCl at 0M, 1M, 2M, and 6M concentration levels at 20oC. The surface tension of distilled water at 5oC, 15oC, 20oC, 35oC and 50oC was also measured.	
Methods/Materials Based on the principle of a stalagmometer, I developed a version of the drop weight method using a syringe and plastic tubing to determine the surface tension of the following liquids: aqueous solutions of sodium lauryl sulfoacetate (SLSA) at 0.01375%, 0.0275%, 0.055%, 0.1%, 0.2% and 0.5% concentration levels at 20oC, and aqueous solutions of NaCl at 0M, 1M, 2M, and 6M concentration levels at 20oC. The surface tension of distilled water at 5oC, 15oC, 20oC, 35oC and 50oC was also measured.	
Results A higher temperature lowered the surface tension of water linearly by moderate amount. Surfactant (SLSA) reduced water's surface tension dramatically until the critical micelle concentration (CMC) was reached at around 0.1%, beyond which the surface tension of SLSA solution remained steady at about 30 dynes/cm. The surface tension of salt water rose slightly (by about 1.7dyn/cm per molar) as salt concentration increased.	
Conclusions/Discussion My hypothesis was supported by all but one discovery: salt actually raised (not lowered) water's surface tension. In the real world, knowing how much soap to use to wash objects is important, since adding too much beyond CMC wouldn't necessarily clean better. When surfactants aren't available, hot water would be most efficient. The concepts of surfactant, CMC, and micelle are fascinating. I'm planning to investigate the properties of different surfactants and find ways to lower CMC to further improve the cleaning process, for example, how do temperature and salt affect CMC? Knowledge gained is useful in real life applications such as oil recovery, environmental remediation, and drug delivery.	
Summary Statement I developed a modified stalagmometric method to study the influence of temperature, surfactant, and salt on water surface tension. I found that surfactant was much more effective in lowering surface tension than rising temperature.	
Help Received Ms. Davignon offered valuable advice and support, and taught me the fundamental chemistry concepts that enabled me to carry out this project. My father tried out my procedure to verify repeatability, and helped me with Excel graphing. My parents purchased all of my materials.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Shoshana H. Ellis	Project Number J0610
Project Title It Says Organic. Is It True?	
Abstract Objectives/Goals Do organic and standard fruits and vegetables have different levels of pesticides? Methods/Materials Commercial Blender, a standard centrifuge machine used for 30 minutes at the speed of 1000rpm., filters which are called filter vials, commercial Mass Spectrometer used with a liquid chromatography method. Results These tests determined that not all the pesticides were found, indicating that there were some pesticides detected. The levels are shown in parentheses and measured in kilo counts per second (kCps). The pesticides that were found in standard apples were Pyrimethanil (326.66), Chlorantraniliprole (0.95), and Thiabendazole (0.21). In standard blackberries, only Pyrimethanil (0.38) was found. In the standard carrots, Pyrimethanil (0.58), and Linuron (0.28) were found. Imidacloprid (1.58) and Azoxystrobin (5.73) were found in the standard tomatoes. In the standard cucumbers Boscalid (5.26) and Dime (3) were detected. Overall, the organic fruits and vegetables had no pesticides detected. Conclusions/Discussion The findings of pesticides did not support the hypothesis because there were no pesticides detected in the organic fruits and vegetables. A possible reason the results came out to be unexpected was because the method that was used in the test was a faster modified method. It could also be because the testing that was done through the mass spectrometer was only done using 180 types of pesticides when there are hundreds more that could have been tested.	
Summary Statement I tested to see if organic and standard fruits and vegetables have pesticides. I found that there were some pesticides in standard fruits and vegetables but no pesticides were detected in the organic foods.	
Help Received I traveled to Bruker, which is a lab in San Jose. Here I received guidance from Dr. Zicheng Yang who helped me test for my project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Sofia C. Fausone	Project Number J0611
Project Title Desalination: Can It Affect the Ocean's Carbon Dioxide Holding Capacity?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my experiment is to determine whether or not the wastewater from desalination plants affects the ocean's ability to absorb CO₂ when released back into the ocean. This brine is 2x as saline as ocean water. The World's oceans are an important sink for CO₂, and increased desalination could have a big impact on Global Warming if it limits the amount of CO₂ that can be absorbed by the ocean.</p> <p>Methods/Materials I used a Soda-Stream to carbonate data sets of water: with no aquarium salt (Control), the average salt concentration of the ocean (A), 1.5x this value (B), and 2x this value (C). I used a Vernier PH probe and a KH kit to test each data set once before carbonation; after adding CO₂ I tested all 15 samples per set. Using an online PH, KH and CO₂ algorithm, I calculated CO₂ absorption. I then compared the results.</p> <p>Results I found that the more salt added to a solution, the more CO₂ it absorbs, but only up to a certain concentration. Set #B# showed an unanticipated peak at which the most CO₂ was absorbed. At the highest concentrations, however, less CO₂ is absorbed. In #C#, the salt concentration of desalination #waste water# absorbed about 619.927 less CO₂ in ppm than the simulated ocean water #A#.</p> <p>Conclusions/Discussion Repeated tests show that simulated desalination brine absorbs much less CO₂ in ppm than simulated ocean water. The results partially contradict my hypothesis, as I did not foresee the spike in set #B#. However, set #C# did absorb less CO₂ than #A#, which I did predict. If brine continues to be pumped into the ocean, over time less CO₂ will be absorbed, and will thus stay in our atmosphere. This expands my knowledge about Chemistry because I learned a lot about PH, KH, and how it can be applied to current issues.</p>	
Summary Statement I showed that increasing the salinity of the oceans through returning desalination brine to them negatively impacts the ocean's ability to absorb Carbon Dioxide.	
Help Received I designed the project, tested all samples, and wrote it by myself. I received help from Healdsburg High School teacher Mr. Lee, who let me borrow the Vernier Lab Pro and PH probe, my science teacher Ms. Smith, who let me borrow the triple beam balance, and my father, who helped me measure out 500 ml of	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Nicholas L. Finke	Project Number J0612
Project Title Drinking the Ocean: Desalinating Seawater and Generating Hydrogen Using Organic Waste	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The object of my project is to determine the effect of hydrogen generation on the amount of desalination produced by a microbial electrolysis desalination cell (MEDC). An MEDC desalinates seawater and also generates hydrogen using only the energy produced by bacteria digesting organic waste. I built two cells - a regular microbial desalination cell (MDC) which does not generate hydrogen as a control, and an MEDC to compare the desalination rate with the MDC. A microbial electrolysis desalination cell can help solve two important global problems: it generates clean energy which reduces greenhouse gas emissions, and it provides drinkable water for the world's expanding population. Due to the abundance of organic waste and seawater, the microbial electrolysis desalination cell can solve these problems cheaply, so even people in developing countries can use the technology and benefit from it. The design can be scaled from a small portable unit for an individual family to a large installation in a wastewater treatment plant.</p> <p>Methods/Materials I built my MEDC and MDC from scratch using acrylic plates and cylinders, semipermeable ion exchange membranes, carbon felt electrodes, and an Arduino microprocessor kit and breadboard. I simulated organic waste using benthic mud from a nearby lake. I measured water salinity with a digital refractometer, hydrogen output using an MQ-8 hydrogen gas sensor, and voltage and current output with a digital multimeter.</p> <p>Results Over a period of one month my MDC desalinated simulated seawater from 35 parts per thousand (ppt) of total dissolved solids (equivalent to seawater) to 19 ppt, and the MEDC desalinated to 20 ppt. The hydrogen output slowly rose over the month, leveling out at the end of the month to around 650 parts per million. The output voltage and current generally decreased over time.</p> <p>Conclusions/Discussion My results show that the MDC and MEDC both can use exoelectrogenic bacteria to desalinate seawater, and although it is generating hydrogen, the MEDC desalinates only a little less than the MDC. Therefore an MEDC is more beneficial than an MDC since it has the added advantage of producing hydrogen, another form of clean energy. I was not able to completely desalinate my simulated seawater because as the water becomes desalinated, the central chamber of my 3-chamber cell loses conductivity, so the cell cannot produce enough electricity to desalinate all the seawater.</p>	
Summary Statement Using a microbial electrolysis desalination cell to generate hydrogen gas has only a small effect on its ability to desalinate seawater.	
Help Received My dad helped me use a power drill and epoxy to build the two cells.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Ariana J. Fotovat	Project Number J0613
Project Title The Effects of Salt, Sugar, and Sand on Ice	
Abstract Objectives/Goals The objective of this project was to test the effects of salt, sugar, and sand, on ice. The purpose of this, was to try to find a substitute to salt to melt ice effectively, while leaving out the negative side effects that salt causes on our environment. Methods/Materials Materials used to conduct this experiment, include ice cube trays, bowls, a freezer and refrigerator, graduated cylinder, stopwatch, measuring spoon, table salt, sugar, and sand. Results Out of the three substances tested, salt melted ice the fastest, followed by sugar, then sand, and lastly control. Conclusions/Discussion Salt melted ice the fastest. This means that out of salt, sugar, and sand, there isn't a more or equally as effective substance than salt, that can melt ice without the negative side effects that salt has on our environment.	
Summary Statement I conducted an experiment that tested salt, sugar, and sand, to find which substance was the most effective to melt ice, and out of these three substances, salt was the most effective.	
Help Received My parents did not help me conduct my experiment, but they did help to clarify some of the concepts related to my project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Alyssa J. Fraser	Project Number J0614
Project Title The Effect of Sodium Carbonate on Pacific Ocean Water Samples	
Abstract Objectives/Goals The objective of this study was to compare the pH and ALK levels and determine how Sodium Carbonate affects them for four different Pacific Ocean water samples. Methods/Materials Collected ocean water samples. Tested the pH and ALK using test strips. Added Sodium Carbonate and tested the pH and ALK again. Results After measuring the pH and ALK before and after adding Sodium Carbonate, I compared the data. The pH levels varied in the original samples and after adding the sodium carbonate the pH levels increased significantly. Conclusions/Discussion Samples from bigger cities had lower pH, so pollution may increase ocean acidification. Sodium Carbonate can be used to reduce acidification but further testing is needed to determine its effect on marine life.	
Summary Statement I tested what effect Sodium Carbonate has on ocean water, and found that it increases the pH level.	
Help Received I did the experiment myself, however my mom helped me find some of my research, and my dad helped with cutting and pasting things on my board.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Samantha C. Gaiera	Project Number J0615
Project Title Does Freezing Carbonated Water Affect CO2 Coming Out of Solution?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project was designed to find out if freezing carbonated water affected CO2 coming out of solution. The hypothesis was that if carbonated water was frozen, more CO2 would come out of solution than if carbonated water was kept at room temperature for the same amount of time.</p> <p>Methods/Materials 80 ml of carbonated water was measured and put into 2 jars. Carbonated water was used because its only ingredients are CO2 and H2O. The pH of the carbonated water was measured and recorded using a digital pH meter. The pH meter was measuring the acidity from the carbonic acid made from the CO2 in the water. The test was placed in the freezer and the control was left to sit out at room temperature. The time of day was noted. After the test froze overnight, it was removed from the freezer and left to melt to room temperature. 24 hours after the initial pH test, the pH of both solutions was recorded. This procedure was repeated for three trials.</p> <p>Results The average difference between the initial and final pH for the carbonated water that had been frozen was 1.20. The average pH difference for the control was 2.19. This showed that less carbon dioxide came out of solution in the freezer than in the solution sitting out. Although the length of each trial was close to 24 hours, the time in the freezer was not controlled, so that might have affected the results.</p> <p>Conclusions/Discussion My hypothesis was incorrect. I said that in one day's time, freezing carbonated water would make CO2 come out of solution faster than letting carbonated water sit out. The results of my three trials showed that letting carbonated water sit out, increases the pH more than freezing and thawing it for the same amount of time. The more carbonic acid in the water, the lower the pH. This suggests that freezing carbonated water slows the amount of CO2 coming out of solution.</p>	
Summary Statement In my experiment, I wanted to know if freezing carbonated water affected the rate of CO2 coming out of solution.	
Help Received My mom gave me format tips for my my back board and drove me places. Mr. Ennes, the 8th grade science teacher at my school, showed me how to use and lent me the digital pH meter I used for my project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Emily S. Herrod	Project Number J0616
Project Title Dirty Money	
Abstract Objectives/Goals The object of this experiment was to see if drug residue is located on currency. If so, where the money was from, what types of drugs were found and how much residue was present. Methods/Materials The experiment was conducted at the Drug Enforcement Administration (DEA) Drug Laboratory in Carlsbad, California. The currency used in this experiment was collected from various parts of the world. All of the machines like the Ion Scan and the LC-MS machine were provided and found in the laboratory. Other materials needed were vials, Methanol solution, a syringe, cartridges with filter paper, a vacuum, safety goggles, and a lab coat. Results The Ion Scan and the LC-MS machines showed that Washington D.C. had the most positives with 100% of the bills testing positive for cocaine residue. Cocaine was the drug that appeared most on the money. Other drugs present were methamphetamine, heroin, and marijuana. Some places that came up negative for any drug residue was Russia, China and Mexico. When the samples were run through the LC-MS machine most of the results corresponded with the ones received from the Ions Scan. Conclusions/Discussion Based on the results from the Ion Scan and the LC-MS machine, it is concluded that the United States has about 51% of their bills contaminated with drugs. Compared to other countries, the United States has the highest contamination rate.	
Summary Statement This project's purpose is to find out what place has the highest contamination rate, what drugs are on the money and to compare the results.	
Help Received DEA Drug Laboratory in Carlsbad: Provided materials and a place to conduct the experiments. Mentor: Forensic Chemist Todd Davis provided guidance during experiments. Parents and Friends: Helped to collect currency.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Sadie R. Howard	Project Number J0617
Project Title Burning Biofuels	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project was to determine if the energy in renewable fuel is equivalent to the energy in the same amount of non-renewable fuel.</p> <p>Methods/Materials Measure the temperature change over time in water as it is heated using renewable fuel and non-renewable fuel. Using a ring stand, stop watch, thermometer, aluminum can, pipette, cotton cordage to absorb fuel, lighter, vegetable oil, and motor oil.</p> <p>Results The amount of energy in non-renewable fuel proved to be greater than the energy in the same amount of renewable fuel because the motor oil heated the water at a rate of .28 degrees (F)/s, while the vegetable oil heated the water at a rate of .21 degrees (F)/s. However, the motor oil was only greater by 7 hundredths of a degree per second.</p> <p>Conclusions/Discussion Repeated trials of non-renewable and renewable fuels show them to be comparable sources of energy, differing by output of 7 hundredths of a degree per second. This means that renewable fuels can provide a reasonable alternative to non-renewable fossil fuels.</p>	
Summary Statement I found that the amount of energy in non-renewable fuel was greater than the energy in renewable fuel by only 7 hundredths of a degree(F) per second.	
Help Received I designed the project using ideas from the internet. My teacher helped me understand the details of science fair. I got help to conduct my experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Zainab Husain	Project Number J0618
Project Title How to Grow Homemade Stalactites	
Objectives/Goals The objective of this project is to determine the growth of stalactites under various temperatures.	
Abstract Methods/Materials Water, Epsom salt (about ten pounds), pieces of rope (thirty centimeters each), ten identical glasses, a heat lamp, ten trays, a spoon, a fridge, and ten clips were used. An infrared thermometer and a ruler with millimeters were also used to make my measurements. Fill water up to the top of the glasses. Add Epsom salt to the water until it does not dissolve anymore. More salt can be dissolved in a hot solution so it is best to dissolve the salt in a pot on the stove. It is best to dissolve the salt a little bit at a time so that the salt dissolves faster. Bend the rope so that it looks like an #m#. It is optional to put paperclips at the end of each glass to secure the rope. Dip the ends of the rope into the two solutions. Put the glasses on the tray to catch the dripping water. Put two of the glasses each on a tray in the following locations: In the fridge, garage, in the warmth of a heat lamp, on the balcony, and in room temperature. The water will climb up the rope and it will drip. Water that has been saturated with Epsom salt should also be added to all of the cups. (Make sure to add the same amount of water and Epsom salt to the cups). In three days your stalactite will have eventually grown many centimeters. Now you can carefully disconnect your stalactite from the end of the rope. Conclusions/Discussion For my experiment, my hypothesis was that the room temperature stalactite would grow the fastest and I was right because I knew stalactites grew in warmer temperatures rather than colder temperatures. Moderate (room) temperature inside the house proved to be most suitable for consistent growth of stalactites. Cold outdoor temperatures slowed down the flow of water on the ropes and therefore the Stalactites grew slowly. The heat lamp increased the temperature too much and caused some of the water to evaporate instead of traveling across the rope.	
Summary Statement My project is about the growth of stalactites under various temperatures.	
Help Received I researched how Stalactites are formed over time and set up the experiment. Dad supervised to make sure I was safe while heating up water to make the salt solution. Mom helped shop for the materials.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Saliha Islamovic	Project Number J0619
Project Title Organic vs. Non-Organic	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to come to test organic fruits and come to a conclusion that Organic fruit is better your health and worth buying over non-organic fruits.</p> <p>Methods/Materials Three Organic Tomatoes, three non-organic Tomatoes, three Organic Apples, three non-organic Apples, three Organic Oranges, three non-organic Oranges. 2 trays to place fruit on for the experiment(When placed in exposed environment. Litmus paper (Also known as PH Scale paper). PH Scale, blender, juicer, notebook, binder, paper, pencil, pens, scissors, plastic ziploc bags.</p> <p>Results The Organic fruits were less acidic than the non-organic fruits. The organic fruits had also decayed faster than the non-organic fruits like I hypothesized because it is at least 95% grown organically and is approved by the US Department of Agriculture and is grown without pesticides, preservative or any other type of growth hormones.</p> <p>Conclusions/Discussion It turned out that the Organic fruits were less acidic than the non-organic fruits. The organic fruits had also decayed faster than the non-organic fruits like I hypothesized because it is grown without pesticides, preservatives, genetically modified organisms, or any other type of growth hormone.</p>	
Summary Statement My project is researching and testing if organic fruit is better for your health and worth buying over non-organic fruits.	
Help Received I performed my experiment alone and got help to fully understand the PH scale and its levels from my science teacher Garry Dillard and former participant Ahmed Asif	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Alexis H. Kim	Project Number J0620
Project Title The Effect of Ascorbic Acid and Phosphate on Copper Corrosion	
Abstract Objectives/Goals A lower scale faster model of copper pitting was created with a copper pipe loop to measure whether or not ascorbic acid and phosphate inhibited copper corrosion. Methods/Materials It was assumed that copper corrosion occurred when copper was found in the test water after trials had been performed with a recirculating copper loop system. The copper was detected and measured using reagents. Ascorbic acid and sodium phosphate NaH_2PO_4 were chosen to be tested because ascorbic acid is used to neutralize chloramine (one of the suspected causes of copper pitting in households) in hospitals and phosphate creates a natural coating in a pipe. Results Distilled water and tap water were used as controls, and the water conditions tested were tap water with ascorbic acid, tap water with phosphate, and ascorbic acid with phosphate. The copper loop system continuously produced consistent results. It was found that tap water with phosphate had the lowest amount of copper (compared the averages after 6 trials of each condition) meaning that it had the best results. On the other hand, tap water with ascorbic acid released the most copper from the pipe, which was unexpected. Overall, sodium phosphate decreased copper corrosion significantly for each condition. Conclusions/Discussion The experiment yielded very consistent results, and it was concluded that phosphate was a reliable inhibitor of copper corrosion. Throughout Southern California, and other places across the U.S., homeowners burdened with pinhole leaks in their copper plumbing systems. Any research on this topic would be significant in fixing or even preventing this expensive and water-wasting problem.	
Summary Statement By successfully building an experiment that was a faster model of copper corrosion, I was able to measure and observe the effects of ascorbic acid and phosphate on copper corrosion, and conclude that phosphate inhibits corrosion the best.	
Help Received Dr. James Li, Dr. Todd Haney, and Dr. Chuck Cao were helpful mentors. Dr. Todd Haney helped get me a water pump and Dr. David Fruman gave me sodium phosphate to use in my project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Ashley S. Kleszewski	Project Number J0621
Project Title The Effects of Eutrophication on Pond Water	
Objectives/Goals Abstract For my project I tested how adding different contaminants to pond water affects the amount of oxygen in the water. My hypothesis was, if nutrient contaminants are added to pond water, then oxygenation will increase as plant growth increases.	
Abstract Methods/Materials Procedure Go to the Guajome Lake and collect 1.2 liters of pond water. Gather all materials. Add 150mL of pond water to each of the 15 mason jars. Add 15mL of fertilizer to 5 mason jars. Add 15mL of detergent to 5 mason jars. Leave 5 jars with only water. Place the jars in the sun. Leave them there for 7 days. Take photos and write observations daily	
Results During the first trial, the jars with no added chemicals remained around the same while the jars with fertilizer and detergent added to them had a decreased amount of oxygen over time. The jars with fertilizer had the most drastic change during this trial. All of the jars started day 1 with about .8 or .7ppm in those jars, the lowest ppm that was reached during this trial was by detergent 3, fertilizer 1, and fertilizer 5, who all reached .3ppm by the seventh day. During the second trial my results remained very similar to the results of the previous trial. For example, the jars with no added contaminants experienced no significant change. While the lowest ppm that was reached was .3 and the fertilizer jars had the highest change. During the third trial, my results changed, the jars without any contaminants added reacted the same as they did the first two times but the fertilizer and detergent jars had a significant drop in oxygen between day 4 and 7. This drop resulted in some jars having only .1ppm of oxygen at the end of the week.	
Conclusions/Discussion Conclusion My hypothesis was incorrect because oxygenation decreased when contaminants were added to pond water. My goals were to help people understand how they unintentionally damage our environment. I also hoped to learn how to prevent eutrophication and what the long-term effects are. I have always been interested in finding ways to conserve resources and protect the environment so this project helped me understand how small actions are very damaging, so when you wash dirt into the water, you are not only making the water more difficult to desalinate, but you could also be contributing to eutrophication which is very damaging.	
Summary Statement This project tested the eutrophication of pond water as seen in oxygen content after adding contaminants.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Joseph Kuruvilla; Lizbeth Kuruvilla	Project Number J0622
Project Title Will Adding Corn Syrup or Glycerin Improve a Mixture of Bubble Solution?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to determine if glycerin or corn syrup will improve a regular mixture of bubble solution by making a better bubble. We will be observing the changes and seeing if there is a longer/shorter duration or an increase/decrease in size.</p> <p>Methods/Materials Three mason jars with lids for the three solutions, measuring cup and tablespoon to have an equal measurement for each solution, spoon and a bowl to help with the mixing, Dawn Ultra dishwashing soap, Refreshed distilled water, Karo light corn syrup, Top Care glycerin are the ingredients for the solutions, pipe cleaners for bubble wands, red Sharpie marker to label the three mason jars, a stopwatch with 0.01-second accuracy to measure the duration of the bubbles from each solution, and a notebook to record observations.</p> <p>Results In conclusion, adding corn syrup or glycerin will improve the mixture of a bubble solution and our hypothesis was correct. In fact, glycerin beat corn syrup. But, they both did better than just detergent and water (Solution # 1). We conducted this experiment outside and it was cool weather. Although it took some tries, we were still able to get accurate results. Depending on the weather conditions, there will be changes in the way the bubbles last. We really did enjoy this experimental procedure because it is a unique way of discovering and exploring. This experiment provided us with accurate results and it also completed our hypothesis. It showed a great contrast among Solution # 1, Solution # 2, and Solution # 3. To sum it up, glycerin would do the right job to improve a mixture of bubble solution that you bought at a store.</p> <p>Conclusions/Discussion Well, surface tension is the key secret for bubbles. According to Kid's Blog, surface tension can be referred to as #the elastic skin# or #the forces holding the molecules together,# according to Scientific American. Have you ever wondered why mixing water to make bubbles doesn't quite work? This is because the surface tension is high, making the bubbles pop. On the other hand, if you mix detergent, corn syrup, or glycerin, the surface tension is low, making the bubbles last longer. To sum it up, you can see how just plain water has a lower surface tension, which is why it's hard for big bubbles to form and the duration of the bubble is short. This expanded our knowledge of chemistry because it showed how two homemade formulas can make a difference.</p>	
Summary Statement We found out that bubble solutions with corn syrup and glycerin are better than a regular bubble solution, but the solution with glycerin is the best out of all.	
Help Received Thanks to Science Buddies for helping us to find a topic for our science fair project. The website helped guide us with our experiment and gave us creative ideas for the project. It also had already laid out the basic outline and we had to plan and create. We also want to thank our parents for buying the supplies in	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Isaac H. Morgan	Project Number J0623
Project Title Testing Voltage Generated from Produce	
Abstract Objectives/Goals The objective is to determine which type of produce generates the most voltage: a lemon, a tomato, an orange, or a potato. Methods/Materials Large naval oranges, lemons, potatoes, tomatoes, butter knife, AA battery, two 2" alligator clips, vice grips, voltage meter, tissue paper. Measured voltage generated by four different types of produce. Averaged the results of the tests to determine which type of produce generates the most voltage. Initially tested a AA battery to ensure that the voltage meter worked properly. Results The tomatoes and the lemons generated exactly the same voltage on average to the hundredth decimal place, but that average was higher than the averages of both the potatoes and oranges. Conclusions/Discussion The averages of my test results, per type of produce, indicate that the salt, water and acid content of each different type of produce have an effect on how much voltage is generated. However, since tomatoes have the highest water and salt content, but lemons have the highest level of acidity, it was inconclusive whether the salt and water content, as opposed to the level of acidity, had a larger effect on the amount of voltage generated. If a larger sample size of tomatoes and lemons was tested and resulted in a higher average of one compared to the other, there would be better data on which to base an inference about whether acidity, as opposed to water and salt content, have a larger effect in generating voltage.	
Summary Statement I found that tomatoes and lemons generate more voltage than oranges and potatoes, which leads me to infer that the level of salt, water, and acid content in each type of produce have an effect on the amount of voltage generated.	
Help Received Both parents helped construct the display board and edit my writing. The superintendent of schools provided an engineer who helped with terminology, my oral presentation and display board. Val Hemingway, who has experience as an electrician, explained what voltage is.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Bhargav Panguluru	Project Number J0624
Project Title Water to Fuel to Water	
Abstract Objectives/Goals To increase the efficiency of the electrolysis of water process with the use of cobalt nitrate catalyst. Methods/Materials Tested the efficiency of electrolysis of water process by measuring voltage drop across the Galvanostatic electrochemical cell by adding cobalt nitrate catalyst to the phosphate buffer solution. 0.1M Phosphate buffer solution pH 7.0; Cobalt nitrate; Nickel metal strips; 9V batteries; Breadboard; Electrical wire; 10K Ohm resistor; Multimeter Results The baseline voltage/efficiency of electrolysis of water is compared with the voltage/efficiency after adding the cobalt nitrate catalyst. The improvement in efficiency is significantly better. I saw the formation of Cobalt based catalyst electroplated on anode. I also saw the formation of hydrogen at cathode, and oxygen at anode as bubbles. Conclusions/Discussion The efficiency of electrolysis of water can be increased by cobalt catalyst. I indirectly proved Ohm's law and learned about measuring voltage and current. Also, I learned that keeping the current constant is the most important factor of this experiment. Three factors that affect the output are 1) Battery source. 2) Resistors. 3) Any change in the electrochemical cell. I also learned about bond formations, catalysts, and chemistry overall in this experiment. I saw the water-splitting reaction, the hydrogen forming at cathode, oxygen forming at anode, and also the catalyst forming at anode.	
Summary Statement I synthesized a cobalt based catalyst that effectively increased the efficiency of electrolysis of water process.	
Help Received I used internet to do my research and development, and followed the directions provided by MIT.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Maya R. Porche	Project Number J0625
Project Title Tough Beans: How Various Substances Affect the Cooking Time of Legumes	
Abstract Objectives/Goals The objective of this project is to measure how different substances cooked with beans affects bean hardness and cooking time. My goal was to determine what substances shorten the time required to cook beans. Methods/Materials I cooked lima beans with each of the following test substances added to the water: baking soda, salt, milk, sugar and tomatoes. Once the lima beans were cooked, I set up a wire-type cheese slicer with a cup attached to the end of its lever, and measured how many pennies placed in the cup were needed to cut through three beans cooked with each of the test substances. Results I determined that beans cooked with salt had the lowest penny count with an average of 13 pennies to cut the beans, and that salt softened them. I determined that beans cooked with sugar had the highest penny count with an average of 151 pennies to cut the beans, and that sugar made the beans harder. Conclusions/Discussion Salt had the lowest penny county because salt allows the rate of adsorption to slow, while majorly speeding cooking. Sugar had the highest penny count because it slows the swelling of granules in cotyledons while strengthening the cell walls in beans.	
Summary Statement This experiment contributes to the world of cooking by showing which substances harden or soften beans and affect the cooking time of beans.	
Help Received I performed each step of the experiment myself without assistance.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Jacqueline Prawira	Project Number J0626
Project Title Coffee-Doh Battery: Boosting the Power of an Enviro-Battery Using Coffee's Acidity in Homemade Conductive Dough	
Objectives/Goals Coffee-Doh battery is an enviro-battery created by combining 3 concepts: the acidity property of spent coffee grounds (SCG), homemade conductive dough and electrolysis. The objective is to prove that adding SCG can boost the voltage and current produced in homemade conductive dough (or Coffee-Doh) and to discover that Coffee-Doh can generate power with the presence of cathode-anode; resulting in Coffee-Doh Battery.	
Abstract Methods/Materials Coffee-Doh = spent Coffee grounds (SCG) + homemade conductive dough Coffee-Doh Battery = Coffee-Doh + (cathode and anode) I conducted six preliminary phases prior to Coffee-Doh Battery testing. The experiment procedures were: 1. Developed Coffee-Doh recipes (control: homemade conductive dough #17) 2. Tested different ratios of SCG in the Coffee-Doh (0%, 12.5%, 25% and 37.5%) 3. Tested different amounts/weight of Coffee-Doh (50g, 75g, 100g, and 150g) All tests performed in 3 trials and compared to control; using multi-meter to measure the amount of voltage, current and power generated, with the same cathode-anode combination (C and Mg). Further testing/Applications were conducted to power up LCD clock, whistle chip and 5 different LED lights by comparing: 1) three different recipes of Coffee-Doh Batteries, 2) the performance of Coffee-Doh Battery to typical enviro-batteries. All tests were performed in 1, 2, and 3 cells connected in series. The levels of power, loudness and brightness were observed.	
Results Voltage, current and power increased as the ratio of SCG and the amounts/weight of Coffee-Doh increased. However, too much SCG will not form a Coffee-Doh. A good Coffee-Doh recipe must have flour (no less than 62.5% in weight) and SCG (no more than 37.5% in weight). Lower voltage anomalies were found and sources of errors were addressed. Coffee-Doh Battery successfully powered up LCD clock, whistle chip, and 5 different LED lights and its performance exceeded typical enviro-batteries.	
Conclusions/Discussion My hypothesis was proven that the acidity property of SCG caused more chemical reaction (oxidation) to happen and boosted the voltage, current and power produced; creating a Coffee-Doh Battery with the presence of cathode-anode. Coffee-Doh Battery is an example of a hands-on school project that involves students in the process of learning and inspires creativity. It can help reduce the regular battery usage and waste in small school projects.	
Summary Statement Coffee-Doh Battery is proven as an enviro-battery that not only performs better than the typical enviro-battery, but also can be beneficial in promoting students' science learning and creativity.	
Help Received My parents were my mentors and supervised this project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Alicia Roice; Ashlyn Roice	Project Number J0627
Project Title Healthy Options for Treating Heartburn (Acid Reflux): Natural vs. Synthetic Antacids	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of our science fair project was to understand the effectiveness of natural antacids in bringing relief to acid reflux compared to synthetic antacids. Our hypothesis for this project was that if we add antacids to an acid(vinegar), then it will neutralize the vinegar(acid) and that the natural antacids will be healthier way to reduce acid reflux compared to synthetic antacids.</p> <p>Methods/Materials Different types of natural and synthetic antacids, vinegar, pH Meter, digital balance, measuring cups, graduated cylinders. Preparation of antacid solution: For antacids in solid form, 1 gm of powdered antacid was mixed with 25 ml of distilled water. For liquid antacids, 1 ml of antacid was mixed into 24 ml of distilled water. The pH value of each of the solutions were measured with pH meter and recorded into appropriate tables. Neutralization reaction: Each of the antacid mixtures was added to 50 ml of vinegar, and the pH of the antacid-vinegar mixture was measured and recorded into the result tables. The above steps were repeated three times for each antacid to get three sets of readings.</p> <p>Results All synthetic antacids neutralized the vinegar and reduced the pH of vinegar to a value between 4 and 5, except for Mylanta. The pH of the Mylanta solution mixed with vinegar was 3.35. Of the number of natural antacids tested, banana, evaporated milk, reduced-fat milk, buttermilk, Manuka Honey and Aloe Vera juice reduced the pH of vinegar to a value between 3 and 4. All the synthetic antacids that we tested lowered the acidity of the solution to acceptable levels. The natural antacids listed above reduced the pH to a range between 3 and 4, which is considered a healthy range of pH for stomach.</p> <p>Conclusions/Discussion The results of our experiment support our hypothesis. The results show that natural antacids can be used to relieve acid reflux caused by a spicy, oily, or fatty meal. The natural antacids neutralize the stomach acid and bring its pH to a healthy level of acidity. Note that a natural antacid acts slow and may not bring relief as fast as a synthetic antacid. Since the natural antacids work as good as the synthetic antacids and they do not have harmful side effects, we believe that the natural antacids are the healthier choice for reducing acid reflux.</p>	
Summary Statement We compared the effectiveness of natural and synthetic antacids for reducing heartburn and found that natural antacids are the healthier choice.	
Help Received Our Mom helped us with acquiring materials for the experiment and setting up the experiment. Our Dad helped us with taking photographs.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Roaa A. Shaheen	Project Number J0628
Project Title What Is the Effect of Different MgSo₄ Concentrations on Hydrogen and Oxygen Gas Production?	
Abstract Objectives/Goals The objective of this experiment is to see the effect of different magnesium sulfate concentrations on hydrogen and oxygen gas production through the process of electrolysis. Methods/Materials 9-Volt battery, test tubes, water, magnesium sulfate, balance, syringe, timer. Put the battery in different magnesium sulfate concentrations, set timer for twenty minutes, saw amount of hydrogen and oxygen gas production using syringe. Electrolysis Process. Results 9-Volt battery placed in several different concentrations of magnesium sulfate to find which concentration produced most hydrogen and oxygen gas. Different peaks at which gas production was most. No particular pattern. Conclusions/Discussion Trials with different concentrations showed no specific - linear/exponential -correlation. No optimum concentration either; just peaks at different concentrations for most gas production.	
Summary Statement Using the process of electrolysis, I proved that there is no particular correlation between magnesium sulfate concentrations and hydrogen and oxygen gas production.	
Help Received None. I prepared the solutions and timed the gas production myself. The only help I received from my parents was getting supplies.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Jada Smith	Project Number J0629
Project Title Transesterification of Peanut Oil: Acid vs. Base Catalyst	
Abstract Objectives/Goals The objective of this project was to see if NaOH as a catalyst (substance used to speed up transesterification) or Hydrochloric acid as a catalyst would produce more biofuel. Methods/Materials Peanut oil, methanol, sodium hydroxide, hydrochloric acid, separation funnel, microwave Results My Hypothesis was correct. After repeating the trials three times, I learned that using the NaOH catalyst ended up producing more biofuel than using the hydrochloric acid catalyst. The results pertain to my objective because I wanted to see which catalyst made more yield of biofuel. Conclusions/Discussion My final results concluded that if you were going to make biofuel, it's best to use NaOH as a catalyst rather than hydrochloric acid. Even though The hydrochloric acid has the potential to make more yield, it takes a whole lot more equipment and time.	
Summary Statement As measured by weight, I was able to conclude that with the procedure I used, an acid catalyst does not produce as much yield as a base catalyst.	
Help Received My dad helped me with my research, my experiment, and getting my materials to complete this project.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Mandika N. Swartz	Project Number J0630
--	---------------------------------------

Project Title
Is It Possible to Generate Electricity from Waste Water?

Abstract

Objectives/Goals
The objective of this study was to determine whether electricity could be generated from waste water.

Methods/Materials
To create electricity, I had to construct a microbial fuel cell. I made the anode and cathode chambers by purchasing two air-tight containers. To connect the two chambers I made an agar salt-water bridge in a PVC pipe. In order to complete the circuit, I had to make two electrodes of carbon fiber sewn to a loop of copper wire. Two alligator cables attached a resistor were clamped to each electrode. The anode chamber contained about a pint of microbe-rich silt and organic matter from the Benthic zone of the San Joaquin River and the cathode chamber contained river water with air delivered by an aquarium pump. Electricity was measured by a multimeter whose leads were in contact with the resistor.

Results
On Days 1 and 2, no electricity was generated. Days 3-9 demonstrated increasing electricity measurements up to 15.7 millivolts. Days 10-14 demonstrated decreasing amounts of electricity.

Conclusions/Discussion
Electricity can be generated from waste water - even the relatively clean sand-rich silt of the San Joaquin River. To be able to take only a pint of wastewater and have it conduct 15.7 millivolts is pretty amazing. That means that 8 gallons of it can produce 1 volt, and about 3.5 volts can power an LED light bulb. Today, we do not really have a sufficient method of purifying wastewater so that we can drink it safely. Even if this was created, would anybody really want to take the risk that it might result with a disease? Instead, people would be much safer if they used wastewater to conduct electricity. If America had a system that could convert waste into electricity, it would definitely boost our nation's economy as well as create job openings.

Summary Statement
I demonstrated that electricity can be generated from wastewater using a microbial fuel cell.

Help Received
My advisor provided me with the list of materials and a guide on how to build a fuel cell. I built the fuel cell under the supervision of my father.



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Nimai Talur	Project Number J0631
Project Title Faster Cleaner Composting: The Effect of Amylase on the Decomposition of Biodegradable Plastic	
Abstract Objectives/Goals The objective of my experiment is to measure the effect of amylase on the decomposition of a biodegradable plastic spoon by varying the amount of added amylase. Methods/Materials Amylase formula, aluminum containers, water, beaker, gloves, kitchen scale, biodegradable plastic spoons. Added different amounts of amylase and measured the decomposition of the plastic spoons over four weeks. Results As I added more amylase, the mass of the spoons decreased. The mass varied indirectly with the amylase. Conclusions/Discussion After comparing the masses of the biodegradable plastic spoons, I concluded that the more amylase added, lower the mass was after four weeks.	
Summary Statement My experiment shows that when more amylase is added to the spoons, the more the mass decreased and faster the spoons composted.	
Help Received My science teacher helped me by giving me research ideas and reviewing my experiment, and my parents also provided me with helpful information throughout my experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Pujita S. Tangirala	Project Number J0632
Project Title Got Antioxidants? Using Chemiluminescence to Study the Effect of Adding Milk or Sugar on the Antioxidant Level of Tea	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Tea, which is a popular drink, is a great source of antioxidants for the body. Many people put additives like milk and sugar in their tea. The purpose of this project was to find the effect of adding different amounts of fat free milk or sugar on the antioxidant levels of green and black tea. I hypothesized that if I increased the amount of fat free milk or sugar added to green or black tea, then the antioxidant levels would decrease.</p> <p>Methods/Materials Tea infusions were made using distilled water. Each of the infusions was divided into seven cups with 100 mL in each cup. The first cup with no milk or sugar was used as control. The amount of fat free milk added to the 2nd, 3rd, and 4th cups was 10, 20, and 30 mL, respectively. The amount of sugar added to the 5th, 6th, and 7th cups was ¼ tsp, ½ tsp, and 1 tsp, respectively. To test the samples for antioxidants, a chemiluminescence reaction was performed using luminol, sodium perborate, copper sulfate, and two drops of the sample. The light produced by this reaction was measured in volts using a light-detecting circuit. The amount of light intensity was used to determine the relative antioxidant levels. Higher light intensity represents a decrease in antioxidants. The entire trial was done three times total each for green and black tea.</p> <p>Results According to the data collected, the percentage increase in light intensity from control was, for milk in black tea: 42.67% (10 mL), 65.33% (20 mL), 77.33% (30 mL); for milk in green tea: 29.01% (10 mL), 50% (20 mL), 79.01% (30 mL); for sugar in black tea: 67.33% (1/4 tsp), 79.33% (1/2 tsp), 93.33% (1 tsp); for sugar in green tea: 43.21% (1/4 tsp), 72.84% (1/2 tsp), 89.51% (1 tsp). The results showed that in both the black and green tea samples, with each increase in the amount of milk or sugar added, more light intensity was produced.</p> <p>Conclusions/Discussion The hypothesis was supported. When more milk or sugar was added to green or black tea, the amount of antioxidants decreased. This was shown by the percentage increase in light intensity from control, which was the most in the 30 mL milk sample and the 1 tsp sugar sample in both green and black tea. Because antioxidants are important in preventing many diseases, like Alzheimer's disease, Cancer, eye disease, heart disease, Parkinson's disease, and Rheumatoid Arthritis, people should use as little milk or sugar in their tea to get optimum antioxidants.</p>	
Summary Statement The purpose of this project is to find how milk and sugar affect antioxidants in tea, and I concluded that both milk and sugar decrease antioxidant levels.	
Help Received My mother supervised and helped me conduct the chemiluminescence test. My brother helped me set up the circuit. My teacher, Mrs. Mackewicz, let me borrow supplies and provided assistance when I needed it.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Ashley A. Teele	Project Number J0633
Project Title Inhibiting the Enzymatic Browning of Avocados	
Abstract Objectives/Goals The objective was to determine which preservation method would best inhibit the oxidation reaction that allow melanins to form on a cut avocado and turn the surface brown. Methods/Materials Used fifteen avocados cut into halves and applied six preservation methods. The methods used were pit, lemon juice, olive oil, onion, and plastic wrap. A plain avocado was used as the control method. The avocados were placed in identical plastic containers and stored in the refrigerator after applying the preservation method. A three day experiment was conducted, checking the avocados every nine hours and recording the data. The results were graded on a scale of 1-10 to estimate the level of enzymatic browning with 1 being no browning and 10 being completely brown on the surface. Results The lemon juice method performed the best. It remained at an acceptable level of browning for 36 hours where the other methods lasted between 18 and 27 hours. The ascorbic acid in the lemon juice slowed the oxidation better than the other methods by inhibiting the oxygen from reacting with the phenolic compounds and reducing the activity of the enzymes through lowering the pH. The other methods produced less effective results with the onion method slighter better than the others. Conclusions/Discussion My hypothesis that the onion method would slow the enzymatic browning of a cut avocado the most was proven incorrect. The use of ascorbic acid from the lemon juice was superior to the other methods tested by 33% to 100%. The propanethiol S-oxide gas released from the onion did not perform as expected. Opening the containers to observe the avocado dissipated the gas and made it less effective. In conclusion, this experiment shows that the best method inhibits the enzymatic reaction in multiple ways. S-oxide gas may have worked but the introduction of more oxygen every nine hours allowed the enzymes to stay active and continue the browning process. The ascorbic acid from the lemon juice inactivated the enzyme activity by reducing the pH and slowed the oxygen from reacting with the polyphenol oxidase enzymes.	
Summary Statement My project is about which preservation method inhibits the enzymatic browning of cut avocados the best.	
Help Received My mother supervised for safety. My father taught me how to develop the graphs. My mother, father, and sister helped me judge the relative level of browning for each sample during the experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Berenice Vega	Project Number J0634
Project Title Reaction Rates: Does Temperature Affect the Iodine Clock Reaction?	
Abstract Objectives/Goals The goal was to find out if temperature affected the rate of the iodine clock reaction. Methods/Materials Stopwatch, distilled water, Vitamin C tablets, 2% Iodine tincture, hydrogen peroxide, liquid laundry starch, disposable cups, thermometer, gas stove, an refrigerator. I made two solutions and poured them at the same time while timing the reaction. Three different batches were made one hot, one cold, and one room temperature. Results After many trials to ensure accuracy, it was evident that temperature played a key role in reaction rates. The solutions made with cold water were the slowest to react, while the solutions made with hot water were the fastest to react. Conclusions/Discussion After determining the results of the experiment, it is evident that temperature plays a key role in reaction rates. This supports the idea that you can alter the amount of time it will take for a chemical reaction to react by varying the temperature.	
Summary Statement Based on the results, temperature plays a key role in altering the reaction time of the Iodine Clock reaction.	
Help Received I performed the Iodine Clock reaction myself, however, I received aid in understanding what happens in the reaction from the website Science Bob.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Ryder J. Wittman	Project Number J0635
Project Title What Effect Does Temperature Have on the Rate of Reaction?	
Abstract Objectives/Goals The objective of this project is to determine what affect temperature has on the rate of a simple chemical reaction. Methods/Materials 3 clear glass cups, a measuring cup, white distilled vinegar, baking soda, one-eighth teaspoon measuring tool, a thermometer and a stopwatch. One cup of vinegar taken to one of three temperatures (45, 70 and 118 degrees Fahrenheit). One-eighth teaspoon was then added to each cup of vinegar and the reaction was timed with a stop watch until no the chemical reaction ended (the end of gas bubble production). This was done three times for each temperature and then averaged. Results It was determined that the reaction times where faster as the temperature increased. The average reaction time at 45 degrees was 194 seconds, 70 degrees was 44.66 seconds, and 118 degrees was 13.85 seconds. Conclusions/Discussion The experiment clearly demonstrates that increasing the temperature also increases the speed of this reaction thus decreasing the time it takes for the reaction to occur. Increasing the temperature increases the average kinetic energy of particles involved in the reaction. It was also discovered that most reactions depend on thermal activation (activation energy), which is the fraction of molecules that possess enough kinetic energy to react at a given temperature. As the temperature increases the number of molecules that possess the necessary kinetic energy to react also increases so the speed of the reaction also increases.	
Summary Statement I discovered that speed of the chemical reaction of baking soda with vinegar increases as you increase the temperature of the reactants.	
Help Received I designed and completed the experiments myself, my father purchased the materials and helped to show me how to make a graph on the computer.	