



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Sudeep Banerjee	Project Number S0501
Project Title Determining a Correlation between Surfactant Properties of Antibacterial Soap and Its Bactericidal Action on S. aureus	
Abstract Objectives/Goals Antibacterial soaps are a combination of a surfactant and a bactericidal agent. The purpose of this experiment was to determine whether there is a correlation between the amount of surface tension reduction of water by antibacterial soaps and its antibacterial action. Better spread of the antibacterial agent should be possible by a better surfactant. Methods/Materials The experiment consists of two parts. A) Studying the inhibitory effect of four different soaps on Staph Aureus colonies on blood agar plates B) Studying the surface tension lowering ability of these soaps by measuring the reduction of rise of a water #soap mixture through a fine bore (0.5mm) capillary tube. Results Of the four antibacterial soaps studied, there was negligible difference between 3 of the soaps, all three exhibiting comparable bactericidal and surface tension lowering properties. However the fourth soap showed a significantly reduced antibacterial effect and a lower reduction in the surface tension of water. Conclusions/Discussion A simple measure of surfactant effect was able to establish the correlation between the antibacterial ability of antibacterial soaps and their detergent property. My experiment elucidated the critical role of the surfactant in soap in improving the bactericidal effect of the active ingredient. In this era of cost containment, widespread use of such inexpensive but effective chemical combinations may play a major role in controlling the spread of disease in the general population.	
Summary Statement The presence of a surfactant enhances the bactericidal action of antibacterial soaps.	
Help Received Used lab equipment at Children's Hospital Central California under the supervision of Mr. Percy Lee. Mr. Garabedian gave me direction. My sister Dipti helped in preparing the board.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jonathan Barber; Allen Brookshire	Project Number S0502
Project Title The Purification Process of Metallurgy	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The basis of this experiment was to alter the properties and structure of natural occurring metals by heating and extracting impurities.</p> <p>Methods/Materials In order to perform this experiment it was necessary to use a heat source significant for melting the metals lead, tin, aluminum, zinc, copper, nickel, and iron. Finding the densities will require graduated cylinders, scales, bunsen burner, crucibles, an oxyacetylene torch and proper safety equipment. Density of each unmelted metal was taken by using a water displacement test in the graduated cylinder. A sample of each metal was melted using a heat source. If possible up to three trials were completed on each metal. Impurities were brushed off and the metal was then cooled to room temperature. The densities of each metal were taken again by using the water displacement test. All data was recorded and densities were compared.</p> <p>Results According to the data Zinc had the most impurities and Bismuth had the lowest amount of impurities. In melting the metals it was found that they all changed in density. All metals except copper and nickel increased in density after being melted.</p> <p>Conclusions/Discussion A bunsen burner of constant temperature made for equal conditions of metals. All of the samples dropped in volume at different proportions. Using an oxy-acetylene torch for some of the metals requiring excess heat had oxidized and caused a decrease in density in nickel and copper. This experiment successfully increased the densities of most of the metals and cleared out a majority of the impurities.</p>	
Summary Statement The project was to test the effect of melting on metal densities.	
Help Received Used classroom equipment at C.V.H.S. under supervision of Mrs. Poquette	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Laura A. Beyer	Project Number S0503
Project Title To Lye or Not to Lye	
Abstract Objectives/Goals To determine if different fats/oils affect the pH level of soap after the saponification process. Methods/Materials For my first test I made four batches of soap using a basic recipe, varying only the type of fat/oil in each batch. After three weeks I tested the pH level of the soaps. For my second test, I made four more batches of soap, again varying the type of fat/oil in each batch, but also basing the amount of lye on the saponification value of each fat/oil. Results The pH levels of the first test ranged from 11.5 to 13.5, all above the normal pH range of 10.5 or less for soaps. The pH levels of the second test ranged from 9.5 to 10.0, which is a much more narrow range and all within the normal pH range for soap. Conclusions/Discussion I concluded that different fats and oils do affect the pH level of soap. I learned from my research that this is because each fat is made of a unique combination of fatty acids which affects the molecular weight of the fat, which, in turn, affects the amount of lye needed for saponification.	
Summary Statement My project is on the chemistry of soapmaking and how different fats/oils affect the pH level of the soap.	
Help Received My mother supervised my soapmaking and gave advice on organization of the project.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Andrew Botts; Michael Botts	Project Number S0504
Project Title Coke Decay	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine which Coca-Cola soft drink has the most damaging effects on healthy human teeth.</p> <p>Methods/Materials Four healthy, third molars (wisdom teeth) extracted from a human mouth, ranging in size from 1.7cm X 1.0cm to 1.4cm X 0.6cm. Teeth were assigned letters, A, B, C and D to avoid confusion. Soft drinks were given letters as well, Tooth A corresponded with liquid A. The teeth were emersed in 65cc of their corresponding liquids. Everyday between January 7 and January 22 the teeth were evaluated for changes in their characteristics and the liquid was changed. Teeth never sat longer than 17 hours between changes and evaluations. At every changing of the liquid, the temprature of each liquid was taken and not allowed to vary more than five degrees. At every evaluation, any changes in the characteristics of the teeth were noted in the journal.</p> <p>Results Tooth A immersed in Coca-Cola had the worst decay, it was stained black and had several deep fissures on its chewing surface and had malleable root chambers. Tooth C had the second worse level of decay, it suffered full loss of its enamel and its entire level of dentin was exposed. Tooth B had the third worse decay, it didn't suffer full loss of its enamel, though it was stained black and had malleable root chambers.</p> <p>Conclusions/Discussion The Conclusion is that those soft drinks that have a high level of carbonation are the most damaging. Carbonation contains carbonic acid, the more carbonation, the more acid is present in the drink. Other teeth-damaging ingredients are sugar and caffeine, which are both present in Coca-Cola. Sprite is caffeine free but contains high amounts of sugar. Diet-Coke has no sugar but does posses caffeine.</p>	
Summary Statement Which Coca-Cola brand soft drink causes the most damage to helathy human teeth.	
Help Received Staff at Sunnymead Dental Group supplied pictures and information.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Evan W. Chan	Project Number S0505
Project Title Invention of a Natural Collagen-like Material as a Plastic Substitute for Making Dental Devices	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to develop a new dental material, starting with all natural and edible ingredients, which can be used to replace plastics for the construction of a mouth guard used to prevent damage to the teeth resulting from bruxism (forceful and involuntary grinding of the teeth).</p> <p>Methods/Materials I experimented with various edible ingredients which together can be formulated to create materials that have properties like soft plastics. I ended up developing a new material using gelatin derived from fish and glycerin. The right proportions of glycerin and gelatin were dissolved in aqueous solution at 90 degrees Centigrade. The slurry solution was poured into a mold and allowed to cool slowly to form a soft plastic-like material. The physical properties of this material were tested using an Instron material testing machine. This material was then formed into a mouth guard which could be worn.</p> <p>Results I invented a new material that is edible, pliable, and malleable and yet can resist strong tensile and compressive stress (up to 400 psi) without breaking. It is as strong as conventional polyethylene plastic. It can be formed into any shape by pouring into a mold. Furthermore, the material can be embedded with various small molecules such that when this material is used to make a dental mouth guard, it will prevent bad breath, plaque formation, and tooth decay.</p> <p>Conclusions/Discussion A new material has been developed that has the desirable properties for dental materials. It can be used as a dental guard for preventing the deleterious effects of bruxism. As yet not widely noticed, bruxism during sleep causes extensive damage to one's teeth, possibly causing the disappearance of all the enamel on the teeth. The percentage of the population that is afflicted with bruxism is larger than formerly thought by dentists. My new mouth guard material provides a solution for preventing trauma to the teeth caused by bruxism and yet avoiding the side effect of the wearer of the mouth guard ingesting plastic. My material is very affordable (roughly one tenth the cost of existing mouth guards) and can be mass-produced for the public.</p>	
Summary Statement The invention of a new material that can replace plastic as a mouth guard against bruxism.	
Help Received Mr. Scott Wang helped me conduct my tensile tests in the laboratory of a company called NPIC. Dr. Bing Han assisted me conduct my compression tests at the Dept. of Chemical Engineering and Material Science at the University of California, Irvine.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jeff Chen	Project Number S0506
Project Title An Alternative Method for Fabrication of Semiconductor Nanorods	
Abstract Objectives/Goals The objective is to find an alternative method for fabrication of semiconductor nanorods. A template-method, whereby two solutions are diffused across a semi-permeable membrane (Nucleopore#), will allow two solutions to deposit their precipitate directly in the pores of the membrane. Methods/Materials Nucleopore# membranes, vials (plastic 1.5ml), pipettes. Lead (II) Nitrate solution (.1 M solution, to be diluted), Potassium Iodide solution (.1M solution, to be diluted), Chloroform, UV goggles, a power drill, a quick clamp are needed to manufacture the nanorods. A Scanning Electron Microscope(SEM) and a Luminescence Spectrometer are needed to analyze the sample. Procedure: First, the diffusion rates must be balanced; this requires varying of solutions to produce a detectable precipitate and varying of concentrations to balance diffusion rates. Confirmation of filled pores can be done by using a SEM or an optical microscope. The second step in this project is to verify the shape of the crystals. Place the membrane in chloroform and analyze it under a microscope. The last part of the experiment is to verify the semiconductor characteristics of the material. An ultraviolet light is used to excite the sample to show that there is an energy band gap. Additionally, a Luminescence Spectroscopy was done on the Lead (II) Iodide to test for a shift of the spectrum under different temperatures. Results Lead (II) Iodide is best candidate for this experiment because it fluoresces and can be easily detected by eye. Concentrations of .01M for Lead and .03M for Iodide balances the diffusion rate for 5 micron pores. However, this set of concentrations seems to change a little as pore sizes are varied . Rods are found under a microscope and the material's light spectrum when shifts to higher energy with lower temperature. Conclusions/Discussion The diffusion method works for fabricating semiconductors. Precipitate in the membranes are cylinder-formed. The bulk sample, however, does not contain nanorods. Luminescence Spectra shows that Lead(II) Iodide's band gap shifts towards higher energy at a lower temperature; this is a characteristic of a semiconductor. Variation of concentrations for balanced diffusion rates leads to a possibility of Cation-Permselective Behavior. The Lead (II) Iodide semiconductor nanorods might replace Cadmium Sulfide as a semiconductor because their energy band gaps are similar.	
Summary Statement Using the diffusion method, nanorods are created inside of a template; through testing of semiconductor characteristics, these nanorods show properties of being a semiconductor.	
Help Received I used a Mitutoyo optical microscope with a CCD camera, a Phillips field emission gun scanning electron microscope and obtained data from a microprobe luminescence spectrometer at University of California, Irvine under the supervision of Dr. Mike Zach.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Whitney M. Cordry	Project Number S0507
Project Title Waiter! There's a Hair in My Hygrometer! Evaluating a Hair Spray's Humidity Effectiveness Claim	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine the validity of Aussie 12-Hour Hair Spray's humidity effectiveness claim. I hypothesized the product successfully protects hair from the adverse effects of humidity as promoted.</p> <p>Methods/Materials Controls were established for hair selection. Two hair hygrometers were built and calibrated together, one as a control. Differences in the instruments' construction caused their reflective disks to rotate within different ranges; calibrating both hygrometers together reconciled their scales. A digital hygrometer validated the control hygrometer's performance. One hair hygrometer was treated with Aussie 12-Hour Hair Spray. All three hygrometers were exposed to three levels of humidity, ranging from 23% to 100%, for timed intervals. The responsiveness of the treated hygrometer determined the validity of the product's claim.</p> <p>Results Hygrometer calibration failed three times. Probable causes were identified and corrected. Successful calibration was essential for experimentation, and was achieved on the fourth attempt. In four separate experiments, the control, treated and digital hygrometer readings registered similar and consistent responsiveness to changes in humidity.</p> <p>Conclusions/Discussion The data contradicts the hypothesis. All three hygrometers respond similarly and consistently to humidity changes. If the Aussie product worked, the treated hygrometer's data should have clustered around 31% (the reading at the time the hair was treated) indicating the product had successfully created a barrier between hair and humidity, evident in the hair's failure to expand. However, upon review, a procedural flaw was discovered which may have skewed the data. Proposed theory: Twenty-five minutes exposure to 100% humidity washed away the hair spray's water soluble resins. Further experimentation is recommended.</p>	
Summary Statement I applied hygrometer mechanics and hair structural properties to develop an instrument and experiment capable of evaluating a hair spray's humidity effectiveness claims	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Timothy A. Dong	Project Number S0508
Project Title Oxidation of Substituted Phosphines with Singlet Oxygen: Intra- vs. Inter- Molecular Pathways	
Abstract Objectives/Goals While the typical product in the reaction between singlet oxygen and phosphines is phosphine oxide, an additional product, referred to as the insertion product, has been found in the reaction of sterically hindered tris(ortho methoxyphenyl)phosphine with singlet oxygen. The objective of this project is to determine how solvent polarity and phosphine concentration affect the product distribution of these two products. Methods/Materials Following reaction between the ortho- phosphine and singlet oxygen, the product distribution was determined by proton and phosphorus Nuclear Magnetic Resonance. From the product distribution the ratio k_o/k_i was obtained, k_o referring to the rate constant of the oxide pathway and k_i referring to the rate constant of the insertion pathway. Results The k_o/k_i ratio was measured in solvents of varying polarity including benzene, methylene chloride, and chloroform, and found to be 52.1, 42.9, and 25.9 respectively. At concentrations of 10^{-3} M, the dominant product was found to be insertion product, while concentrations of 1.5 M yielded phosphine oxide as the dominant product. Conclusions/Discussion Since the value of k_o/k_i is higher in non-polar solvents than in polar solvents, formation of phosphine oxide is favored in more non-polar solvents while formation of insertion product is favored in more polar solvents. Increasing concentration of phosphine facilitates formation of phosphine oxide, a conclusion supported by a similar scientific study done in the past.	
Summary Statement The reaction between phosphine and singlet oxygen involves two pathways, an intra- molecular pathway that results in formation of insertion product and an inter- molecular pathway that results in formation of phosphine oxide.	
Help Received Father helped make board. Professor, graduate students, and science teacher provided guidance.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kaila Figone; Hollie Leister	Project Number S0509
Project Title Fast Gas	
Objectives/Goals The purpose of our experiment was to see how temperature affected gas diffusion. We looked at how different temperatures affected the diffusion of chemicals. We also wanted to know how the temperature would affect the distance the molecules traveled.	
Abstract Methods/Materials To start the experiment, we obtained two chemicals; an acid, concentrated hydrochloric acid (HCl), and a base, concentrated ammonium (NH ₄). We placed several drops of the chemicals each on to a different Q-tip. Then we inserted the two Q-tips in opposite ends of a 100cm piece of glass tubing simultaneously. We closed the ends using rubber stoppers. We placed the tube carefully into a water bath and started the stopwatch. For the several trials, the water was set at different temperatures. The three temperatures we used were 30°C, 25°C, and 20°C. When the gas molecules from the two chemicals collided with each other in the tube, they reacted and form a white ring, which was NH ₄ Cl, or ammonium chloride. We stopped the stopwatch and recorded the time when a complete white ring had formed on the inside.	
Results The results were as our research had suggested. At the lower temperature, it took a while for the white ring to show up. At the higher temperature, the white ring appeared much faster. The white ring appeared on the hydrochloric acid side of the tube, it wasn't in the middle. At the higher temperature, the ring was farther from the end of the HCl Q-tip than where it was at the lower temperature.	
Conclusions/Discussion At the higher temperature, the white ring formed more quickly because the gas expanded with the heat. The heat increased the gas molecules' average kinetic energy and they traveled faster down the tube. At the lower temperature, the white ring took more time to appear. The molecules didn't expand as much and had less average kinetic energy. That is why it took them a longer time to travel down the tube. The NH ₄ Cl appeared on the HCl side for a reason. An HCl molecule has more molar mass than NH ₄ . The NH ₄ molecules were lighter, thus enabling them to travel faster down the tube. When the two gases met, their reaction appeared on the HCl side of the tube. The ring appeared at different spots on the tube because the heat affected the two chemicals differently so they didn't always meet in the same spot.	
Summary Statement How temperature affects gas diffusion	
Help Received Chemistry teacher helped us with idea and let us borrow lab supplies; Galileo Academy lent us the glass tube	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Daniel O. Fishman	Project Number S0510
Project Title A Study of Light-Sensitive Electron Transfer between Anthocyanin Pigments and Nanocrystalline Titanium Dioxide	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals It is predicted that the electron transfer between anthocyanin pigments and nanocrystalline Titanium Dioxide, as measured in dye-sensitized solar cells, will vary with changes in the light source.</p> <p>Methods/Materials Anthocyanin solutions were prepared from natural and artificial sources. Each solution was analyzed by color, pH and paper chromatography. Three solar cells from each pigment were made by soaking Titanium Dioxide coated glass in each solution. The completed solar cells were exposed to different light sources (halogen, incandescent, Reveal and fluorescent). Solar cell voltage and current were then measured.</p> <p>Results The most efficient electron transfer occurred using the halogen light source followed by Reveal, incandescent and fluorescent. Solar cells made from red cabbage anthocyanin produced the highest average electron transfer at 400 millivolts. Data showed a pH to current relationship that peaked around a pH 2.5.</p> <p>Conclusions/Discussion The data supports the hypothesis that electron transfer between anthocyanin pigments and nanocrystalline Titanium Dioxide, is affected by changes in the light source. The light source affects the efficiency because each light source emits specific intensities of each wavelength of light. The anthocyanins can absorb some wavelengths more efficiently than others. The more light an anthocyanin absorbs the more electrons are excited and the higher the electron transfer efficiency. The efficiencies were the highest under the halogen light because halogen light is the closest to sunlight, which these pigments naturally absorb. The pH is an indicator of the stability of an anthocyanin molecule. Anthocyanins with lower pHs and therefore more stable molecular structures produced the highest current and had the lowest deviation between trials. Dye-based solar cells using anthocyanin have the potential to provide clean, natural and renewable energy for the future.</p>	
Summary Statement This project compares the electron transfer efficiency between various natural and artificial anthocyanins and Titanium Dioxide under different lighting conditions.	
Help Received Father helped buy chemicals and equipment; Margaret Carlberg provided some information on anthocyanins.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Nicole L. Francisco	Project Number S0511
Project Title Estimating Future NO(2) Concentrations at Mt. Miguel High School	
Abstract Objectives/Goals NO(2) is one of the common components of automobile exhaust. If individuals are regularly exposed to a high concentration of NO(2), it can potentially be hazardous to their health. Future students of Mt. Miguel High School will soon be attending school immediately adjacent to a freeway where NO(2) concentrations may significantly increase. The purpose of this project was to estimate future concentrations of NO(2) at Mt. Miguel High School. Methods/Materials This was done by preparing passive diffusion samplers and placing them at freeway locations at distances from the freeway similar to MMHS and the new freeway under construction. The tubes of the samplers are small#71mm (length) by 11mm(diameter)-with two stainless steel meshes in one cap at the closed end, coated with TEA-a chemical compound that absorbs NO(2) during the exposure period. After a three-day exposure period, the samplers were treated for color development with two analysis solutions and analyzed with a spectrophotometer at 540nm. Nitrite standards were used to create a standard curve. Results Results showed that Freeway #1 sampler concentrations and current school sampler (control) concentrations were similar. Freeway #2, Freeway #3, and Freeway #4 sampler concentrations were significantly higher than school sampler concentrations. Conclusions/Discussion These concentrations were just below the World Health Organization's issued guidelines for human exposure to NO(2) (1987). Therefore, there is reason to believe nitrogen dioxide concentrations should be carefully monitored after freeway construction is complete.	
Summary Statement The purpose of this project was to estimate future concentrations of NO(2) at Mt. Miguel High School by preparing passive diffusion samplers, placing and then exposing them at freeway locations, and analyzing them with a spectrophotometer.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) David W. Frank	Project Number S0512
Project Title The Fading of Prints	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My Project was to determine what type of color printer technology was most resistant to fading.</p> <p>Methods/Materials Six color bars (red, yellow, blue, green, magenta, cyan) were printed out of each of the three types of printers (Laser, Piezoelectric and Thermal) on to acid-free paper. A lightbox with UV lamps was constructed and two prints from each type of printer was faded for 39 days. As a control sample, three additional prints were stored in the dark for 39 days. The prints' colors were measured by a paint color analyzer at the beginning and end of the experiment.</p> <p>Results The laser printer sample faded least, followed closely by the piezoelectric. The thermal printer sample faded very quickly.</p> <p>Conclusions/Discussion My conclusion is that there is a significant difference in the fading qualities between the tested printer technologies.</p>	
Summary Statement My project demonstrated differences in how well prints from three color printer technologies resisted fading when exposed to ultra-violet light.	
Help Received My project demonstrated differences in how well prints from three color printer technologies resisted fading when exposed to ultra-violet light.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Megan Gates; Katie Hutchinson	Project Number S0513
Project Title Indicators or Not?	
Objectives/Goals The purpose of this project is to test the petals of different types of flowers for indicators. An indicator is present if a smearing of a single petal changes color with the addition of acids and bases.	
Abstract	
Methods/Materials The first step for testing is to choose one container and add ½ cup of vinegar. With the second container add ¼ cup of baking soda and two tablespoons of water. Add one Q-Tip to each of the containers and stir. With one petal, rub harshly on the computer paper until color is visible on the paper. Using the Q-Tip from the vinegar container, smear vinegar on the top half of the petal smears. Using a pen, label the vinegar side of the petal smears. With the Q-Tip rub baking soda onto the other half, but remember to leave some room between the two for reference to the original color. Again using the pen label the side with baking soda. Repeat these steps with all varieties of flowers.	
Results After our tests were completed, the flowers with white or yellow petal colors did not have indicators because of their light color. However, the flowers that had darker colored petals clearly showed indicators. Indicators were visible by the color change using vinegar and baking soda. For example a reddish colored rose had changed to a light blue (using baking soda) and a florescent pink (using vinegar). This change was caused by an imbalance in the pH level. Thus, the color would change dramatically from the base color.	
Conclusions/Discussion The results showed that flowers with dark colored petals clearly exemplify indicators. Dark colored flowers have indicators because they change their color in the presence of acids and bases. The petal smears changed colors dramatically because of the pH imbalance. The hydrogen ions in acid solutions are what causes the petal smears to become lighter than the original petal color. The hydroxide in base solutions is what causes the color to become darker. Flowers that had light color petals (including yellow and white) did not show any signs of indicators. Flowers with bright petals showed various changes depending on their species.	
Summary Statement Flowers were tested to determine whether or not they had an indicator.	
Help Received Dana's Flower Basket donated bouquets of flowers for testing.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Lupita Guerrero; Melinda Mendoza	Project Number S0514
Project Title Rise to the Point: Ice-Nucleating Protein in Water	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Ice-nucleating protein is a protein used as a snow inducer. Our project was to test this protein to see how much it raises the freezing point of water.</p> <p>Methods/Materials We used a container and added ice, rock salt, and water to get the temperature to be -5°C. Then we mixed ice-nucleating protein with distilled water. We put 3 ml of distilled water in one test tube and 3 ml of the ice-nucleating protein water in another test tube. To get data we connected a Vernier LabPro to a computer and two sensors to the LabPro. The computer graphed the temperature of the two test tubes for 35 minutes.</p> <p>Results In two of our test the plain water froze at a higher temperature. In three of our tests the water with ice-nucleating protein froze at a higher temperature.</p> <p>Conclusions/Discussion We didn't find a specific difference of degrees in the two, but we learned that water with ice-nucleating protein always freezes faster than plain water.</p>	
Summary Statement Our project was to find out how ice-nucleating protein affects the freezing point of water.	
Help Received Our teacher helped us research.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Denise Gutierrez; Maria L. Navarro	Project Number S0515
Project Title An Investigation in the Correlation Between the Hotness of Peppers and Using Using Salsas	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine if there is a correlation between the hotness of chili peppers and acidity, using chili salsas. Our hypothesis is that if there is range of hotness in chili peppers, as measured by capsaicin level, then salsas made with different chilis should show a correlation between the increasing levels of hotness and acidity.</p> <p>Methods/Materials Peppers: Habanero, Serrano, Yellow Jalapeno, Jalapeno, Bellpepper, Anaheim; Roma tomatoes; sodium chloride; computer Probeware; comal; blender; banalce; six plastic containers; Scoville hotness scale (capsaicin content).</p> <p>Results Using bellpepper and Anaheim chilis as our controls, and the Scoville scale of hotness, we determined that there was an inverse trend between hotness and acidity in chili salsas. Other than Jalapeno salsa, and the controls, the hotter the peppers, the less acid they were.</p> <p>Conclusions/Discussion Our hypothesis was incorrect; there was not a direct correlation between the hotness of peppers and acidity. We saw an inverse trend between hotness and acidity. The more capsaicin, the hotter the chili the less acid the salsa tends to be.</p>	
Summary Statement There is a lack of correlation between capsaicin level of chilis and acidity in salsas.	
Help Received Input of the Women in Science Club members and advisors.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ashley B. Kelley	Project Number S0516
Project Title The Evaluation of Fruit from Various Grocery Stores	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine which grocery store, of three evaluated, will have the best quality of fruit.</p> <p>Methods/Materials 13 types of fruit were donated from three different stores (Food Max, Vons, and Ralphs) and was directly analyzed using a hand refractometer. The fruit sat in a refrigerator for four days after the initial testing, and then was tested again using the same method and device. A drop of fruit sap (juice) was placed on the lense of the refractometer and the results of the chart in the refractometer were recorded. The readings were compared to the recommended allowance in the Ream's Composite.</p> <p>Results After completing an analysis of variance (ANOVA) test, it was determined that Food Max possessed the best quality of fruit as compared to the Ream's Composite. Ralphs had the worst quality of fruit with the greatest degree of variance from the recommended allowance.</p> <p>Conclusions/Discussion Of Food Max, Vons, and Ralphs, Food Max had the best quality of fruit with the highest Brix (sugar content) level. The conclusion did not support the theory that Vons had the best quality of fruit.</p>	
Summary Statement Testing fruit donated from three different stores to determine which has the best quality.	
Help Received Used hand refractometer, supplied by Ms. Christine Dickson, Agriculture teacher at North High School.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ping Han Luh	Project Number S0517
Project Title Chromatography: A Separating Process	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment is to analyze the substances within the shells of candies. After determining which FD&C dyes are used and considering the known side effects to certain dyes, it brings up the possible dangers of eating these candies.</p> <p>Methods/Materials I. Materials: 6 unknown candies, 1 Bunsen burner, 1 graduated cylinder, 4-5 beakers, 6 test tubes(for each candy), chromatography papers, scissors, toothpicks, chopsticks, paper clips, household ammonia, and 1 large transparent plastic box II. Methods: a. Remove the food colors by melting candy shells in boiling water. b. The solution was applied to chromatography paper to create the color pattern known as a chromatogram. c. Measure the distances that the solute and the solvent travel. d. Find the flow rates for each food dye by dividing the distance solute travels by the distance solvent travels. e. The variable was the different solutions. f. My sample size was 6 (6 different candies), and I got 2 trials for each candy. g. I measured each distance to 0.1 cm. h. Finally, use the chart that contains known flow rates for FD&C dyes to determine which food dyes are used in candy shells.</p> <p>Results Most candies contained FD&C dyes Red #3 and Yellow #5; however, they consisted of a mixture of other dyes as well.</p> <p>Conclusions/Discussion There is more than 1 component in most food colors; therefore, most food colors are mixtures. Chromatography is a useful process to separate solutions and determine their identities based on known flow rates.</p>	
Summary Statement This experiment is designed to analyze the substances within the shells of candies by using chromatography.	
Help Received My chemistry teacher Mrs. Petro devoted class time to help us work on papers and background research, supplied laboratory devices, and gave advices for correctly conducting the experiment. My mom helped my colect essential materials. My younger sister, Lisa, helped guide my in writing endnotes and the	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Carley G. Millian	Project Number S0518
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Project Title Cry1AB in Corn

<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To find out if Cry1AB can be found in different corn samples. Also to see how strongly it can be detected.</p> <p>Methods/Materials #1- You go get different corn samples, blend them up separatly in a food processor, and add the correct buffer volume which is at a 1g to 1L ratio. Then you stir it up, put it in a testing cup, and put a test strip in. #2- Take the positive control (Caterpillar Killer) and dilute it with a 1-10, 1-100, and 1-1000. Put them into the testing cups and put a test strip in.</p> <p>Results Negative- Stater Bros.(yellow), Stater Bros.(white), Baby Corn, Suplantation, Vons(white), Birds Eye(frozen), Organic corn(frozen), Arrowhead Cornmeal, Mother#s cornmeal. Positive- Alber#s cornmeal, Caterpillar Killer(positive control) 1-10 (very strong line) 1-100 (pretty strong line) 1-1000 (light line)</p> <p>Conclusions/Discussion Well after I had seven negative corn results I thought something might be wrong. So, I went and got Caterpillar Killer which contain 1.76% Bt protein as a positive control. That tested positive so I knew that there wasn#t something wrong with the kit. Then Alber#s cornmeal tested positive, but to make sure that it wasn#t just something weird in cornmeal that made the red line I had to find a negative control. I went to Mother#s Market and got Arrowhead and Mother#s cornmeal. They both tested negative so I knew that Alber#s was really positive.</p>
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Summary Statement I wanted to see if any of the corn I eat could contain this genetically engineered protein.

Help Received UCI/CMHS Science Fair Grant



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Bindu N. Patel	Project Number S0519
Project Title Photopolymerization: Advanced Technology, Environmentally Friendly, Energy Efficient	
Abstract Objectives/Goals My objective is to find the affect of monomers, oligomers, and photoinitiators on the characteristics of the polymer during photopolymerization. Also, I want to determine the affect of UV intensity on the rate of polymerization (solidification). Methods/Materials Make Gel A by using 25% monomer, 70% oligomer, and 5% photoinitiator. Make Gel B exactly the same, except use another type of monomer. Make Gel C exactly like Gel A except use a different oligomer, and make Gel D exactly like Gel A except use a different photoinitiator. Expose 0.5 g of each gel under the same intensity of UV light. Record all the properties exhibited by the final products of each of the gels. Also, obtain three UV lamps of different intensities. Using the same gel, expose equal amounts of it into each of the UV lamps and record the highest exotherm reached and the time it took to reach it. Results The most prominent difference between Gel A and Gel B was the shininess of the polymers. The most prominent difference between Gel A and Gel C was durability, and between Gel A and Gel D was the rate of polymerization. Also, the gel exposed to the lamp with the highest intensity reached the highest exotherm and in the shortest amount of time. The gel exposed to the lamp with the lowest intensity reached the lowest exotherm and it took the longest amount of time to reach it. Conclusions/Discussion Monomers, oligomers, and photoinitiators all seem to have an affect on a range of properties; however, there is one main characteristic that each contributes to the polymer. Monomers affect the shininess of a polymer, while oligomers affect the durability of the product, and photoinitiators affect the rate of polymerization (how fast the gel becomes a solid polymer). Also, the higher the UV intensity applied to the gel, the faster the rate of polymerization, and the higher the amount of exotherm (heat produced).	
Summary Statement My project concerns researching the characteristics of certain chemicals involved in photopolymerization, a reaction that occurs when monomers, oligomers, and photoinitiators are combined and exposed to UV light to form a polymer.	
Help Received All of the raw materials and equipment used in this experiment were provided by Jagdish Cosmochem Products, Inc. However, I received no help in carrying out any experiments. I did all of the work on this project by myself.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kimberly Perring	Project Number S0520
Project Title What Is the Best Solution for Hair Exposed to Pool Water?	
Abstract Objectives/Goals My objective was to test which solution worked best to prevent hair from being damaged by pool water and to repair hair damaged by pool water. Methods/Materials I tested two solutions (hair conditioner and water) as pretreatments before putting the test hairs in pool water, and 4 solutions (lemon juice & water, aspirin & water, Swimmers shampoo, and regular shampoo), as post-treatments after putting the test hairs in pool water. Measurements of each hair were taken before and after their treatments. I measured hair width and appearance (amount of cracking) under a light microscope and I measured the hair's strength by stretching them using a modified stretching machine. I calculated the differences between pre and post treatments. Results Some of the treatments caused a loss in hair width and some showed an increase. From most loss to least, the treatments were swimmer's shampoo (-3.5 mm), pre-water treatment (-2.3 mm), pre-conditioner (-2.2 mm), water control (-0.7 mm), chlorine control = no solutions (+1.4 mm), regular shampoo (+3.9 mm), and lemon water (6.2 mm). Treatments impacted hair cracking. In order of increased cracking, pre-conditioner treatment, pre-water treatment, regular shampoo and swimmers shampoo cause fewer cracks, while aspirin water, water control, chlorine control, and lemon water caused more cracks. Treatments also affected hair strength. From stronger to weaker, the treatments were aspirin water, regular shampoo, water control, pre-water treatment, lemon water, chlorine control, swimmer's shampoo and pre-conditioner. Conclusions/Discussion The data shows that regular shampoo after exposure to pool water helps hair the most. From before placing in pool water to after, it increased hair width by 3.9 millimeters on average. It also lessened cracks by a rating of 0.2, and it made the hair stronger, on average, by 288.75 stretching units. The results of my experiment proved my hypothesis wrong. I thought that the swimmer's shampoo would work the best because it is pH balanced and contains sodium thiosulfate which replaces the protein eroded by chlorine. It ended up that the swimmer's shampoo was one of the worst solutions. It made the hair thinner, helped the appearance only slightly, and it made the hairs weaker.	
Summary Statement My project tested various solutions to prevent damage or repair hair exposed to pool water and it showed that regular shampoo after swimming worked best.	
Help Received Father helped make graphs. Used lab equipment at University of California Riverside under the supervision of Dr. Thomas Perring. Mother helped glue work on board.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Larry D.W. Schmidt	Project Number S0521
Project Title The Effect of Ingredients on the Structure of Chocolate Chip Cookies	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project demonstrates the roles of the various ingredients in the structure of a chocolate chip cookie.</p> <p>Methods/Materials I baked eight batches of cookies, a control, a batch each with more and less butter, more and less sugar, cake flour (low protein), bread flour (high protein), and baking powder. Then, I went to UC Davis and performed texture analysis tests, where an arm moves through the cookie for a distance of 25 mm and measures the resistance against it. I then photographed a top view and a cutaway view of each cookie.</p> <p>Results The cookies with more sugar never really formed into cookies and the cookies with less sugar were more pale and watery, since there was not enough sugar to absorb the water. The cookies with more butter were flat and brown, while the cookies with less butter were thicker and pale, since butter lubricates the dough and controls the spread of the cookie as well as helping with browning. The cookies with bread flour were tough and brown, since a stronger network was formed, while the cookies with cake flour were softer and flatter, since a weaker network was formed. Cookies made with baking powder were very thick coming out of the oven, but baking powder was too strong of a leavening agent, so the cookies collapsed in on themselves.</p> <p>Conclusions/Discussion I discovered that butter, sugar, and flour play the most vital roles in the structure of the cookie: the flour providing the network that is the basic structure of the dough, the sugar preventing the structure from becoming too strong by absorbing water, and the butter lubricating the dough.</p>	
Summary Statement I varied the ingredients in the recipe for chocolate chip cookies and measured the effects they had on the texture of the cookies.	
Help Received My mother drove me to UC Davis, where I used equipment and research materials from Dr. Charles Shoemaker, chairman of the Department of Food Science and Technology	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Cameron J. Shepherd	Project Number S0522
Project Title Can Conductivity be Used to Determine Diffusion and Other Ionic Properties?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I was interested in using conductivity to evaluate the diffusion characteristics of different ionic solutions to see if properties of their original molecules that affected diffusion could be determined. My hypothesis was that conductivity would allow me to obtain experimental data about how diffusion of permeate solutions into deionized water was affected by membrane combinations for different cations and anions.</p> <p>Methods/Materials I built an apparatus to use conductivity to measure diffusion into deionized water from a permeate reservoir over time for different membranes [0.45 and 1.2 micron cellulose, dialysis tubing, Parafilm, plastic wrap, and coffee filter] and water-based permeate solutions [KCl, NaCl, KNO₃, NH₄Cl, CoCl₂, MgCl₂, Sugar, Cu(NO₃)₂, Ba(NO₃)₂, and BaCl₂]. My test vessel was made out of plexiglass and a Mason canning jar.</p> <p>Results When plotted, the raw data from each run showed a smooth, logarithmic shape. Using a spreadsheet, I took the antilogarithm and then took roots to find a curve to fit each set of data. When I compared the roots of these equations with properties of the chloride cation, I found that there was a trend linking the atomic weight and the exponential power of the equation for that run. I confirmed the trend with additional permeates.</p> <p>Conclusions/Discussion Conductivity proved to be an excellent way to measure diffusion. After I analyzed my conductivity data, I found a correlation between chloride cation atomic weight and the exponential power of the diffusion curve for that permeate, once I adjusted for valence. I plotted that correlation as a linear graph that allows anyone to predict the diffusion rate for chloride permeates knowing only the atomic weight of their cation or, alternately, to determine cation atomic weight from a measured diffusion rate.</p>	
Summary Statement My project used conductivity measurements of diffusion to establish a correlation between chloride cation atomic weight, valence, and the exponential power of the measured diffusion curve.	
Help Received Reference potassium chloride standard solutions obtained from Metropolitan Water District of Southern California.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Alianne M. Steffenson	Project Number S0523
Project Title The Gastric Solubility Rate of Acetaminophen when Combined with Various Beverages	
Abstract Objectives/Goals To determine whether the beverage taken with a pain reliever affects the time it takes to dissolve. Also to find out if the coating on a pain reliever affects the time it takes to dissolve. Methods/Materials A stomach-like solution will be made using a hydrochloric acid supplement. The solution should represent the pH and action of the stomach. It will be placed in a ziploc bag to simulate the contents of the stomach churning occasionally. Then the pain reliever and beverage will be poured in to represent someone taking medication. Each type of pain reliever will be tested with each beverage. Pain Relievers: 500mg Acetaminophen tablets, 500mg Acetaminophen caplets, 500mg Acetaminophen gelcaps. Beverages: Nothing, Water, Milk, Orange juice, Soda. Results The solubility rate of the pain reliever was affected by the beverage used. Milk acted as a buffer while the rest varied. The coating of a pain reliever also affected the solubility rate. The tablet dissolved the fastest and the caplet and gelcap were slower. Conclusions/Discussion The data supports my hypothesis that the solubility rates of pain relievers are affected by the beverage taken with it. The data also shows that the coating of a pain reliever affects the solubility rate.	
Summary Statement Determining the solubility rates of different pain relievers when tested with various beverages.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Shayla A. Stewart	Project Number S0524
Project Title Brighten That Lightstick	
Abstract Objectives/Goals To determine the affects of vibration, pH level, and temperature on the chemical reaction inside a lightstick. Methods/Materials First a box for measurements was constructed. Then the lightsticks were placed inside containers of the desired temperature and measurements were took of light output every 20 minutes until there was no measurable light. For pH, different solutions with different pHs were mixed and measurements were taken of that light output. To test vibration, the lightsticks were duck taped to a massager and then measured in 20-minute increments. Results Temperature and pH level both strongly affected the chemical reaction while vibration did not affect the chemical reaction at all. The higher the temperature the brighter the light but for a shorter period of time, while the lower the temperature the duller the light but for a longer time period. In pH, the basic solutions created light while acidic solution did not. It was found the solutions must be between 5-6 to create light for a long period of time. Conclusions/Discussion The hypothesis was proven to be partially correct. Both temperature and pH affected the chemical reaction, but vibration did not. The results may pertain to some chemical reactions. Chemical reactions can occur faster at a higher temperature and at different pH levels. The chemical reaction inside a light stick works best if activated at a higher temperature and has a basic pH level.	
Summary Statement The affect of vibration, pH, and temperature on the chemical reaction inside a lightstick.	
Help Received My parents, especially my father, helped oversee handling the chemicals used in project.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Annie T. Thomas	Project Number S0525
Project Title Effects of Chemical Contamination on Aluminum Potassium Sulfate Crystal Growth	
Abstract Objectives/Goals The goal of this experiment was to determine the effects of contamination on the growth of aluminum potassium sulfate crystals. Methods/Materials Saturated aluminum potassium sulfate solutions were contaminated with each of four contaminants: potassium ferricyanide, chromium aluminum potassium sulfate, nickel sulfate, and copper sulfate. They were seeded with small, pure aluminum potassium sulfate crystals, and growth was measured daily in centimeters. Control crystals were also monitored. Results The crystals grown from the contaminated solutions were generally not affected in appearance, but their growth rates were altered. With 0.5 gram of contamination, the growth was slowed by 33 percent. With 1 gram of contamination, the growth was slowed by 66 percent. The chromium aluminum potassium sulfate was the contaminant that affected appearance. The color was a cross between the aluminum potassium sulfate and the chromium aluminum potassium sulfate. When 1 gram of copper sulfate or nickel sulfate was used, the seed dissolved completely. Potassium Ferricyanide created a visible layer over the seed crystals. Conclusions/Discussion The hypothesis tested was that contamination would result in smaller crystals, and this experiment supported it. The experiment provided knowledge of some effects of contamination on crystal growth. Another connection with this experiment is in electronics. The properties of contaminated crystals are extremely important in creating semiconductor devices. Contamination can create positive or negative charges, which can be directed through wire as an electrical current. This experiment expands knowledge in chemistry by showing how chemicals can crystalize and behave differently depending on their surrounding environment.	
Summary Statement Aluminum Potassium Sulfate (alum) crystals were grown from contaminated alum solutions to understand the effects of contamination on the resulting crystals.	
Help Received My grandfather helped me to buy the chemicals I needed for this experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Alan T. Vickery	Project Number S0526
Project Title The Amount of Heat Energy Given Off by Various Species of Nuts When Burned	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to test various types of natural nuts for the amount of heat energy each type gave off when burned and to determine which specie burned hottest.</p> <p>Methods/Materials A calorimeter was constructed so that the amount of heat energy each nut gave off when burned could be measured. The calorimeter was constructed of homemade materials. It consisted of a large coffee can with a series of small holes punched at its base to allow it to function as a chimney, containing heat and ventilating smoke. Two holes were punched at the top of a soup can, and a barbeque skewer was placed through them. A needle was inserted into the middle of a cork. The soup can was hung above the larger can by utilizing the skewer, and one-half cup of water was placed into the soup can. The water temperature was taken with a Fahrenheit thermometer. A nut was placed on the needle inserted in the cork, lit on fire with a match, and placed under the soup can filled with water. It was allowed to burn until burning out or after five minutes, whichever came first. Water temperature was taken promptly and recorded. The water was disposed of, and the soup can was permitted time to cool. The process was repeated for each type of nut until each specie was tested twice to ensure no irregularities occurred. Water was kept at a room temperature of seventy degrees Fahrenheit to ensure that no irregularities resulted as well. The average rise in temperature and amount of Btu each type of nut gave off when burned was able to be calculated from the data collected.</p> <p>Results The results varied during the experiment. Most nuts measured a very small increase in temperature ranging from four to eight degrees Fahrenheit; however, the walnut raised the water temperature an average of twenty-five degrees Fahrenheit and the pecan raised it an average forty-four degrees Fahrenheit. They were also the only two species that were extinguished for safety purposes after the five-minute time limit after each trial.</p> <p>Conclusions/Discussion In conclusion, most nuts tested gave off minimal heat energy when burned except the walnut and pecan. Attempts were made to measure mass during the experiment. At the time it was performed, materials to register the mass of the miniscule nuts were not available. Mass measurements and inclusion of data relating to calories per gram of each specie of nut are additions that will be made to enhance the project.</p>	
Summary Statement The project is about testing the amount of heat energy various species of nuts give when burned and determining which type of nut burns the hottest.	
Help Received Mother helped type project and with board; Grandfather helped by supplying cans, metal hole punch, and such materials; Chemistry teacher Mrs. Poquette helped draft abstract and gave suggestions for improvement.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Daniel A. Whisler	Project Number S0527
Project Title Molecular Mass of a Volatile Liquid Derived through Increasing Temperature	
Objectives/Goals Volatile liquids vaporize at low temperatures. It has been proven that by increasing temperature, the kinetic energy of the molecules increases, and likewise, the number of molecules changing from a latent liquid state into a gas state also increases.	
Abstract Methods/Materials In order to test the hypothesis that increased temperature will result in a more accurate calculation of molecular mass, acetone was allowed to vaporize at a specified temperature and condense. The resulting liquid was massed and the figure, in terms of m, placed in the formula $M = mRT/PV$. Four different temperatures ranges were tested. The volume of the test tube, the pressure of the atmosphere, and the R constant were also determined. By solving the formula, the M variable (molecular mass) was determined and compared with the known molecular mass of acetone (58.09g).	
Results The molecular mass decreased as the temperatures increased, deviating from 164g and lowering to an accurate 61.5g. Lines of best fit shows strong correlations (above -0.96) between temperature and several variables.	
Conclusions/Discussion Explanation is due to the nature of acetone molecules; they remain bonded together at low temperatures. A decreased number of molecules results in decreased pressure and subsequently, a minute amount of excess vapor being eliminated. This causes a large quantity of condensed vapor to be massed and a higher, inaccurate molecular mass results. By increasing temperatures, the exact opposite occurs. The molecules become more excited, the pressure increases and all excess vapor is expelled. Less liquid is massed and therefore, the molecular mass is much more accurate.	
Summary Statement Showing the relationship between increasing temperatures and the behavior of vaporized gases at the established temperature.	
Help Received Used laboratory equipment at Southwest High School under the supervision of Mr. V. Bowen.	