CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Mohnish Alishala

Project Number

J0501

Project Title

Biodiesel: The Future Generation Fuel

Abstract

Objectives/Goals

There is a constant production of trash in the world and there isn#t enough space to accommodate the amount. The objective was to find which type of organic waste produces the most lipid and then into biodiesel, and which reaction condition is more efficient in terms of biodiesel in comparison to the lipid amount.

Methods/Materials

This experiment utilized lab equipment at Menon Internationals, Inc. San Diego and four different types of waste. The amount of biomass, lipids, and biomass were recorded for the experiment. The fermentation part of this experiment was done using a microorganism and pH was adjusted daily to get optimal growth using citric acid as acid and potassium hydroxide as base. After, the fermentation was done in seven days, a filter cloth with 300-thread count was used to harvest the biomass. The biomass was dried using a Lyophilizer and grinded. Using a Soxhlet extraction apparatus, the oil was extracted using hexane as solvent. Hexane was removed using rotavapor. Finally, using transesterification reaction method the lipid was converted into biodiesel through five reaction conditions.

Results

Each waste had two flasks, which were combined to make more biodiesel. From this experiment, green waste created 1.59 # 1.88g of oil and 1.43 # 1.67g of biodiesel, brewery waste 2.76 # 3.12g of oil and 2.34 # 2.78g of biodiesel, bakery waste 10.05 # 11.03g of oil and 9.00 # 9.92g of biodiesel, and food waste 3.15 # 3.73g of oil and 2.82 # 3.23g of biodiesel. The average conversion rate for biodiesel was for condition 1 - 88.6%, condition 2 - 89.8%, condition 3 - 89.6%, condition 4 - 87.8%, and condition 5 - 89.5%.

Conclusions/Discussion

The hypothesis was very incorrect because the numbers never reached that high of an amount. Bakery waste had the most lipid and biodiesel yield. However, the other types of waste didn#t do well. Green waste produced the least, then brewery waste, and the second best was the food waste. The highest percentage was around 22-23% while it was estimated that the highest would be 40%. For the estimation of bakery waste it was 30%, which was the most accurate estimation of all of them. Reaction condition 2,3 and 5 had the best conversion rates however reaction condition took half the time in comparison to the other conditions. But, if the fermentation conditions are fully optimized there is a possibility of getting hypothesized lipid and biodiesel amounts.

Summary Statement

This project tests which of the four types of waste and five reaction conditions produces the most biodiesel.

Help Received

My father helped experimentation and edited the paper and he was also my mentor. Melissa Lee helped preparing the flasks and recording the pH numbers. Elaine Gillum helped refine the idea and helped in editing the paper.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Suraj K. Anand

Project Number

J0502

Project Title

Conserved Regions of Coagulation Factors III, VIII, and XII's Percent, Location, and Function in Diverse Species

Abstract

Objectives/Goals

The objective of this study is to locate and quantitate the conserved regions of Coagulation Factors III, VIII, and XII across diverse species as well as to discover the functions of major polypeptides located in the conserved regions.

Methods/Materials

Laptop computer with access to the Internet. Websites and databases used include NCBI, T-coffee, Clustal Omega, and Prosite. Sequences of the Coagulation Factors III, VIII, and XII of diverse species were found and aligned with the human sequence using computer databases and programs. Created Java program to obtain the number and percent of amino acids conserved. Major, important polypeptides and their functions were then searched for in the protein.

Results

The closer related the species was to Homo sapiens, the more conserved the amino acid sequence of the factor was. Compared to humans, mammals had 50-80% of the amino acids sequences of Coagulation Factors III, VIII, and XII conserved; reptiles scored between 30-50% of the Coagulation Factors conserved whereas fish only had about 25% of the amino acid sequence identical. Another major trend was that when the whole sequence was tested for polypeptides, only the conserved regions contained major known functional polypeptides. For example, in Coagulation Factor VIII (Figure 5) the Multicopper Oxidases Signature was found in the first half of the first conserved region.

Conclusions/Discussion

These results provide scientists with a roadmap of the highly conserved regions of the Coagulation Factors III, VIII, and XII. For patients that have unknown mutations that cause hemophilia, scientists can look at this roadmap to find the likely location of the undiscovered mutation. This data will also allow scientists to discover new important polypeptides because major polypeptides are present in conserved regions. By studying the conserved regions that have no known major polypeptides present, one can likely discover new functional polypeptides. These results concur with Natural Selection.

Summary Statement

I located and quantitated the conserved regions of the Coagulation Blood Factor proteins across diverse species and showed that important functional polypeptides are located in conserved regions.

Help Received

I formulated and completed my experiment myself. Some of the ideas I used came from a website called science buddies. The tools and databases used were from the National Center for Biotechnology Information (NCBI).

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Joseph S. Campbell

Project Number
J0503

Project Title
Acid Base Effect on Catalase

Abstract

Objectives/Goals
My objective was to see if food types varying on the pH scale would affect how quickly Catalase breaks down Hydrogen Peroxide (H2O2).

Methods/Materials
To complete this experiment I took USDA approved cow liver and blended it. I poured 1/8 of a teaspoon of H2O2 onto one tablespoon of cow liver and timed how long the bubbles effervesced. I also did the same thing but with various food types mixed into the liver. All of the food types were sampled separately. I did each experiment three times per food item the recorded all of my data.

Results
100% of the samples with alkaline foods had a quicker reaction rate than the controlled variable. Of the acidic foods, 60% of the samples had a faster reaction rate than the controlled variable. 40% of the acidic foods demonstrated a slower reaction rate than the cow liver alone.

Conclusions/Discussion
I conclude that the various food types will affect how our body works, including the body's enzymatic reactions. The alkaline foods lower the Activation Energy. This is important to make chemical reactions occur quicker, which saves our body energy.

It is possible that not all of the acidic foods demonstrated a slower reaction rate because this experiment was not done in the human body.

It is important to eat healthy. Alkaline foods are better for our body; although, we do need to balance our intake of both acidic and basic foods.

Summary Statement
This project tests how various food items can affect the reaction rate for Catalase to break down Hydrogen Peroxide in the liver.

Help Received
I blended the liver and mixed the food items but I was assisted in timing how long the bubbles effervesced.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Aathith Chandrasekaran; Ian Kim

Project Number

J0504

Project Title

Investigating the Deactivators of Enzymatic Browning

Abstract

Objectives/Goals

When fruits are cut, they release polyphenol oxidase (PPO). When PPO comes in contact with air, it triggers oxidation, resulting in enzymatic browning of fruits. Goal of the project was to determine effects of acidity and antioxidant on enzymatic browning of banana peels. This year's hypothesis was that fresh sources of antioxidant is more effective in stopping enzymatic browning then preserved sources of antioxidant.

Methods/Materials

Last year: Banana peels cut in 2cm by 2cm were dipped in various solutions of different pH. Enzymatic browning of banana peels were observed and recorded over time.

This year: Banana peels cut in 2cm by 2cm were dipped in both fresh and preserved source of antioxidant rich products. Effects of enzymatic browning was observed and recorded over time.

Further experiments involved banana peels dipped in diluted solution of vinegar to accelerate enzymatic browning followed by exposing them to various concentrations of known deactivators of enzymatic browning.

Results

Previous year's experiment showed that solutions with pH between 1 to 6 did not showed appreciable difference in slowing down the enzymatic browning of banana peels. Vinegar with low pH actually accelerated the enzymatic browning of banana peel.

This year's experiment comparing fresh sources of antioxidant versus preserved sources of antioxidant also did not show appreciable difference in deactivation of enzymatic browning.

Conclusions/Discussion

Neither the acidity of the solutions nor freshness of antioxidant slow down the enzymatic browning of banana peels.

Vinegar with low pH actually accelerated the enzymatic browning by breaking down the cell wall and we were able to utilize this unique effect of vinegar to further study other known deactivators of enzymatic browning.

Summary Statement

The acidity and the fresh source of antioxidant did not deactivate the enzymatic browning of the banana peels.

Help Received

Our parents helped design the expirements and we performed the expirements.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Kyra Jan S. Cruz

Project Number
J0505

Project Title
Developing a Model of an Artificial Pancreas

Abstract

Objectives/Goals
The objective of this experiment was to see if a simplified model of an artificial pancreas is able to detect high simulated blood glucose levels and add insulin to the simulated glucose levels.

Methods/Materials
In this experiment, a model of an artificial pancreas was first developed using electronic parts and a motor pump. Simulated blood glucose and insulin were then created using water, vinegar, and baking soda. The conductivity sensor was calibrated so that it would cause the pump to stop once it detected the neutralization of the high simulated glucose level (vinegar) by the insulin (baking soda solution) that was pumped into it. In the ideal setting, the pump would have stopped pumping once 200 mL of baking soda solution is pumped out and 100 mL remained in the bowl (meaning the vinegar had been neutralized).

Results
The first trial in balancing the high simulated blood glucose level using the artificial pancreas model resulted in 200 mL of baking soda solution remaining in the bowl which is far from the expected result. In the ideal setting, the pump should have stopped pumping once 100 mL of baking soda solution remained in the bowl and 200mL is pumped out(meaning the vinegar had been neutralized). The second trial resulted in 120 mL of baking soda solution remaining which is closer to the the ideal. Subsequent trials were also successful with the third trial resulting in 105 mL and the fourth trial with 110 mL of baking soda solution remaining.

Conclusions/Discussion
After performing four trials of balancing a high simulated blood glucose level with the artificial pancreas model I can conclude that my model is able to successfully balance simulated blood glucose levels. It was able to pump the right amount of baking soda into the vinegar to neutralize the vinegar. The future of treatment of type 1 diabetes is through an artificial pancreas, it can make living with type 1 diabetes easier, instead of managing blood glucose levels carefully with constant insulin shots and finger pricking.

Summary Statement
My project aims to create a model of what a future artificial pancreas used to help improve the treatment of type 1 diabetes would be like.

Help Received
My father helped me in purchasing the materials required and in assembling the circuit and conductivity sensor. My mother helped me in board design and proof-reading.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Akshaya Ganesan

Project Number
J0506

Project Title
Do Common Genetically Modified Foods Carry Tnos and CAMV 35S Promoter Genes?

Abstract

Objectives/Goals
PRIMARY GOAL of this project is to find if we consume DNA disasters in our daily GMO foods and also to create awareness among public about GMO foods.
OBJECTIVE is to test the presence of Cauliflower Mosaic Virus Promoter genes and terminator of nopaline synthase genes of Agrobacterium tumifaciens in squash, Hawaiian papaya, corn on the cob, cluster tomato, corn chips and corn puffs and create awareness about GMO food among the public.
BIG QUESTION - Do common GMO foods carry dangerous GMO genes?
HYPOTHESIS - I think all tested food items will carry GMO genes.

Methods/Materials
Materials:
1.Food samples
2.GMO testing kit
3. Lab facilities - weighing balance, water bath, centrifuge, PCR thermal cycler, agarose gel electrophoresis apparatus, micropipeetes, tips, beaker, conical flask and measuring cylinder
4. Lab coat, gloves, and goggles,

Method
1.DNA extraction from food samples and control
2. DNA amplification using PCR
3. Seaparation of CAMV 35S and Tnos genes using Agarose gel electrophoresis.

Results
Results obtained indicated that the tested Hawaiian papaya, corn on the cob, cluster tomatoes, and soybeans carry GMO genes. Squash was GMO negative and the DNA extraction from corn chips and corn puffs were not successful even after repeated trials.

Conclusions/Discussion
With the results obtained, I conclude that the tested Hawaiian papaya, corn on the cob, cluster tomatoes and soy beans are not safe for human consumption as they carry GMO genes. Research evidences indicate that these GMO genes - CAMV35S nad Tnos are proven to cause many health hazards including stomach problems, activating cancer genes and even HIV. So by finding their presence in our daily food, I advice the public to avoid these food items and request scientists to reconsider using these genes for engineering plant genome.

Summary Statement
I FOUND THE PRESENCE OF DNA DEVILS (CAMV 35S AND TNOS) IN THE COMON GMO FOODS WE CONSUME IN OUR DAY TO DAY LIFE.

Help Received
1.Ms.Jennifer East - my science teacher for encouraging me to participate 2.Biocurious lab for providing me lab space and equipments. 3. Mr.Antonio in the lab who taught me how to use the PCR and Agarose gel electrophorseis (only first time) and my parents for the moral support

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Lukas A. Jarasunas

Project Number
J0507

Project Title
Drip, Drip, Drip: Which Ice Cream to Choose on a Hot Day to Avoid a Big Melted Mess?

Abstract

Objectives/Goals
The purpose of my experiment was to determine which type of ice cream would melt the slowest by measuring time to first drip.

Methods/Materials
I made 1 control ice cream--high-fat, high-sugar, vanilla ice cream--and 6 other types of ice cream using the same base ingredients. While keeping the other ingredients constant, I varied FAT content in 2 ice creams, SUGAR content in 2 ice creams, and FLAVOR in 2 ice creams. I made a contraption out of Legos that suspended 3 spoons over a counter and measured how long it took for each ice cream to first drip. First, I tested 3 ice creams with different fat contents, then 3 ice creams with different sugar contents, and finally 3 ice creams with different flavors.

Results
My results were consistent across each set of trials. The low-fat ice cream had the longest time to first drip; low-sugar ice cream had the longest time to first drip; strawberry ice cream had the longest time to first drip.

Conclusions/Discussion
My hypothesis was that the low-fat, the low-sugar, and the vanilla ice creams would melt the slowest. My assumptions about fat and sugar were correct; however, the strawberry ice cream melted the slowest. I think this was due to using all of the reserved liquid after pulsing the strawberries in the recipe, resulting in an icy strawberry ice cream. Next time, instead of testing for flavor, I would test 3 different colors of ice cream because my flavor experiment introduced too many different ingredients into the experiment.

Summary Statement
As measured by time to first drip, I found that the low-fat, the low-sugar, and the strawberry ice creams melted the slowest.

Help Received
I designed and ran the experiments myself. My mother helped me make the ice creams.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Elisha D. Johnston

Project Number

J0508

Project Title

Investigating the Molecular Mechanisms of a Safe Promising Treatment for Chronic Joint Pain

Abstract

Objectives/Goals

My objective is to investigate prolotherapy. Prolotherapy is a localized injection-based procedure. Advocates claim that prolotherapy activates the body#s natural healing mechanism to regrow cartilage. Researchers agree that the mechanism of action is poorly understood. I summarize results from the single published in vitro study into a testable hypothesis: Treatment with 15 microliters of a prolotherapy agent (P2G) is associated with increased proliferation of preosteoblast cells.

Methods/Materials

Following the single published in vitro study, I used standard mammalian cell culture techniques with preosteoblast cells and the phenol, glycerin, and dextrose (P2G) compound. To measure cell death and proliferation, I used an Olympus FSX100 Microscope (20X), a Beckman spectrophotometer (with colorimetric CellTiter 96 AQueous One Solution Cell Proliferation Assay), and flow cytometry.

Results

To advance understanding about the mechanism of action, I developed a novel theoretical model of the way that prolotherapy regenerates cartilage. Through multiple experiments, I generated statistically significant evidence supporting the literature-derived hypothesis and key parts of my novel theoretical model. Importantly, I found that treatment with P2G induces moderate cell death ($p<0.05$) and that remaining cells proliferate faster than control ($p<0.05$). I leveraged my novel theoretical model, experimental results, and molecular biology and biochemistry concepts to propose original hypotheses, with the primary one as: Treatment with 15 microliters of P2G kills some cells, releasing IGF-1 growth factors that cause remaining cells to proliferate faster.

Conclusions/Discussion

In reproducing findings from the single published in vitro study, my project further validates the hypothesis that prolotherapy activates the body#s healing mechanisms to regrow cartilage. Additionally, my novel theoretical model and original hypothesis further elucidate the molecular mechanisms. Molecular biology and biochemistry tools and techniques hold great promise to further investigate whether prolotherapy is an effective treatment for reducing chronic joint pain.

Summary Statement

My project aims to further validate the hypothesis that prolotherapy works by activating the body#s natural healing mechanisms to help regenerate cartilage, thereby reducing chronic joint pain.

Help Received

I performed research at TheLab in Downtown LA. Dr. Andrali trained me in cell culture techniques and my father provided general safety supervision. As UCLA does not allow middle school students to actively participate in research, a tutor allowed me to observe while he acquired flow cytometry data.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Dominic C. Jones

Project Number

J0509

Project Title

Comparing the Vitamin C Levels in Various Vegetables after Steam Cooking

Abstract

Objectives/Goals

The purpose of this experiment is Comparing the Vitamin C Levels in Various Vegetables after Steam Cooking. It is important to the real world because our bodies need a certain amount of Vitamin C each day to remain healthy. Picking the right vegetables and preparing them the proper way will allow individuals to maintain the highest nutritional benefits and maintain a healthy lifestyle.

Methods/Materials

This test will have four independent variables and a control group.

Test Set Up

Rinse each vegetable under water in a colander, chop each raw vegetable up in 2cm chunks. Place each vegetable in test tubes for ten trials each using vitamin C titration testing solution. Then steam each vegetable for 10 and 15 min trails. Chop each vegetable after steam cooking into 2cm chunks. Place each vegetable in test tubes and perform testing using vitamin C titration drops for 10 trails each and record results.

Administration

Pour 4 cups of water in a pot let boil add each vegetable in steamer basket and steam on stove top for 10 and 15 minute increments. Repeat process for each variable separately. Test vegetables raw and cooked and record results.

Sample Collecting and Processing

Gather data collected by testing each vegetable raw, steamed for 10 and 15 minute trials. Add drops of titration solution to turn blue water clear, and record results. Then compare which vegetable contained the most Vitamin C after using the steam cooking method. The least amount of titration drops used the higher the vitamin C content.

MATERIALS:

Broccoli, Carrots, Asparagus , Zucchini, water, colander, measuring cup, pipets, titration testing solution kit, steamer basket, gloves, knife, cutting board, spoon

Results

Discussion: After steaming Broccoli, Asparagus, Carrots, and Zucchini for 10 trials at 10 and 15 minutes each, it was determined that Zucchini was the vegetable that had the highest vitamin C present.

Conclusions/Discussion

After completing this investigation of Comparing the Vitamin C Levels in Various Vegetables after Steam Cooking it was determined that my hypothesis was accurate. The Hypothesis stated that Zucchini would

Summary Statement

Comparing The Vitamin C Level In Various Vegetables After Steam Cooking showed a significant change from 1st year study to 2nd year Study.Broccoli was not first in this years experiment, it was Zucchini.

Help Received

Mom helped me with photos on the board

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Prabhdeep Kaur

Project Number
J0510

Project Title
Grainy Gluten

Abstract

Objectives/Goals
Gluten is a protein found in wheat, barley, and rye. It has a high content of iron. Gluten is important for humans because it contains the vitamins, minerals, and fibers that are necessary for our health. The purpose of my experiment was to find which type of flour, whole wheat, all-purpose, or whole wheat graham flour, has the most gluten.

Methods/Materials
For my experiment, I mainly used whole wheat flour, all-purpose flour, whole wheat graham flour, a strainer with small holes, a ruler, and a scale (grams). I added water to the flours while stirring with a fork. Then, I kneaded each ball of dough for five minutes. The kneading process is essential because it helps form the gluten. After letting the dough sit for 10 minutes, I ran cold water over the balls of dough, which caused the starch to wash away and left the gluten. The starch is water soluble and gluten is insoluble. Then, I measured and weighed the gluten from the three different types of flour.

Results
After conducting five trials, I found that the average diameter of the gluten from the whole wheat flour was 4.7 centimeters, the average diameter for the all-purpose flour was 3.8 centimeters, and the average diameter for the whole wheat graham flour was 4.5 centimeters. The average mass of the gluten from the whole wheat flour was 55 grams, the average mass for the all-purpose flour was 39 grams, and the average mass for the whole wheat graham flour was 50 grams. Whole wheat flour had the most gluten.

Conclusions/Discussion
My results supported my hypothesis. This project expands our knowledge of the vital benefits of gluten. My experiment contributed to the scientific community by representing human life and shows that whole wheat flour contains more gluten than all-purpose flour and whole wheat graham flour.

Summary Statement
By using water and the kneading tequnique, I discovered that whole wheat flour has more gluten than all-purpose flour and whole wheat graham flour.

Help Received
My science teacher reviewed my project and instructed me in how I could improve it. My siblings acted as timers and held the strainer as I rinsed the dough.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Itai Koronyo

Project Number

J0511

Project Title

Prolonging Shelf Life of Produce: A New Potassium Permanganate Product to Oxidize Ethylene

Abstract

Objectives/Goals

The objective was to develop a product that extends the shelf life of healthy produce at home and reduces excessive waste. Ethylene is a gaseous natural plant hormone that triggers ripening and senescence of fruits and vegetables, shortening their shelf life. Potassium permanganate (PP) is an ethylene oxidizer that neutralizes ethylene effects on produce. A product that increases PP surface area and effectively controls ethylene outcomes, could achieve the objective.

Methods/Materials

Same PP concentrations were used to create products with reduced or increased PP surface areas, Pouches and Sheets, respectively. Zeolite rocks were coated with PP solution, hood dried, and shaped in plastic/paper pockets. Bananas, tomatoes, and broccoli heads were each placed in two containers with six produce per experimental group (Pouch, Sheet, no PP control; n= 54 produce total). They were examined daily for up to 34 days.

Results

Refrigerated Broccoli without PP became brown and non-edible in 15 days, while no signs of senescence were detected in PP-containing refrigerators. Tomatoes with no PP or PP pouches in room-temperature containers started softening or having black-rotten spots after 3-6 days, while tomatoes with PP sheets only after 9-13 days; indicating 6-7-days prolongation. Quantification of bananas# ripening/senescence, showed delayed color change and reduced % area of brown-black spots, PP sheets (11%) versus PP pouches (30%) or no PP (47%), after 34 days.

Conclusions/Discussion

A new effective product to extend the shelf life of fruits and vegetables was successfully created and tested. This potassium permanganate-based product with enlarged surface area (PP sheet) substantially halted ripening and delayed senescence processes, thus prolonging their shelf life. Results from this project provide the rational to commercialize this product for household use.

Summary Statement

This was undertaken to design and build a new, feasible, household product that extends the shelf life of fruits and vegetables by increasing the surface area of potassium permanganate, which neutralizes ethylene's aging effects on produce.

Help Received

Dad assisted in heating and hood drying the potassium permanganate to create the sheet and pouch products. Mom showed me how to use the image processing software (ImageJ), and helped conduct the statistical analysis. Teacher edited my report.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Christopher M. Laurits

Project Number
J0512

Project Title
Comparing the Amount of Lactose in Human, Cow, and Goat Milk

Abstract

Objectives/Goals
This project investigated how the lactose content of milk varies between species. The objective, using organic chemistry laboratory techniques, was to compare the weights of lactose crystals extracted from samples of human milk, cow milk and goat milk. I predicted human milk would contain the most lactose, cow milk the next most and that goat milk would have the least.

Methods/Materials
150 ml each type of milk; distilled H2O; 20% acetic acid; organic chemistry lab equipment; 95% Ethanol; hot plate; thermometer; weighing scale; compound microscope. Heat 50 ml milk sample to 55 C; add 10% acetic acid drop-wise to precipitate casein protein; filter and discard precipitate; add 2.0 g CaCO3; heat to 75 C to precipitate remaining proteins; filter and discard precipitate; boil down to a volume of 10 ml; add 50 ml hot 95% ethanol, filter and allow lactose to crystallize (24 - 48 hours); filter off crystals, dry and weigh.

Results
I was able to extract the lactose from the milk samples and the average yields were: cow milk - 0.86 g; goat milk - 0.42 g; human milk - 0.02g.

Conclusions/Discussion
The data partially supported my hypothesis and partially did not. Based on my research, I expected human milk would contain the most lactose, cow milk the second most and goat milk the least. My data showed that cow milk contains more lactose than goat milk, however they also showed that human milk contained far less lactose than either cow or goat milk. Further experiments are necessary to make a conclusion as I now believe the method used was optimized for lactose extraction from cow milk. My results indicated that the method was not optimized, and therefore did not work as well, for goat or human milk.

Summary Statement
I used a lactose isolation method to compare the amount of lactose in human, cow and goat milk.

Help Received
My aunt helped supervise my experiment and obtain materials; my aunt and teacher helped edit my report; my mother helped with my board.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Serena K.T. Low

Project Number
J0513

Project Title
Effects of Temperature on Catalase Enzymes

Abstract

Objectives/Goals
The objective of this study is to measure and find which temperatures are optimal for catalase enzymes to work in by testing the reaction time of catalase enzymes and hydrogen peroxide.
Catalase enzymes work to decompose hydrogen peroxide into water and oxygen, as hydrogen peroxide can cause harmful oxidative damage. Hydrogen peroxide is usually formed as a byproduct of metabolism. Enzymes are special types of proteins used to initiate chemical reactions. Without enzymes, reactions would not occur fast enough to sustain human life. In this experiment, filter paper dipped in potato catalase is dropped in a test tube of hydrogen peroxide solution (with varying temperatures) and the time the papers take to float to the top of the test tubes are measured.

Methods/Materials
Test tubes, hydrogen peroxide solution, thermometer, water, mashed potato (used for catalase), 5mm by 5mm filter papers, and stopwatch. Measured times for filter paper dipped in potato to float to the top of the hydrogen peroxide solution at various temperatures.

Results
The optimal temperature of catalase enzymes is about 35℃ due to the faster reaction time with the hydrogen peroxide solution. The optimal temperature was hypothesized to be around human body temperature (37.5℃). Two trials were run to provide more accuracy of the data. Both trials showed faster reaction rates around 35℃ and 40℃. Temperatures too low or too high provided slower results.

Conclusions/Discussion
Repeated trials proved that the reaction rates between catalase enzymes and hydrogen peroxide were faster in hydrogen peroxide solutions of temperatures 35°C and 40°C, as hypothesized. In conclusion, catalase enzymes work best at temperatures around body temperature (37.5°C), and do not work as well around temperatures 30°C or lower, or 45°C or higher.

Summary Statement
I showed that temperatures affect the reaction rate between hydrogen peroxide and catalase enzymes.

Help Received
I improvised the experiment procedure after doing some online research, and conducted the experiment myself. I also received help from a parent in understanding the statistical results of my project.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Tanvir S. Mann

Project Number

J0514

Project Title

Troubled Transfusion: Reactions between Antigens and Antibodies

Abstract

Objectives/Goals

The objective of the project is to resolve how different blood types, with varying antigens and Rhesus factors, react to other antibodies in their rates and severity of agglutination.

Methods/Materials

Synthetic Blood +/-(A,B,AB,O), synthetic antibodies (A,B,AB) magnifying glass, mixing slides, stopwatch, and safety gloves. Used stopwatch to measure the agglutination between various blood types (antigens) and antibodies on mixing slides.

Results

The results of my experiment showed that the blood types reacted the in various aggressions towards antibodies. Those without the presence of the Rhesus factor agglutinated in a clumpier manner, with a small time of reaction, while their positive counterparts were fairly lax. Lastly, blood types only formed agglutination with their corresponding antibodies (at least one) while opposites had no effect.

Conclusions/Discussion

This science project shows the Rh factor and the type of antibody can affect the rate and severity of agglutination in a transfusion of multiple blood types. This can be implemented during the transfusion of blood, or work involving the presence of blood, such as physiology.

Summary Statement

I elaborated on the subject of agglutination in blood types and their antigens, providing consensus that the Rh factor, as well as the type of antibody involved, play drastic roles in the reactions.

Help Received

None; the science project [experiment] was both created and performed by myself at home.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Nathan G. Mermilliod

Project Number

J0515

Project Title

Scar Solutions: The Effects of Enzymes in Collagen Breakdown and Scar Prevention

Abstract

Objectives/Goals

The objective of this experiment is to test whether enzymes can inhibit the binding of collagen during the formation of scar tissue thereby reducing the swelling and severity of a scar.

Methods/Materials

The ability of collagen in gelatin to bind when exposed the papain enzyme in meat tenderizer was tested. Prepared, liquid gelatin was added to six cups containing a serial-diluted solution of the papain enzyme, which included a control sample, and allowed to set. Viscosity was observed, compared, and recorded.

Results

Observable differences in viscosity among the samples showed a direct relationship with exposure to the papain enzyme. The cup with the most meat tenderizer kept the gelatin from solidifying the most, resulting in a liquid-like gelatin that poured easily. The control cup containing no meat tenderizer (papain enzyme), contained the thickest gelatin of all the sample cups.

Conclusions/Discussion

The gelatin was unable to fully develop when exposed to the meat tenderizer, thus the papain enzyme inhibited the gelling process. As gelatin primarily contains collagen, the experiment showed that enzymes, specifically papain, can inhibit the binding of collagen, the main component of scar tissue, and therefore may be indicated in the reduction of scar formation and severity.

Summary Statement

As measured by the viscosity of gelatin exposed to meat tenderizer, I showed that the papain enzyme inhibits the binding of collagen as an effective treatment in scar formation.

Help Received

I used online sources to identify collagen experiments and understand serial dilution techniques. My science teacher and peers reviewed my report and offered comments for revision, as did my mentor, Cynthia Dick, a graduate student at the University of California, Riverside.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Madeline K. Michaelson

Project Number
J0516

Project Title
Correlation between Vitamin C Levels and Expiration Dates

Abstract

Objectives/Goals
The objective of this study is to determine if expiration dates play a role in vitamin C content in orange juice.

Methods/Materials
I am using iodine and a starch solution made up of baking soda and water to determine how much vitamin C is in the orange juice. I#m using a starch solution because when you mix 10 drops of the starch solution with the orange juice it helps the iodine to find and absorb the vitamin C. The iodine absorbs the vitamin C and when it is all absorbed the orange juice changes colors. I will be adding drops of iodine until all the of the orange juice is absorbed and its color goes from orange to brown. I will have one control group and that is the brand of orange juice I am using.

Results
After completing my investigation on if expiration date affects how much vitamin C is in orange juice, I found that my hypothesis for expiration date affecting how much vitamin C is in orange juice was correct. My hypothesis for expiration date affecting how much vitamin C is in orange juice stated that the 5 weeks will have the most vitamin C, the 2 ½ weeks expiration date will have the second most amount of vitamin C, the 1 ½ weeks will have the second least amount of vitamin C, and the expired one will have the least. When compared to the control group the expired orange juice had a lot less drops of iodine needed to absorb the vitamin C and the orange juice that was well away from expiring had more average drops as the control group.

Conclusions/Discussion
The orange juice samples that were further away from expiration dates had a higher concentration of vitamin C.

Summary Statement
The titration methods I did indicated that expiration dates did play a role in vitamin C content in orange juice. The more expired orange juice samples had less vitamin C content.

Help Received
Jewely Lickey, Science teacher at Sanger Academy Charter School provided lab equipment

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Shivek Narang

Project Number
J0517

Project Title
Study of Osmolarity and Fluid Homeostasis Using Saccharomyces cerevisiae: Implications for Regulation of Hypertension

Abstract

Objectives/Goals
I wish to understand the impact of Sodium on human body. All organisms must maintain homeostasis and water balance to survive. Water balance is essential for nerves to function properly, as demonstrated by the Sodium Potassium pump. Too much salt (Na+ ions), causes our body to hold extra water thus increasing the blood volume. This adds stress on our heart and blood vessels, leading to hypertension. But why do we need so much water to lower salt concentration? This question relates to salt#s effect on osmotic pressure and active transport, which I answered by conducting my experiment. I used yeast for experiment as most metabolic and cellular pathways occur in the same way in humans as in yeast.

Methods/Materials
Materials used were Packaged Yeast, Salt, Distilled Water, Congo red, Microscope and Slides. Dehydrated Yeast cells were activated in distilled water and then further incubated in different salt solutions (the manipulated variable), including no salt (served as the control group). The salt concentrations used were 0%, physiological concentration of 0.75%, and also hypertonic solutions containing 2% of salt. The rate of budding, active transport of Congo red and the diameter of the yeast cells (all dependent variables) were observed at 0, 2, 4, 6, 8, and 10 min. The results are average of three independent trials.

Results
As the percentage of salt was increased in the yeast solution, there was an impact on the size of the cell, active transport process as well as cell budding. The cell diameter decreased by 13%. The active transport of Congo red decreased by 45% and the cell budding was also negatively impacted and decreased most by 85%.

Conclusions/Discussion
All of the responding variables were negatively impacted by the increasing salt, thus supporting my hypothesis. It was surprising that there was not much difference in the cell diameter or active transport between the physiological concentration of salt and the hypertonic conditions of 2% salt. It may be because the physiological concentration for human is already hyperosmotic to the yeast cells. There was also sugar in the activation mixture that would have added to the osmolarity of the solution. Further research will look at what will happen if we repeat the experiment without sugar, wide range of salt solutions and different salt compounds like Potassium Chloride or Calcium Chloride and analyze if they will also have similar effects.

Summary Statement
In summary this project observed the importance of osmolarity of solutions in the homeostasis of water movement, active transport, and growth of Saccharomyces cerevisiae

Help Received
I wish to express my deep gratitude and sincere thanks to my teacher Dr. Anuradha Murthy for her invaluable guidance, constant encouragement, constructive comments and immense motivation, which sustained my efforts at all stages of this experiment.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Milena Novakovic

Project Number
J0518

Project Title
The Magic of Yeast

Abstract

Objectives/Goals
The goal of this study is to see how different amounts of yeast affect the rising of bread dough.

Methods/Materials
Flour, salt, yeast and warm water,mixing bowl with units on the side
mixing spoon, teaspoon measuring tool, measuring cup, oven

Remark: All the measurements are expressed in milliliters because I measured the volume for the ingredients, not the mass. If I used a scale I would have had to measure in grams for mass.

Results
The case with 7.5 mL yeast always grew closer to the case of 10 mL yeast in volume, than to the case of 5 mL yeast.This means that the addition of more yeast does not proportionally cause the dough to rise. After a certain point adding more yeast won#t affect the growth of the dough. The case of 7.5 mL is the most productive for baking bread.

Conclusions/Discussion
My hypothesis states that all of the dough will grow the same amount, which didn#t happen in the experiments. The case with the most yeast grew the most because it produced the most CO2 faster than the others. I used the same amount of flour which means that the same amount of sugar was used in each mixture for the yeast to consume. However in the 1st hour and 20 min not all of the sugar was consumed, by the yeast. So the case with the 10 mL of yeast consumed most of its sugar in the allowed time and therefore generated the most CO2. Because of the practicality of this experiment I could not wait any longer for the proofing time. If I had, my hypothesis might have been correct. This is because if all the sugar was consumed for all three cases the size after proofing could be the same; Meaning the yeast would have consumed all of the sugars having them all come to a similar height. In the end, when all the baking is done most of the bread is similar in volume. Also, when I cut the bread open, bubbles from the CO2 were similar in size and amount.

Summary Statement
I studied how different amounts of yeast affect the rising of bread dough, I discovered that the middle case of yeast was the most productive.

Help Received
I did the project by my self, but my father tought me the importance and ways of data organization.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Swethasai Palakur

Project Number

J0519

Project Title

Were Micelles or Vesicles the First Protobionts? Measuring DNA Phase Extraction into Lipids

Abstract

Objectives/Goals

The objective of the study was to investigate a specific stage in the process of abiogenesis. In the packaging stage, where DNA and other genetic material need to be packaged into some sort of compartment to form protobionts. Micelles and vesicles are two different forms of compartments that are able to contain genetic material. Micelles are more lipid-based, having a hydrophobic core while vesicles are more complex and have an inner water based core. Therefore, I aimed to determine whether or not DNA is soluble in, and thus more compatible with, lipids (a micelle environment) or water (a vesicle environment).

Methods/Materials

I used falcon test tubes to set up a phase extraction between the lipids and DNA. I also used both saturated and unsaturated oil to perform the phase extraction. I increased ratios of oil to DNA with every phase extraction, simulating ratios of lipid to water that may exist in prehistoric oceans. I isolated DNA from strawberries using a detergents and rubbing for my experiment. By layering the DNA and oil on top of one another, shaking and centrifuging them both, I can test whether DNA may be extracted into the lipid layer or not. I measured the DNA concentration of the water layer after extraction using a spectrophotometer to calculate the percentage of starting DNA that was soluble in oil. Methods such as these have not been used in labs and research facilities, and this is a new way to analyze this topic.

Results

Results indicated that DNA was less likely to be extracted into the lipid layer due to the incompatibiity of DNA with lipids. It was concluded that micelle-based protobionts were less likely to form in comparison with vesicle-based protobionts. DNA is known to be hydrophilic, and may not be comfortable in an hydrophobic environment. Based on this study, micelles are less likely to package genetic material due to its hydrophobic environment. Therefore it is concluded that vesicles were likely to arise as the first protobionts, and therefore were the first compartments to package genetic material. DNA could easily package into a vesicle-based structure. NASA, and other astrobiologists count infer that if all the necessary ingredients to life are present, and genetic material is packaging into vesicles, life will form sooner. For, genetic material is already fitting into protobionts. If no vesicles or other hydrophilic structures are containing genetic material, NASA could conclude that it would take a long time for life to evolve.

Conclusions/Discussion

Results indicated that DNA was less likely to be extracted into the lipid layer due to the incompatibility of

Summary Statement

Through DNA and lipid phase extractions, it was shown that DNA is insoluble in oil and that protobionts probably emerged from vesicles, leading to the first basic prokaryotic cell.

Help Received

Mr. Tom Caldwell, Pre-Doctoral Student, Chessler Lab, UC Irvine Health-School of Medicine assisted me by supplying the needs for equipment. Mr. Caldwell clarified any questions related to the research. He assisted with centrifuging the samples and measured the DNA with a spectrophotometer.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Justine E. Sato

Project Number

J0520

Project Title

Increasing Cellulosic Bioethanol Production with Ultrasound and Cellobiase

Abstract

Objectives/Goals

The objective of this project was to determine how ultrasound would affect enzymatic production of glucose at varying temperatures.

Methods/Materials

Multiple trials of low concentration cellobiase (enzyme) mixture and 1.5 mM p-Nitrophenyl glucopyranoside were mixed together in a test tube and held in PID temperature-controlled water baths (10C,20C,30C,40C) for the assigned amount of time for the control sample. After each assigned time, the mixture in the test tube was pipetted into a cuvette with carbonate buffer (pH 9.5) and the absorbance of the resulting p-Nitrophenol was measured in a spectrometer set to 410 nm. This process was repeated with the same mixture pipetted into a test tube and held in a PID temperature-controlled 28 kHz ultrasonic bath. To ensure repeatable results, micropipettes and control samples were used and the spectrometer was calibrated before each set of measurements were taken. Using a standard dilutions plot made by diluting the substrate, the absorption, measured by the spectrometer, was then converted into concentration (nmol).

Results

For each temperature, the raw results were plotted and curve-fitted to find the rate of reaction (product generation/time) with and without ultrasound. The difference of rates with and without ultrasound were compared at each temperature and the variation in rates was found. The increase in difference of rates for each temperature tested (10C,20C,30C,40C) were 0.025 nmol/second, 0.040 nmol/sec, 0.021 nmol/sec, and -0.012 nmol/sec, respectively.

Conclusions/Discussion

I can conclude that surprisingly, at 20C, the ultrasound increased glucose production by 19% while at 40C, the ultrasound decreased production by 2%. When temperatures are lower, the kinetic energy of enzymes lower. Ultrasound increases mass transfer, prevents agglomeration of the enzyme, and breaks down the substrate resulting in increased reaction rate. When temperatures are raised without ultrasound, the kinetic energy of enzymes increases which increases the reaction rate. However, when ultrasound is added to the already high temperature, the mass transfer is enhanced and the enzyme becomes deformed so that it actually decreases the reaction rate. The information from this project can be scaled up to increase biofuel production at lower temperatures where it would be more beneficial to use ultrasound at the ambient temperature rather than processing at a higher temperature.

Summary Statement

I tested the effect of ultrasound on enzymatic (cellulase) production of cellulose (glucose) and found that at 20C, there was the greatest increase in product generated.

Help Received

My science teacher, Mrs. Nelly Tsai, advised me on how to conduct my experiment.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Ryan M. Singer

Project Number
J0521

Project Title
Does Boiling Broccoli in Lemon Water Alter the Vitamin C Content?

Abstract

Objectives/Goals
The objective of this project was to find out if boiling broccoli in lemon water would change the vitamin C, and make a healthier option for eating.

Methods/Materials
Broccoli, lemon water, titration set. Boiled broccoli in lemon water, blended it to a liquid, dropped in the broccoli, and counted the number of drops it took for the titration chemical to change color.

Results
After using titration on the regular boiled broccoli and the lemon water broccoli, the average number of drops for the regular was 23.9, while the lemon water was 23.5. This evidence shows that the lemon water broccoli, having less drops, had slightly more vitamin C

Conclusions/Discussion
The lemon water broccoli had 0.4 less average drops, meaning it had a little bit more vitamin C than just normal boiled broccoli, but not enough to make a difference in healthy eating.

Summary Statement
I proved that boiling broccoli in lemon water does not add to the vitamin C content.

Help Received
I performed the boiling along with the titration by myself, while Mrs. Cohen of Mt. Helix Academy helped me figure out the way to measure the vitamin C.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Ryan W.T. Tanner

Project Number
J0522

Project Title
Hay in a Tray: Does Barley Fodder Increase Unsaturated Fat in Eggs?

Abstract

Objectives/Goals
The objective of this experiment was to determine if giving Barley Fodder to a chicken will increase the amount of unsaturated fat in their eggs.

Methods/Materials
To find out how much unsaturated fat is in the chicken's eggs, I put Iodine into a test tube filled with egg yolk and counted the amount of Iodine that was added. In a different test, I put Bromine Water into the test tubes filled with egg yolk. There wasn't enough room for the Bromine Water to fully react with the egg yolk. Next I put an egg yolk diluted with water into a beaker. I added Bromine Water to the mixture until it stopped reacting with the unsaturated fat in the mixture and the color of the Bromine Water reappeared.

Results
The experiment showed that there was slightly more unsaturated fat in the eggs from chicken's whose feed was supplemented with Barley Fodder than the eggs from chicken's whose feed was not supplemented.

Conclusions/Discussion
When I put Bromine Water in the beaker the color of the solution turned white because it was reacting with the carbon-carbon double bond in the unsaturated fat. After adding a little more Bromine Water to the solution the brown color of the Bromine Water came back because there was no more unsaturated fat in the egg yolk mixture.

I discovered that supplementing chicken's feed with Barley Fodder does increase the unsaturated fat in their eggs, although not a lot.

Summary Statement
In my experiment I showed that if you feed a chicken Barley Fodder, it will slightly increase the amount of unsaturated fat in their eggs.

Help Received
None, I got the idea of using Bromine Water and Iodine to test for unsaturated fat in chicken eggs from a website that tested how much unsaturated fat is in oils.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Geneva D. Trovato

Project Number

J0523

Project Title

Effects of CaCl2 Temperature in the Creation of Competent Host Cells: A Study in Genetic Engineering of E. coli

Abstract

Objectives/Goals

I wanted to find out if protein production could be maximized by changing part of the transformation process. Transformation is the process of inserting a foreign piece of DNA that makes it produce a protein of interest. This experiment looked at the individual steps of transformation and considered the easiest way to maximize the result: a host cell that is producing the greatest volume of protein. Temperature of CaCl2 was the focus of this experiment. The results revealed that more transformed colonies grew from the 42°C CaCl2 than any other CaCl2 temperature.

Methods/Materials

I used BactoBeads (attenuated E. coli), plasmids (with +amp gene inserted for screening), CaCl2 (at three temperatures), agar plates (poured myself), pipettes and tips for transfer of cells. Standard Transformation protocols were used with one exception: CaCl2 temperature was a variable.

Results

After transforming the E. coli cells, at the various CaCl2 temperatures, the number of colonies formed (CFUs) were counted and recorded in a table. The two control plates were as expected and were an indication that the conditions were held constant and in working order. The three plates exposed to the E. coli cells, made competent with the 42°C CaCl2, had 30, 84 and 25 total CFUs. The 4°C CaCl2, had 22, 17 and 25 total CFUs. And, the 27°C CaCl2, had 15, 31 and 18 total CFUs.

Conclusions/Discussion

Transformation is of critical importance in genetic engineering. It includes the selection, propagation, expression and purification of a particular gene, such as INS-the gene that codes for Insulin. By examining the number of colonies formed, one can calculate transformation efficiency. In this investigation, the temperature of CaCl2, at cold (4°C), room temperature (27°C) and hot (42°C), affected the competence of E. coli cells when transformed with plasmids. It was determined that the CaCl2 temperature, most likely to produce the highest transformation efficiency, was 42°C.

Summary Statement

Effects of CaCl2 Temperature in the Creation of Competent Host Cells: A Study in Genetic Engineering of E. coli showing that Hot CaCl2 produces the most competent cells.

Help Received

1. Dr. Nick Webster, UCSD, Assistance with brainstorming, ideas, and procedure. He also provided many of the tools necessary. 2. Kathy Blakemore, EMS Science Teacher, scientific inspiration. 3. Irene Trovato, ThermoFisher Scientific (& Mom), guidance and scientific discussions 4. Ed Trovato, Scientist,

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Andrew W. Troxell

Project Number

J0524

Project Title

Can I Create Gas from Trash? A Scientific Approach Creating Methane from Manure and Biomass

Abstract

Objectives/Goals

The objective of this experiment is to prove that with an environment that is oxygen free, added biomass, and a warm environment for the microbes, methane gas can be formed at an increased rate. The benefits of this experiment is to prove that waste products such as manure and biomass can replenish our natural resources and reduce our need for fossil fuels. Cow manure houses Obligate Anaerobes which converts cow manure to methane in the right environment. This environment must be depleted of Oxygen, have a catalyst or biomass source, and must maintain warm temperatures. The biomass added to the cow manure can cause a variation in the fermentation process. Bananas, for example, will break down into sugar, hydrogen, carbon. This type of chemical breakdown releases chemicals the Obligate Anaerobes can use to speed up the production of methane gas.

Methods/Materials

20g of cow manure, bananas, and vegetables was used. Bottles were labeled manure, manure with bananas, and manure with vegetables. balloons were placed on the top to contain the newly produced methane gas. The bottles were all placed in a heat box with a 100 watt light bulb used as a heat source. Information was gathered for 10 days. The girth of the balloon measured and recorded along with the temperature inside the heat box. Math formula V=4/3(pi)(radius cubed) was used to equate how much methane was actually produced.

Results

The data collected form this experiment clearly demonstrates the rate of growth for three trials. It demonstrates the bananas and manure biomass mixture with the ability to produce the most methane in the right environment. The rate of growth for the banana and manure biomass was greater by 2 days and approximately 50% in girth.

Conclusions/Discussion

In conclusion, bananas and manure produced the most methane gas. During fermentation bananas produce high levels of hydrogen which helps the anaerobes produce methane. The average temperature during experiment was 80-90°F. The manure bottles produced the least amount of gas followed by the manure and vegetable biomass mixture. This demonstrates that my hypothesis was correct, bananas and methane biomass will in fact create the most methane gas in the proper environment for the Obligate Anaerobes which was constant for all three different scenarios.

Summary Statement

This project is focused on anaerobic microbes and biomass used to create methane gas.

Help Received

I did my research independently of any outside help other than my math teacher and my parents who took me to the farm to gather supplies.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
R. Alexander Vasquez

Project Number
J0525

Project Title
Effects Temperature Has on Yeast

Abstract

Objectives/Goals
Does the amount yeast rises vary depending on the temperature the yeast is exposed to prior to baking?

Methods/Materials
Used thermometer, standard bread recipe to make dough, heating cabinet, oven, refrigerator, and freezer. I tested 5 identical bread portions in 5 different temperatures to identify the difference in their height after risings.

Results
The yeast exposed to a mid temperature rose the most after 2 identical testings. drastic temperatures up and down failed to rise much at all.

Conclusions/Discussion
Knowing around 100 degrees works the best can be used for anyone who wants to efficiently make their bread rise more.

Summary Statement
How temperature effects how much yeast rises.

Help Received
I ran through the experiment myself but my science teacher helped me throughout the whole process.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Dean V. Zepeda

Project Number
J0526

Project Title
Determining the Amount of Vitamin C in Boiled Broccoli

Abstract

Objectives/Goals
The objective is to determine how varied times of boiled broccoli affect the Vitamin C content.

Methods/Materials
I made a control Vitamin C by crushing a 500 mg tablet of Vitamin C and dissolved it in 500 mL of water (creates 1mg/mL solution). I measured out 20 mL of the solution. (20 mg of Vitamin C). I created a starch solution to add to the 20 mg of Vitamin C solution. I slowly added the iodine into the Vitamin C solution and starch mixture, stirring it in and counting each drop. When the titration process was complete, the solution turned and stayed a dark blue. The number of drops is the amount of iodine needed to oxidize 20 mg of Vitamin C. I did the same process using 5 g of crushed broccoli boiled at 1 minute, 5 minute, and 10 minutes. 5 trials were performed for each of the times. I mixed the liquefied broccoli with 20 mL of water. I calculated the amount of Vitamin C in each trial by dividing the number of drops for the broccoli by the number of drops for the Vitamin C solution, multiplied by 20 to cancel out the 20 mg of the control Vitamin C to give the amount of Vitamin C in 5 g of that boiled broccoli.

Results
I found that increasing the boiling time of broccoli will result in a decreased amount of Vitamin C.

Conclusions/Discussion
I had hypothesized that boiling broccoli for 1 minute would contain the most Vitamin C. My results showed this. The 5 minute boiled broccoli came in second place and the 10 minute boiled broccoli came in third. My experiment could help others in the future by using this comparison to find an optimal boiling time for broccoli so it is soft enough to chew, but still retain most of its Vitamin C. After completing the experiment, one thing I would alter is performing 5 Vitamin C control trials to determine a more accurate average. Additionally, I could steam or fry broccoli.. Since Vitamin C is water soluble, steaming/frying would have less water contact thus retaining more Vitamin C.

Summary Statement
I found how the boiling time of broccoli affected the amount of Vitamin C it contained by using an iodine/starch titration method.

Help Received
My parents and science teacher helped me revise my work.