Category: Chemistry & Biochemistry

Student Name: Rebecca Anderson
Team Members (if any):

Project Title: Did it Dawn" on You to Wash Right?"

Abstract: My question was, Which Brand of Dish Soap is the Best Degreaser? My hypothesis was that the Dawn Bleach Alternative would be the best because it says that it powered away grease and looked promising. I tested my hypothesis by using oil on a brown paper bag then putting the soap on and drying it next i put a drop of water on the brown paper bag by blowing in the end of a straw that had been dipped in water. I figured out that the Dawn ultra-concentrated was the best because of the powerful surfactants.

Category: Chemistry & Biochemistry

Student Name: Matthew Bentley
Team Members (if any):

Project Title: Tough Beans

Abstract: What substances cause beans to soften fastest when cooking? Tomato puree is expected to soften faster because the acid will help dissolve the bean coat. Procedure: Soak beans in large container for 12 hours. Strain off the water. Put in a pot with room temperature water. Put on stove. Set temperature to medium. Set a timer for 25 minutes. Remove 10 beans. Check how soft each bean is. Record how many tuna cans it took to cut or smash each bean. Wash the pan and spoon. Cool them to room temperature. Be sure the stove is cooled to room temperature. Repeat steps 5 times using 1 tsp salt, 1 tsp baking soda, 1 tsp sugar in water, 2 cups diced canned tomatoes pureed, and 2 cups milk. Cooking softens beans and makes them better tasting. However, it usually takes hours. It's because the hard seed coat on the outside does not easily absorb water. The only way to get water in at the beginning is through the Hilum. The Hilum is where the bean was attached to the plant. After about 20-30 minutes, the water is able to penetrate the seed coat. Since softening takes so long, people have tried to make it go faster. When cooking beans in baking soda, they soften over four times faster than the control and over 6 times faster than tomato puree. To have soft beans very soon, use baking soda.

Category: Chemistry & Biochemistry

Student Name: Madeline Elder
Team Members (if any):

Project Title: Rising to the occasion

Abstract: I decided to do my project on bread because I've wanted to learn more about how everything works together to form a loaf of bread. I did some research and found out a lot of things one being that yeast releases more carbons when it absorbs sugar and dies when it absorbs salt. So I figured that the bread recipe with the most sugar and least salt would be the fluffiest (least dense) bread loaf. I varied the ingredients in a normal bread recipe and then mixed them, let them rise, and baked them all for the same amount of time. We weighed the loaf of breads and then put them into a bull of water and measured the displaced waters weight (since are best measurement tool was my scale.) My results came out the opposite of what I thought! When sugar went up so did its density. I was stumped. After a long while of thinking I came up with the Idea that maybe we gave the yeast too much sugar to absorb in too little time which resulted in having left over sugar at the bottom of the loaf, making it denser. I learned two things. One that even if something seems to makes complete sense it might not be right. Number two, that everything has a part in the recipe even if it doesn't seem to have a big impact.

Category: Chemistry & Biochemistry

Student Name: Jennifer Golightly
Team Members (if any):

Project Title: What Battery Lasts the Longest?

Abstract: I wondered what battery would last longest. My hypothesis was that Energizer would last the longest because it usually did. I used a program called audacity to conduct my tests. I used 8 batteries. Two of the following, Energizer, Kirkland, Duracell, and Sunbeam. My first test was running the songs straight through. Energizer lasted the longest in that test. My second test was playing one song over and over again. Energizer did come in first again but it had suprisingly about a 15 minute difference. When I averaged it out Energizer came first, then Duracell, third Kirkland, and lastly Sunbeam.

Category: Chemistry & Biochemistry

Student Name: Joshua Mason
Team Members (if any):

Project Title: A Comparison of Hydrocarbon and Water Fuels for Heat Production and Emissions

Abstract: Question: Which is a more efficient and environmental-friendly fuel: Hydrocarbon-based or Water? Hypothesis: I believe that water is the more efficient and environmental-friendly fuel. Methods: Using the mole count at 1 atmosphere pressure at room temperature for the hydrocarbon fuels (Methane, Ethane, Propane, Butane) and water, and knowing the cumbustion energy of each fuel, I mathematically proved the total heat production of each field. I then tried to demonstrate the difference by gathering equal amounts of each fuel, burning them and measuring the temperature increase in a known amount of water. The inaccuracies of my apparatus did not provide good reproduction of the math results.

Category: Chemistry & Biochemistry

Student Name: Elizabeth Mathis
Team Members (if any):

Project Title: Sock it to Me

Abstract: The purpose of my experiment was to see which laundry detergent removed stains the best, and why. I tested Homelife Original Scent Laundry Detergent (a.k.a. the generic detergent), Kirkland Free & Clear Ultra Laundry Detergent, and 2x Ultra Tide with Colorclean Bleach Alternative. After some research, I formed the hypothesis that the Tide will work the best because the generic brand does not use enzymes (a key part in laundry detergents) and the Kirkland brand has many ingredients that derive from calcium or magnesium products, which could deactivate the anionic surfactants while cleaning. My original idea was that I was going to get nine white t-shirts and pour grape juice on them, then wash them. After a talk with the person in charge of my expenses (my mother) I decided to use nine white socks instead of nine white t-shirts. I stained the socks, washed them, and held them up to a grayscale. The three socks from the generic brand had percentages of 20, 25, and another 20, making the average 21.67%. The Kirkland brand's percentages were 20, 25, and 30 which means the average was 25%. Lastly, the Tide's percentages were 5, 10, and 5, therefore the average percentage was 6.67% for Tide. In this case, the lower the percentage the better, so Tide was the proud winner! Even though Tide won, the stain was still not completely removed, and with all of the detergents the stain turned a

Central Utah Science & Engineering Fair 2009 Junior Division

strange blue color. This was an excellent learning experience for me and my mom, because she uses the Tide a lot more often now. I now often wonder whether or not the Tide only is efficient in getting grape juice stains out, and if it would falter when removing other stains, like ketchup, or chocolate. Also, maybe the generic or Kirkland brand don't work well on the polyester/cotton blend of the socks, but they would work wonders on other materials. If I were to expand my research, I would try and answer these questions to help the moms (and dads) of America get the stains out of their clothes!

Category: Chemistry & Biochemistry

Student Name: Margot Porter
Team Members (if any):

Project Title: Hot or Not How temperature effects reaction time

Abstract: Hot or Not? How temperature effects reaction time. This study investigates how different temperatures effect the speed of reaction. I gathered information and formed a hypothesis that the hotter a substance was, the faster it would react, so cold should prove the opposite. Ten trials in each temperature of water (for a total of 30 trials) were conducted to find how fast an Alka-Seltzer tablet reacted in cold, room temperature and hot water. The results reveal that the Alka-Seltzer in the hot water reacted about six times faster than in the cold water. The investigator's hypothesis that the hotter a substance was, the faster it would react, so cold should prove the opposite is correct. The average time for the Alka-Seltzer to react in hot water was much faster than the cold and room temperature water. Temperature definitely effects the speed of reaction.

Category: Chemistry & Biochemistry

Student Name: Sarah Sperry
Team Members (if any):

Project Title: Does the Time of Day Effect a Human's Body Temperature

Abstract: My question is Does the time of Day Effect the Human Body Temperature? After my research, which included the human circadian cycle (a cycle of human behaviors put into a clock form) I hypothesised that the human's body temperature would be higher than 98.6 degrees Fahrenheit if the time of day was later. I tested my family for four days over Christmas break. I took their temperatures every four hours from 8 am to 8 pm. My results said that the average human's body temperature was highest at 4 pm. I figured that was because my subjects were more active during that time, and because the external temperature is hottest at this time.

Category: Chemistry & Biochemistry

Student Name: Eva Willardson
Team Members (if any):

Project Title: What drives Osmosis?

Abstract: Question: What drives osmosis? Hypothesis: The goal of my project is to determine if solute concentration and membrane permeability of the solute determines the degree of osmosis. Methods: I tested how osmosis is driven by using salt, sugar, and Polyethylene Glycol(PEG) at different concentrations mixed with 10 ml water and placed into Dialysis tubing. I let them sit for 2 days and observed which solution made the dialysis bag increase the most. Results: the final volume of each solution at 10 mg/ml and 100 mg/ml concentration were: The 10 mg/ml salt was actually a little less than the original 10 ml volume (9.0 ml), probably because of losses that occurred during transfers. The 10 mg/ml sucrose solution was about the same as the original volume (10.6 ml), but the PEG volume increased by 60% to 16.0 ml during the dialysis. At the 100 mg/ml concentration, the changes in volume were greater for each solution than at 10 mg/ml. The salt solution increased in volume by 25% to 12.5 ml. The sugar increased by 46% to 14.6 ml, and the PEG had a striking increase of 136% during dialysis. Conclusions: From these results, it is clear that more osmosis occurs with larger solutes at higher concentrations.

Category: Chemistry & Biochemistry

Student Name: Leif Andrus
Team Members (if any):

Project Title: Copper vs. Steel

Abstract: This project looks at wires with different levels of conductivity to see if a higher level of conductivity would allow molecules to move at different distances. The copper and stainless steel electrodes (independent variable) were tested in electrophoresis gel and the distance of each band (dependent variable) was measured with a centimeter ruler every five minutes for each of the wires in the experiment. My hypothesis was that a higher level of conductivity would allow more current to flow in the gel causing the molecules to travel a longer distance. The experiment results supported my hypothesis by showing that the copper wire with the blue dye traveled 3.0 cm, the red dye traveled 2.6 cm and the green dye traveled 2.4 cm on average. The stainless steel electrode with the blue dye traveled 2.4 cm, the red dye 2.0 cm, and the green dye traveled at 1.7 cm on average. The results show that the copper electrode on average allowed the dye to travel a longer distance then the stainless steel electrode.

Category: Chemistry & Biochemistry

Student Name: Megan Burton
Team Members (if any):

Project Title: What common sugars + yeast + water = the most carbon dioxide

Abstract: My name is Megan Burton. My question was to find out what common sugars produce the most carbon dioxide mixed with water and yeast. Why I wanted to find this out is producing biofuel such as ethinyl and denatured alcohol, and ethyl produce the greenhouse gas, carbon dioxide. How I tested this is I took common sugars such as molasses, corn syrup, white sugar, flour, brown sugar, and orange juice and combined them each with warm water and yeast. I used bottles and capped them off with latex balloons to capture the carbon dioxide. I waited two hours and measured the circumference of the balloons to figure out the volume using the calculation 4/3 x pi radius squared. Molasses produced a lot of carbon dioxide. Brown sugar was next, followed by orange juice, then white sugar, corn syrup, flour, then my control (which produced no carbon dioxide). I was amazed about the molasses making so much carbon dioxide because my hypothesis was that the light sugars would produce more carbon dioxide than the darker sugars. My hypothesis was wrong. I proved this to myself. This project was really interesting and it was fun to do. It was really cool to see the balloons blow up with carbon dioxide.

Category: Chemistry & Biochemistry

Student Name: Austin Buxton
Team Members (if any): Kristofer Shawgo

Project Title: The Effects of Temperature on CO2 Production

Abstract: The Effects of Temperature on CO2 Production Question: Does the temperature of water affect the amount of CO2 given off by Alka-Seltzer? We predicted that the higher the temperature of the water, the more CO2 gas will be given off by the Alka-Seltzer and at a quicker rate compared to the lower temperature that we predict will create less gas. We drilled a hole in the lid of a bottle and inserted tubing in the hole. We then put the other end in a 65ml syringe. We then put an Alka-Seltzer in 500ml of water, put the lid on and recorded the results every 10 seconds. We did this with 5 temperatures of water and repeated the experiment 3 times. We recorded our data and calculated the standard deviation. Our hypothesis was correct. Hotter water produced a greater volume of gas and is produced more quickly than when the water was a lower temperature. In this experiment, temperature played a role in accelerating the chemical reaction. The knowledge that temperature affects the rate of chemical reactions is important considering pollution and possible global warming. Some potentially hazardous reactions could be slowed with the use of this knowledge, and some inadvertently sped up. This could have a positive or negative impact on the environment. One example of this is

Central Utah Science & Engineering Fair 2009 Junior Division

the carbon monoxide produced by cars. If the rate of carbon monoxide production is sped up when the temperatures are higher, we could find ways to reduce the amount of gas created.

Category: Chemistry & Biochemistry

Student Name: Erin Davis
Team Members (if any):

Project Title: Redox

Abstract: Which orange juice has the most vitamin C? Four different types of orange juice were tested. The types were: Frozen concentrate, fresh squeezed, store bought not from concentrate, Sunny D. My hypothesis was that fresh squeezed would have the most vitamin C because it didn't have any substances added like water and sugar, and it didn't sit on the shelf in the store. The method that I used was the starch solution and iodine solution was added by titration which means drop by drop to the orange juice until it changed color. The results were fresh squeezed orange juice did have the most amount of Vitamin C next was Sunny D then Kirkland frozen concentrate and last Simply Orange.

Category: Chemistry & Biochemistry

Student Name: Tanner Day
Team Members (if any):

Project Title: To Burn or not to Burn

Abstract: Question: What fabrics are the most resistant to radiant heat and direct flame? Hypothesis: I learned from my research that no fabric is actually fire proof. I think both types of Nomex will perform better than the others. Because that is what they are designed to do. Eight different fabrics were used in each test. Four of the fabrics are worn by most people everyday. 100% Cotton, 100% Polyester, Denim, 90% Cotton, 10% polyester (t-shirt), 100% wool, 7 and 9 oz. Nomex (fabric used in firefighters protective clothing) and Felt. Two test were performed. Radiant Heat test where each fabric was placed in a 500% oven for 15 minutes. The second test was an open flame test where each fabric was held over an open flame until the the fabric ignited and lost it's integrity. Results: Radiant Heat test: The wool piece shrunk considerably and turned black and brittle. The cotton, denim, nomex and t-shirt fabrics scorched but didn't burn or change shape. the felt and polyester melted. Open Flame: The cotton, denim, t-shirt, caught fire and burned completely within 5 seconds. The polyester didn't flame it just melted as did the felt. The wool just curled around itself and turned black. The nomex lasted 25 to 30 seconds longer than the others before it caught fire. It didn't continue to burn it just turned crunchy and black.

Category: Chemistry & Biochemistry

Student Name: Matthew Ettinger
Team Members (if any):

Project Title: Explosive Sugar

Abstract: The purpose of my experiment was to find what type of sugar would have the most thrust and the highest calculated height in a sugar rocket. My hypothesis was that white sugar (granulated sugar) would have the most thrust and the highest calculated height in a sugar rocket because according to my research the fewer the ingredients in the fuel the faster it will burn. My procedure was first; build three sugar rockets for each type of sugar. I first ground together KNO3 and sugar and cooked it in a small pot at 70 C . Then I cut nine P.V.C. pipes and compacted kitty litter inside each pipe with a hammer and a nail. Then I poured the KNO 3 sugar mix into each motor casing (the P.V.C. pipes) until it was 1.5cm from the top of motor casings. Then I compacted the remaining space with kitty litter and drilled hole 10 1/2 cm down. I repeated this with all the types of sugar. I placed each motor face down in a motor mount on a scale. I placed a fuse in the motors hole, lit it and filmed each test, and then I analyzed data. My conclusion was that brown sugar gave a sugar rocket the most thrust and the highest calculated height in a sugar rocket. Although there was molasses in the mix, the molasses slowed down the burn time just enough so that it had a longer and more controlled thrust unlike the granulated sugar.

Category: Chemistry & Biochemistry

Student Name: Madison Goff
Team Members (if any):

Project Title: Frozen Salt

Abstract: The purpose of this experament is to find if adding salt will lower the freezing point of water. The hypothesis is salt will lower the freezing point of water. The experiment consists of four eight ounce clear plastic cups filled with six onces of water. The cups of water were observed over a period of 5 hours in a freezer. The hypothesis was proven correct; salt does lower the freezing point of water. This experiment was trialed fiveteen times to verify the results.

Category: Chemistry & Biochemistry

Student Name: Brittney Gubler
Team Members (if any): Natalie Tobler

Project Title: Chemistry of ice-cream making: Lowering the freezing point of water

Abstract: My project is about the chemistry of ice-cream making: lowering the freezing point of water. My and I partner put ice water with salt/NaCl in it and ice water with sugar/sucrose in it. We timed it for 20 minute intervolves and when the 20 minutes were up we recorded the finishing temperature. My partner and I expected the salt/NaCl to lower the temperature the fastest and then the temperature would say cooled and on the other hand we thought that the sugar or sucrose would lower the temperature really fast and then it would heat up quickly after it got low. We also had a constant which was pure water with just ice and nothing else we didn't expect the pure water to get any lower the 0 degrees Celsius but it got much lower then that. We tried to make ice-cream by shaking it in a bag, when that didn't work we put the ice-cream in an ice-cream drum and put the salt or NaCl and sugar or sucrose mixtures in to the outside and that worked very well. Our conclusion was that the more salt or NaCl you put in the colder the water would get and the less sugar or sucrose you put in the warmer it would get because the sugar made that water heat up and it just would just accumulate at the bottom of the bowl. Where the salt or NaCl would not it would flow thought the bowl which resulted in cooler temperatures.

Category: Chemistry & Biochemistry

Student Name: Hunter Hill
Team Members (if any):

Project Title: Which Orange Juice Has the Most Vitamin C?

Abstract: My question was: Which type of orange juice has the most Vitamin C? My hypothesis was that fresh squeezed orange juice would have the most Vitamin C. The methods I used included making an iodine titration solution and a 1.0% starch indicator solution. I titrated a 20mL sample of premium not-from-concentrate orange juice by adding 10 drops of starch indicator solution. I measured an amount of iodine titration solution in a graduated cylinder and then added drops of the solution until a distinct color change occurred. Then I measured the final volume of iodine solution to find out the amount of iodine solution needed to oxidize the Vitamin C in the juice sample. This process was repeated two more times. Next I tested three samples of orange juice made from frozen concentrate using the above method. I then made a Vitamin C standard solution by crushing a 250mg Vitamin C tablet and dissolving it in distilled water to make a solution of 1mg/1mL (a known amount of Vitamin C). I then tested three samples of this solution and three samples of fresh-squeezed orange juice. Next I calculated the average amount of iodine solution needed to oxidize the Vitamin C in each type of juice and the standard solution. By using a proportion, I calculated the amount of

Central Utah Science & Engineering Fair 2009 Junior Division

Vitamin C in each sample. The results showed the premium not-from-concentrate juice had the most Vitamin C.

Category: Chemistry & Biochemistry

Student Name: Sarah Jones
Team Members (if any):

Project Title: Do Different Enzymes Attribute To Different Amounts Of Visivle DNA?

Abstract: I had one main purpose of doing this experiment, and that was to find a fun, easy way to tell people that everything that lives and grows, or once lived and grew has DNA. My hypothesis is that Meat Tenderizer will be the best enzyme and bring out the most visible DNA, the Pineapple Juice will be second, the Contact Lens Solution will be third, the Milk will be fourth and the Shampoo will be last. I always used the same amount of materials during the procedure and that is my constant. However, I didn't have a control because the experiment wouldn't work well with the control. My variables were the different enzymes that I mentioned above in my hypothesis. I measured my results by eyeballing the amount DNA in rubbing alcohol and gave it an aproxamate percentage, using the percentage to compare the different trials. My results are that the Contact Lens Solution brought out the most DNA visible, the Meat Tenderizer was next, then the Pineapple Juice, the Shampoo, an the Milk was last. My results show that my hypothesis is false because the Contact Solution was a better enzyme than the Meat Tenderizer. If I did this experiment again I would devise a better way to measure my results and I would figure out a way I would be able to invlove a control in the experiment.

Category: Chemistry & Biochemistry

Student Name: Kristopher Karr
Team Members (if any):

Project Title: Does Fresh Water Hold Heat Longer Than Salt Water?

Abstract: My purpose is to find out if fresh water, salt water or sand holds heat the longest. My guess (hypothesis) is that the salt water will hold heat the longest. The best place to do the experiments for this project is the kitchen. The materials used in these experiments are mostly found in your kitchen. You will need a large pot, measuring cup, cooking thermometer, timer, stove, fifteen cups fresh water, salt and five cups of sand. The simple procedures for this project are; bring five cups of water to boiling (93 degrees celcius due to altitude). Remove from heat. Take and record temperature readings at one, two, three, four, five, ten, and fifteen minute intervals. Repeat these steps for a 1.5% salt water solution, 3.0% salt water solution and sand. The results show that fresh water and 1.5% salt water solution lost heat faster than the 3.0% salt water solution and sand. My conclusion is that the 3.0% salt water solution retains heat longer than fresh water, 1.5% salt water solution or sand.

Category: Chemistry & Biochemistry

Student Name: Courtney Platt
Team Members (if any):

Project Title: DNA Extraction

Abstract: Question: How does using different types of soap products affect the amount of DNA given in the DNA extraction process. Hypothesis: It is hypothesized that the powdered detergent will result with the most DNA. Method: Blend split peas, salt, and water. Pour mixture into strainer. Add soap products (liquid detergent, powdered detergent, shampoo, or kitchen soap) to mixture and let sit for 5-10 minutes. Pour it into test-tube then add meat tenderizer. Then pour alcohol into test-tube. DNA will form in between alcohol and pea mixture. Use wooden stick to get it out. Results: Powdered detergent did end up with the most DNA. But all soap products did the same sequence to seperate fats and proteins. But some soaps have stronger chemical bases to seperate the membrane better. Powdered Detergent: 6.2 cm, Liquid Detergent: 2.3 cm, Shampoo: 2.1 cm, and kitchen soap: 5.3 cm.

Category: Chemistry & Biochemistry

Student Name: Kristofer Shawgo
Team Members (if any): Austin Buxton

Project Title: The Effects of Temperature on CO2 Production

Abstract: Question: Does the temperature of water affect the amount of CO2 given off by Alka-Seltzer? We predicted that the higher the temperature of the water, the more CO2 gas will be given off by the Alka-Seltzer and at a quicker rate compared to the lower temperature that we predict will create less gas. We drilled a hole in the lid of a bottle and inserted tubing in the hole. We then put the other end in a 65ml syringe. We then put an Alka-Seltzer in 500ml of water, put the lid on and recorded the results every 10 seconds. We did this with 5 temperatures of water and repeated the experiment 3 times. We recorded our data and calculated the standard deviation. Our hypothesis was correct. Hotter water produced a greater volume of gas and is produced more quickly than when the water was a lower temperature. In this experiment, temperature played a role in accelerating the chemical reaction. The knowledge that temperature affects the rate of chemical reactions is important considering pollution and possible global warming. Some potentially hazardous reactions could be slowed with the use of this knowledge, and some inadvertently sped up. This could have a positive or negative impact on the environment. One example of this is the carbon monoxide produced by cars. If the rate of carbon

Central Utah Science & Engineering Fair 2009 Junior Division

monoxide production is sped up when the temperatures are higher, we could find ways to reduce the amount of gas created.

Category: Chemistry & Biochemistry

Student Name: Natalie Tobler
Team Members (if any): Brittney Gubler

Project Title: The Chemistry of Ice Cream Making: How to Lower the Freezing Point of Water

Abstract: We were curious on how to lower the freezing point of water. We decided to have several different types of items to lower the freezing point of water. The first of the items was NaCl, or salt, the second was Sucrose or sugar. We had a constant so we would know what normal water and ice did. We kept all of the water and ice amounts the same and we lowered the amount of each of the items with each test which was all kept in a clean Styrofoam bowl to make sure no cold was transferred out. We expected the NaCl to lower the freezing point of the water the fastest and keep it the coldest, on the other hand Sucrose would lower the freezing point fast, but it would soon heat up. We didn't expect the pure water to get lower than zero degrees Celsius. As we added each item and timed each for twenty minute intervals we recorded the data. After getting the data on the lowest temperature we could with the items without toying around with it, we decided to try to make ice cream. We shook a bag with ice cream mixture inside of a larger bag with the items. That didn't freeze for a long time so we decided to make the ice cream in an ice cream drum. Needless to say, the ice cream turned out wonderfully. Our conclusion was that NaCl is the best method at lowering the freezing point of water.