Water

Does the Level of Turbidity[1] in Water Increase or Decrease Dissolved Oxygen Levels?

(Project found at http://www.all-science-fair-projects.com/)

Purpose

Determine if the level of turbidity in water affected the amount of dissolved oxygen.

Materials

- ☑ Turbidometer
- ☑ Dissolved oxygen test kit
- ☑ Container for water
- ☑ Pipette
- ☑ Stop watch

Safety Concerns: Chemicals in dissolved oxygen test kit. Students will wear gloves, apron, and goggles when testing water.

Materials

1. Find ***at least*** three different sources of water to test (from pond, lake, and/or stream).

2. Place containers in water and get a sample. Put on the lid.

3. Immediately, set up the dissolved oxygen test kit. Using the pipette, fill the vial(s) with water. Follow all directions ***exactly*** to ensure accurate results.

4. Bring samples to school. Using the turbidometer, check the turbidity of the water.

5. Record your results on your tables.

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[1] ***Turbidity*** - Turbidity is the cloudiness or haziness of a fluid caused by individual particles (suspended solids) that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality. (http://en.wikipedia.org/wiki/Turbid, accessed January 17, 2009)

How do phosphates affect oxygen levels in water?

(Project found at http://www.all-science-fair-projects.com/)

Purpose

The purpose of this experiment is to test the effect of a phosphate on the oxygen levels in pond water.

Materials

- ☑ 18 mayonnaise jars
- ☑ Algae
- ☑ Water
- ☑ Pipette
- ☑ Flask
- ☑ Graduated cylinder
- ☑ Dissolved oxygen meter
- ☑ 1.38g Sodium Phosphate Monobasic ($NaH_2PO_4 \cdot H_2O$)
- ☑ Growth light
- ☑ Triple-beam balance
- ☑ Eyedropper
- ☑ Rubber stopper

Safety Concerns:

Procedure

1. Fill eighteen mayonnaise jars with 500 mL of water.

2. Measure 1.38 g of Sodium Phosphate Monobasic ($NaH_2PO_4 \cdot H_2O$) and mix it with 100mL of water in a flask. Place a rubber stopper over a flask and shake it. The mixture would serve as a detergent solution (the phosphate).

3. Let the jars, without tops, and the detergent solution sit overnight.

4. Using the pipette, place one mL of algae in each jar.

5. Place the detergent solution in each bottle as follows:

- ⊗ Bottles 1-3 – no detergent solution
- ⊗ Bottles 4-6 – ten drops of detergent solution
- ⊗ Bottles 7-9 – twenty drops of detergent solution
- ⊗ Bottles 10-12 – thirty drops of detergent solution
- ⊗ Bottles 13-15 – forty drops of detergent solution
- ⊗ Bottles 16-18 – fifty drops of detergent solution

6. Place the jars under a growth light to let the algae grow.

7. Measure the amount of dissolved oxygen in each bottle for twenty-one days. Record your observations on a table.

How Much Pollution Can Water Take Before it Becomes Unsafe? Does This Differ Between Different Water Sources?

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project438_37.html)

Purpose

To learn if local bodies of water have fallen victim to chemical pollution. This experiment will determine the amount of buffer capacity[1] if any is in three local bodies of water.

Materials

Glass jars for collecting samples of 200 ml
distilled water
pH meter
medicine dropper
Celsius thermometer
pH buffers for pH 4, pH 7, and pH 10
0.2 M HCl solution
200ml beaker stirring rod

Procedure

1. In glass jars, collect 200 ml water samples form three different bodies of water. (If solids are present in the samples, remove them by filtering or by allowing the sediments to settle to the bottom before taking pH readings.)

2. As a control, determine the buffering capacity of distilled water found. To do this, take a 200 ml sample of distilled water and, using the pH meter, measure its pH at 20°C. Using the dropper, add the HCl solution one drop at a time until a pH of 4 has been reached. Stir the solution well after each addition of HCl. Wait 30 seconds before reading the pH meter. Count and record the number of drops required to reach the desired pH.

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[1] The maximum amount of either strong acid or strong base that can be added before a significant change in the pH will occur.

3. Repeat Step #2 for each of the natural water samples. (The buffer capacity of each sample is found by subtracting the base number you found in Step #2 from the number of drops required for the sample.)

Are Waters in Urban Areas More Polluted than Waters in Rural Areas?

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project430_37.html)

Purpose

The purpose of this experiment was to determine whether the level of certain chemicals in two different rivers – one in the Brigham City area (rural) and one in an Urban area.

Materials

QUANTITY	ITEM DESCRIPTION
1	Thermometer
2	Pairs waders or hip boots
1	Liter Distilled water
1	Turbidimeter
1	One liter Imhoff cone
1	Nitrate test kit

Procedures

1 Rinse sample tubes with water from the test site.

2 Take two .5 liter Depth and Width Integrated Samples from the Brigham City river/creek.

3 Test sediment with a one-liter Imhoff cone.

4 Let sit for fifteen minutes.

5 Put rubber gloves on.

6 Gently mix water sample.

7 Rinse turbidity sample vial three times with sample water.

8 Fill the vial at least to the line with well mixed sample water.

9 Put into turbidimeter.

10 Push the Read button on the turbidimeter.

11 When done taking sample, rinse vial with distilled water.

12 Rinse sample tubes with water from a different test site.

13 Take two .5 liter Depth and Width Integrated Samples from an urban river/creek.

14 Test sediment with a one liter Imhoff cone.

15 Let sit for fifteen minutes.

16 Put rubber gloves on.

17 Gently mix water sample.

18 Rinse turbidity sample vial three times with sample water.

19 Fill the vial at least to the line with well mixed sample water.

20 Put into turbidimeter.

21 Push the Read button on the turbidimeter.

22 When done taking sample, rinse vial with distilled water.

4. Using a distilled water jug (make sure there are holes in the cap) water the beans in each container so the top is moist, but there's no water visible on the bottom

5. Water the beans each day until 14 seeds germinate. The other 6 are back ups

6. After 14 seeds have germinated, separate them into seven groups of two each

7. Label two containers 1/2% nitrogen

8. Repeat step #7 with the other containers, except label each group of two 1%, 2%, 4%, 6%, and 10%

9. Pour 200 ml of distilled water into each of the seven beakers

10. Us a balance scale to weigh the nitrogen from the bag. Add the nitrogen to the scale until it balances at 0. Set the scale to 1 gram for 1/2%, 2 grams for 1%, 4 grams for 2%, 8 grams for 4%, 12 grams for 6%, and 20 grams for 10%.

11. Pour the nitrogen into the beaker labeled 1/2% nitrogen.

12. Repeat steps 10 and 11 five more times, except set the scale so that it will balance for the different levels of nitrogen.

13. Shake each container vigorously until the nitrogen dissolves

14. Using a 1 ounce measuring cup, fill it with the 1/2% nitrogen solution about 2/3 of an ounce full

15. Pour the solution into one of the containers labeled 1/2%

16. Repeat step #15 with the other solutions. Have one beaker contain just distilled water. That is the water for the "Control Group."

17. Let the containers sit on a windowsill or under a grow light.

18. Water the beans every other day during a two-week growing period. If you need to make more of one of the nitrogen solutions, follow steps #9-#13

19. After the two weeks are up, carefully remove the plants from the Pearl Light but measure the plants before taking them out.

20. Record the height (in centimeters) and the weight (in grams) of the plants and find the average for each group.

Mother Knows Best: A Study of the Health Benefits of Spicy Cooking

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project931_107.html

Problem

Do spices have the ability to kill food-spoilage microorganisms. And if they do, which spices are most effective and by how much?

Materials

- Agar plates
- *E. coli* sample
- Sterile swabs
- Spices (cinnamon, garlic, mustard, black pepper, coriander, lemon juice, chili powder, etc.)

Procedure

1. Carefully streak *E. coli* on agar plates.

2. Turn them upside down and apply 1/4 tsp. of spice on the lid.

3. Seal the plates and incubate them at 27° Celsius for 4 days.

4. Analyze results.

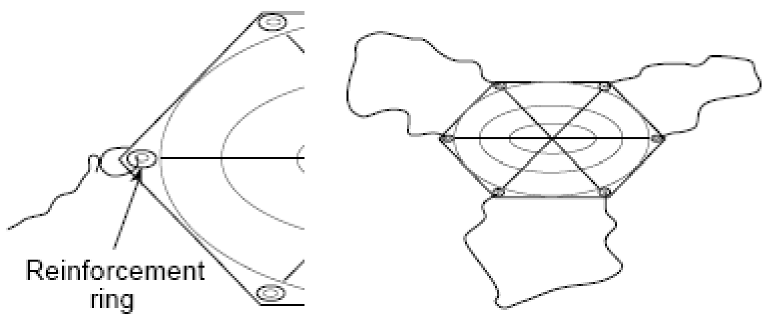
Parachute Recovery Systems #1

(*from Rocket Science Fair Projects*)

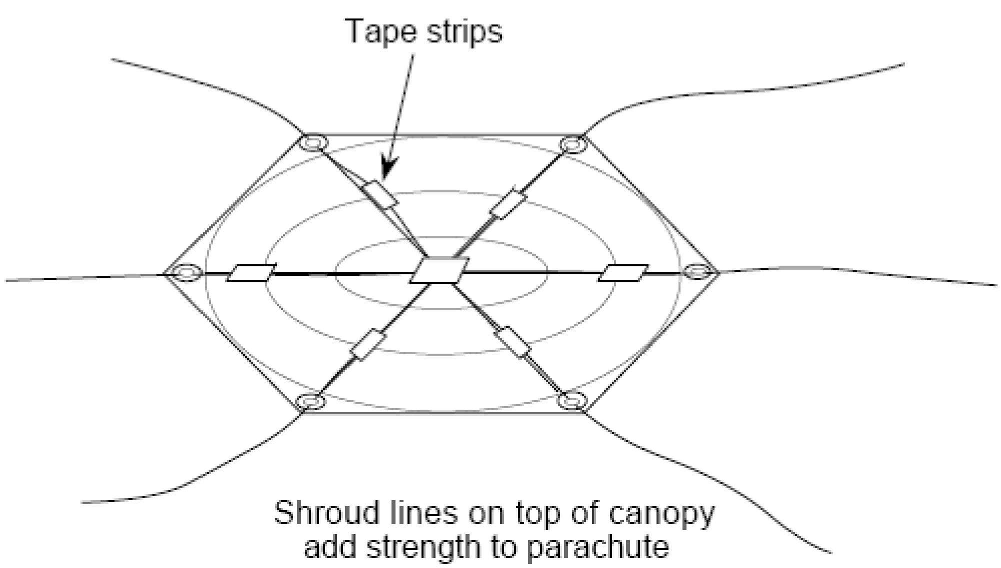
Project: Determine the strength of the typical plastic parachute.

Background:

In model rocketry, parachutes are commonly made from polyethylene plastic. The problem with them is that they rip or shred when they open at high speeds. In performing this experiment, you will determine the maximum speed at which a model can be traveling so that the parachute can safely open without being damaged. You should also determine the minimum speed required for the chute to open and inflate fully.



This test might be performed while driving down the highway in an automobile and letting the chute open outside the window (while holding onto the strings of the chute). These tests might be video taped for further analysis. Your set-up should be the same for each test, as you don't want your hand blocking the wind from hitting the parachute when it starts to open.



A better set-up method would be to use an actual rocket body tube. Pack the parachute into the tube, and blow it out (like it would be done in an actual launch). This would more closely simulate what actually happens during a real launch.

After you have determined the maximum safe opening speed of the parachute, you might experiment with ways of attaching the shroud lines (tape or rings), and methods of increasing the strength (looping the lines over the top as shown in the illustration).

A further version of this experiment is to find out what happens if the parachute is made larger? Will it damage more easily? Does the maximum safe opening speed change?

Where to Start

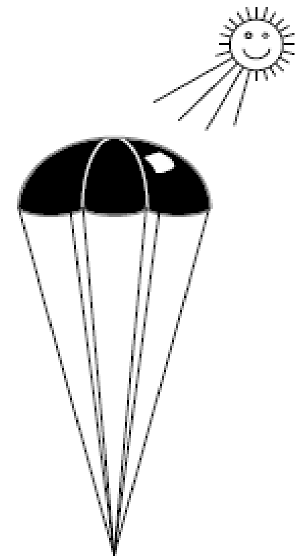
The book *Model Rocket Design & Construction* describes a how to determine the size of a parachute for a desired descent speed. It also describes how to build a basic parachute out of commonly available materials (trash bags and plastic drop cloths). You'll also want to look in your library for other books on parachutes.

Parachute Recovery Systems #2

(*from Rocket Science Fair Projects*)

Project: Determine the effect of solar heating on a parachute's descent rate.

Background:



The purpose of this experiment is to see if the color of a parachute affects the descent rate of the model. Warm air has less density than cooler air. Because of this, it will rise higher into the air. The purpose of this experiment is to see if it is possible to use this principle to keep a parachute in the air longer. You need to determine if sunlight on a black parachute will heat the air beneath it. If it does, will the warm air tend to rise and slow the descent of the model?

Where to Start

The book *Model Rocket Design & Construction* describes how to determine the size of a parachute for a desired descent speed. Black parachutes can be made out of black plastic sheet. A black trashcan liner bag will make excellent parachute material.

Photosynthesis: A Controlled Experiment

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project904_102.html)

Objective

To measure the amount of starch left in a leaf of a geranium plant under the following conditions; carbon dioxide increased, decreased and neither increased or decreased.

To prove increased starch increases the process of photosynthesis in the green plant.

Materials

3 Geranium Plants (same size, shape and color)
3 2 gallon plastic bags with twist to close
2 250ml Beakers
1 500ml Beaker
1 Hot Plate
1 Pair of Plastic Tongues
4 Petri Dishes
1 1pt. 91% Isopropyl Alcohol
1 Package of Alka-Seltzer
1 50mL of Soda Lime
1 Bottle of Potassium Iodide
3 Pieces of Cardboard
1 Pitcher of Water

Procedure

1. Mark plants A, B and C.
2. Put cardboard pieces at the bottom of each bag.
3. Put plant A in one bag with one 250mL beaker half filled with water. Place Alka-Seltzer in water, twist close.
4. Put plant B in one bag. Put 50mL of Soda Lime in a Petri dish and place in bag with plant B, twist close.
5. Put plant C in one bag. Twist close. (This is the "control" plant.)
6. Find a sunny place in your classroom to place all three plants. (The plants must have same amount of sunlight and water.) The plants are to set for one day.

7. After one day, remove plants from bags. Break off one leaf from each plant put in Petri dishes marked A, B, and C.
8. Half fill the 500mL beaker with water.
9. Fill the 250mL beaker with alcohol.
10. Place beaker with alcohol into beaker with water, on to the hot plate.
11. Take leaves one at a time and put in beaker with hot alcohol. Leave in for ten minutes.
12. Remove leaf with plastic tongues.
13. Place leaf on paper towel to dry, then place in Petri dish.
14. Place several drops of potassium iodide on each leaf.
15. Observe color change of the three leaves. (the darker the color (purple) the more starch. The lighter the color, the less starch.

Conclusion

To determine how much starch is left under three conditions.

1. Carbon Dioxide increased.
2. Carbon Dioxide decreased.
3. Carbon Dioxide neither increased or decreased.

Discussion

1. What were the results of plant A, with Alka-Seltzer? Was the carbon dioxide increased, decreased, or remained the same?
2. What were the results of plant B, with the soda lime? Was the carbon dioxide increased, decreased, or remained the same?
3. What were the results of plant C, the "control" plant? Was the carbon dioxide increased, decreased, or remained the same?

Rocket Fin Design #1

(*from Rocket Science Fair Projects*)

Project: Determine the best criteria for fin design to prevent fin flutter.

Background

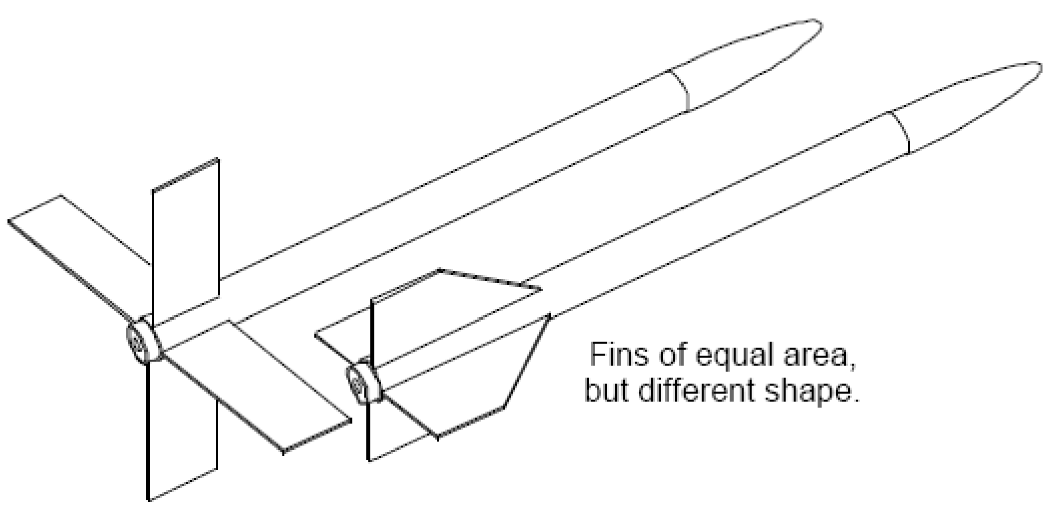
Very thin fins will begin to vibrate when the model flies very fast. This is called *"flutter."* Sometimes the flutter is so bad that it causes the fins to fall off during the flight. Even when flutter is not too bad, it still creates drag; which then robs from the maximum altitude the model could achieve.

This project would be to find out what criteria could be used to design fins that resist fluttering. Typically, flutter occurs with high fin "span-to-chord" length ratios. But what other factors contribute to flutter?

First, determine a way to detect that the flutter problem is occurring. This might be through measuring the model's altitude, or by listening for the buzzing sound that sometimes occurs with fluttering fins. You'll probably want to use a fairly flexible material (such as thin cardboard) so that you can make sure that it does occur on your model. Then start to devise a way of preventing it from happening.

Where to Start

The book *Model Rocket Design & Construction* has basic guidelines on sizing



Rocket Recovery #1

(*from Rocket Science Fair Projects*)

Project: Determine the type and color of tracking powder that works best for spotting rockets in the sky.

Background

Tracking powder is used in rockets that fly to extremely high altitudes. It is a powdery substance that creates a large puffy cloud in the sky to help you see the model's location.

The purpose of this experiment is to find out what type of substance works best to help you see the model. What color works best? Should you use a different color when the sky is cloudy or hazy? What density or amount of tracking powder should be used? How does adding powder in the tube affect the way a parachute or streamer opens? Should the tracking powder be placed in some type of container or pouch so that it is easy to load into the model?

Where to Start

Try flying your rocket with different types of substances. Some powders that have been used in the past are: talcum powder, ground chalk, and tempera paint. Do not use a material that could burn easily, as this would be against the NAR safety code.

Fly your rockets in different weather conditions too - blue sky vs. cloudy days, and calm days vs. windy days, cold days vs. hot, humid days, etc.

The Effect of Color on Memory Retention of Items on a List

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project320_28.html

PURPOSE

The purpose of this experiment was to determine if colored versus black and white printed words affects human memory.

EXPERIMENT DESIGN

The constants in this study were:
1. The place to take the test
2. The amount of time to take the test
3. The content of the test
4. The amount of time to look at list #1
5. The amount of time to check off words on list #2
6. The passage of time from looking at the words until taking the test

The manipulated variable was color versus black and white printed words subjects were to read and remember.

The responding variable was the number of words the subjects remembered after one hour.

To measure the responding variable I will use a black and white list of words that has all 20 correct answers plus 20 new words to see which they remembered better

MATERIALS

QUANTITY	ITEM DESCRIPTION
50-60	6th grade children, half boys and half girls
30	List #1's. 20 words, half black and white, half color.
50-60	List #2's. 40 words all in black and white. Half of the words from list one, half of them new

	words. On the left of each word there is a check-off box. Each person has to check off 20 words they can remember from the first list.
10	#2 pencils
10	Desks
2	Answer sheets that showall of the words that were actually on list one, one for black and white words, one for color.
2	Instructor s scripts for giving directions to each group. One for before list #1, one for before list #2.

PROCEDURES

1. Create all of the materials (list one and two).

- Gather the words for the lists by using a spelling book from a grade lower than the grade your subjects are in. (I chose words from a fifth grade spelling list because my subjects were in sixth grade. I wanted to have words easy enough for all children even those below grade level in reading.)
- Randomly select half the words to print in a bright color. Randomly colorize a nearly equal number of these as pink, blue, lime, and orange.
- Write the instruction script for each group before they begin the experiment.

2. Get together a small test group: ten people, about five boys and five girls.

3. Have the people sit in the same room away from each other and get comfortable.

4. Read the instructions to the group before they see "List #1".

5. Hand out "List #1".

6. Instruct them to read the list carefully for two minutes.

7. After exactly two minutes, take away the list.

8. Let them leave for one hour before giving them "List #2".

9. After an hour is over, call the subjects back to take "List #2".

10. Give each person "List #2" inside a folder.

11. Read them the second set of instructions.

12. Give them two minutes to select their answers on "List #2".

13. After the two minutes are over, gather all of the tests.

14. Check their answers with a key that has all the right answers.

15. Record the information.

16. Repeat steps 1-16 about six times until all subjects have been tested.

17. Compare the data to see if they remembered words in color better, or words in black and white.

The Effect of Ultraviolet Light on Yeast

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project924_109.htmll)

Problem

What is the effect of UV light on yeast?

Experiment Design

The constants in this study were:
- -The amount of yeast
- -The kind of yeast
- -The UV lamp and its distance from the fermentation flask
- -The size and shape of the fermentation flask
- -Quantity and type of apple juice
- -The temperature at the time of fermentation

The manipulated variable was whether or not the yeast was subjected to UV light during fermentation.
The responding variable was the amount of $CO2$ produced by the yeast as it fermented the apple juice.
To measure the responding variable I used a graduated cylinder and measured how much water was displaced by $CO2$ put out by the yeast during fermentation.

Materials

QUANTITY	ITEM
1	flask
1	Measuring cylinder
1	water bath
1	stopper
1	clamp and stand
? teaspoon	UV lamp
1	yeast
100 ml	plastic tube
1	apple juice
1	microwave
1	Heating pad

1	Pencil
1	Paper pad

Procedure

1. Get all materials.

2. Fill the water bath with water.

3. Fill measuring cylinder with water.

4. Put plastic wrap over measuring cylinder.

5. Flip the water-filled measuring cylinder over in the water bath.

6. Get the plastic tubing and attach one end to the rubber stopper.

7. Put 100ml-apple juice into 250ml flask.

8. Heat apple juice in microwave for 25 seconds.

9. Put 1/4-teaspoon yeast in flask.

10. Shake flask to mix apple juice with yeast.

11. Plug in heat pad.

12. Put flask on heat pad.

13. Slide the stopper into the top of the flask.

14. Place the rubber tubing into the water bath.

15. Slip the plastic tubing up inside the cylinder.

16. Put a straw on other side of measuring cylinder to balance it.

17. Clamp cylinder to support measuring cylinder in an upright position.

18. Watch for CO_2 bubbles in the measuring cylinder.

19. Record volume of captured CO_2 in the measuring cylinder every 10 minutes for one hour.

20. Repeat steps 1-14 with the following exception.

21. Place an UV lamp so it shines directly on the flask and the yeast during ermentation

The Use of Lichens as Bioindicators

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project936_108.html)

Problem

The purpose for this experiment is to investigate the effect of acidic solution on fruticose, foliose, and crustose lichens. This experiment is being done to model the effect of acid rain on lichens in the natural environment and to use this information to determine if these lichens can be used as bioindicators.

Materials

- Lichen sets that included portions of crustose, foliose, and fruticose lichens
- Glass jar for each sample
- Two Spray bottles
- Bottled water
- Vinegar
- Plastic wrap

(Can purchase lichens from: http://www.sciencekit.com; http://www.sargentwelch.com/; http://www.carolina.com)

Procedure

To study the effect of acid rain on different samples of lichens, I first ordered two lichen sets that included portions of crustose, foliose, and fruticose lichens from the Carolina Biological Supply Company. I then took both sets of lichens and placed each individual sample into its own glass jar. I then filled one spray bottle with 10 ounces of Dannon bottled water. I placed a label on the spay bottle and labeled it water. I took a slit of white tape a put it on one of the ditches in the twisting top to the spray bottle. I then turned it around four times. I then filled half of the other spray bottle with 5 ounces of vinegar and the other half with 5 ounces of Dannon bottled water. I did this because acid rain has the same effect on plants and organisms as water and vinegar mixed together; only vinegar and water works slower and is weaker (Wilkes 1991). I then placed a label on the spray bottle and labeled it acid. I took a slit of white tape and put it a ditch of the twisting top of this spray bottle. I then turned it four times so the mist settings of both bottles were the same. I then took a sample of crustose, foliose, and fruticose lichens and used them as a control, misting them daily with water. After I misted each sample three times with water I placed Saran wrap on the opening in the jars and sealed it with a rubber band. I then took the remaining samples of crustose, foliose, and fruticose lichens and misted them daily with the acid. After I misted each sample with the acid three times I placed Saran wrap over the opening in the jars and secured it with a rubberband. Everyday I took off the Saran wrap and examined the lichen samples with a magnifying glass, took pictures, and wrote down my observations in my logbook. After doing this, I misted the plants again and replaced the Saran wrap. I did this repeatedly for ten days. I then performed the experiment again with new lichen samples keeping all the variables the same. I recorded all my observations in my logbook.

What are the Effects of Polyacrylamide and Polyacrylate on Soil Erosion?

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project451_38.html)

Purpose

To determine the effects of polyacrylamide versus polyacrylate on erosion.

Materials

Dirt
Polyacrylamide
Polyacrylate
Twelve trays
Box
Cup

Procedure

1. Fill the twelve trays with 227.25 grams of dirt.

2. Get one, two, three, four, and five grams of polyacrylamide and polyacrylate.

3. Place one gram of polyacrylamide in a tray, two in the next, and so.

4. Repeat Step #3 for the polyacrylate.

5. Spread the polyacrylate and polyacrylamide evenly in each of the twelve trays.

6. Place the trays in a box at an angle.

7. Each day for five days, pour 100 mL of water through each of the twelve trays. Collect the runoff in a cup.

8. Measure the amount of erosion in each cup.

What Color Can Be Seen Most Clearly Through a Fog?

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project758_91.html)

Purpose

Learn which color light would shine the brightest through fog.

Materials

1. Jar with no label
2. Milk
3. Water
4. Flashlight
5. Cellophane wrap colored film,
6. Light meter, an instrument that measures the intensity of light

Procedure

1. Buy colored cellophane wrap and rent or buy a light meter.
2. Get a jar and remove the label.
3. Cut different colors of cellophane wrap and fold them into squares.
4. Fill the jar with water.
5. Add two teaspoons of milk to the water.
6. Stir milk and water to form a cloudy liquid.
7. Put the light meter behind the jar and the flashlight in front of the jar.
8. Shine the flashlight through the cloudy liquid into the light meter. The light meter will measure the intensity of the light shining through the clouds formed in the liquid.
9. Put different colors of cellophane wrap film over the flashlight to make different colors of light.
10. Record the brightness or strength of the different colors of light shining through the liquid.

What is the Effect of Ultraviolet on Bacteria?

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project930_107.html)

Problem

What is the effect of ultraviolet light on bacteria?

Materials

- Water samples from local creek
- UV light
- Agar plate

Procedure

1. Collect water samples at a local creek.

2. Collect one sample before shining UV light on water.

3. Shine UV light on water. Take samples of the water at 1 hour, 6 hours, 12 hours, and 24 hours.

4. Place the samples on agar plates.

5. Incubate the samples and analyze results.

What Factors Affect the Yield and Composition of Meat After Cooking?

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project488_39.html)

Purpose

To determine factors that affect the yield and composition of meat after cooking.

Materials

Ground beef
Rice
Broiler pan
Aluminum foil

Procedures

I. Ground Beef Fat Level And Doneness

A. Procedure

1. Shape 120 grams of ground beef into a round patty 1.0 cm. thick. (This is a rather thin patty.)
2. Cover part of a broiler pan with aluminum foil and poke holes in the foil to let the fat drip through.
3. Turn on the broiler in the oven and place the broiler pan in the oven so the top of the meat is about 9 cm. from the coil. (This will probably be the second rack slot down.) Leave the door of the oven part way open.
4. Cook the patty until either medium or well-done.

    - Medium-done - broil until the center of the patty is a pinkish-brown color (about 10 min. - 5 min. on each side.)
    - Well-done - broil until the center of the patty has no evidence of pink (about 16 min. - 8 min. on each side)

5. Weigh the cooked patty immediately after cooking, place on a plate and cut in half.
6. Calculate yield percent as follows:

(cooked weight/starting weight) x 100

7. Report yield and observe color and firmness. Tasting is not necessary and not advisable for the medium-done patties.

B. Treatments

1. Regular ground beef
2. Low fat ground beef

Regular - Medium	**Regular - Well Done**	**Low fat - Medium**	**Low fat - Well Done**
Yield Percent:	Yield Percent:	Yield Percent:	Yield Percent:
Color:	Color:	Color:	Color:

II. Evaluation of wild rice addition to regular ground beef

A. Procedure

1. Make a round 120 gram patty about 1.5 cm. in thickness.
2. Weigh a piece of heavy-duty aluminum foil large enough for the patty and with enough foil left around the edges to fold up to make a pan for the patty. The edges of the pan should not be higher than the patty; preferably, a little lower than the patty.
3. Put the patties (in the foil pans) on a baking sheet. Insert a thermometer into the patty from the side so the end is in the center of the patty.
4. Bake the patties at 325°F to an internal temperature of 80°C (176°F). When patty is done lisft with tongs and let drip 20 seconds before weighing.
5. Record for each patty: weight of cooked patty, weight of drippings, and % of yield.

B. Treatments

1. Ground beef
2. 1 part (30 g) cooked wild rice to 3 parts (90 g) beef

Ground Beef	**Ground Beef + Wild Rice**
Weight of Cooked Patty: Your Group: Class:	Weight of Cooked Patty: Your Group: Class:
Weight of Drippings: Your Group: Class:	Weight of Drippings: Your Group: Class:
% of Yield: Your Group: Class:	% of Yield: Your Group: Class:
Tenderness:	Tenderness:

What is the Best Drought Resistant Grass?

(from All Science Fair Projects/http://www.all-science-fair-projects.com/project682_50.html)

Purpose

The purpose of this experiment is to determine the best drought-resistant grass. The game of golf is very important to me and I know that growing the perfect grass is a major objective in the construction of golf courses. Botanists and golf course designers are always looking to use the best drought-resistant grass available in order to save money. This project will give me an insight to the field of botany as well as landscape architecture.

Materials

* rye grass seeds - approximately. 1.5 oz.
* centipede grass seeds - approximately. 1.5 oz.
* Bermuda grass seeds - approximately. 1.5 oz.
* bent grass seeds - approximately. 1.5 oz.
* potting soil - approximately. 1 lb.
* four (4) 10 oz. plastic cups

Procedure

1. Label each of the four 10 oz. plastic cups with the name of one of the four experimental grasses.

2. Fill the cups were with approximately 300 grams of potting soil.

3. Apply a generous, even layer of rye grass on top of the soil of its respective cup. Cover the seeds with a 1 cm layer of potting soil.

4. Repeat Step #3 for Bermuda grass, centipede grass, & bent grass.

5. Place the cups in an area of direct sunlight.

6. Monitor the grasses' germination and their growth daily.

Which Combination of Materials Are Best For Mars Temperatures?

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project70_7.html)

Purpose

The purpose of this experiment was to find out which type of fabric combinations could be used in space suits for astronauts exploring Mars.

Experimental Design

The constants in this study were

* Number of tests of each spacesuit prototype, (3).
* Size of water containers
* Amount of water in containers.
* Time of exposure to warm and cold conditions.
* Type of thermometer
* The temperatures that the combinations were tested in

The manipulated variable was the combination of fabrics used for each prototype.

To evaluate the responding variable I measured the water temperature at the start of the experiment and at the end. I also used a thermometer outside the prototype to measure the air temperature. All temperatures were measured in degrees Celsius.

Materials

QUANTITY	ITEM DESCRIPTION
4	Mercury Thermometers (Celsius)
30cmx30cmx37cm	Polyester Lycra fabric
31.4cmx31.4cmx38.4cm	Camouflage fabric

30.5cmx30.5cmx37.5cm	Fleece fabric
30.8cmx30.8cmx37.8cm	Aluminized Mylar
30cmx30cmx37cm	foam fabric
32.5cmx32.5cmx39.5cm	Flannel Backed Vinyl
32cmx32cmx39cm	Vinyl
31.3cmx31.3cmx38.3cm	Rubber Coated Nylon
32cmx32cmx39cm	Nylon Cordura fabric
1 pair	Scissors
1 bottle	Liquid Stitch™
1 spool	Brown Thread
1	Sewing Needle
1	Heating Device
3	Plastic Containers
1	Ice Chest Cooler
10 kilo.	Dry Ice
1,273mL	Water
1 pair	Rubber Gloves

Procedures

1. Cut out fabrics

2. Make three different combinations of fabrics.

3. Once the fabric combinations are complete, glue the fabrics for each combination together.

4. Sew all edges of prototypes together except for top.

5. Sew Velcro® around lids of prototypes

6. Fill plastic container with water to top (make sure temperature is close to 37* C.)

7. Put thermometer in bottle to get starting temperature.

8. Slide bottle in spacesuit prototypes.

9. Velcro lid to the body of spacesuit.

10. Place heaters around spacesuit prototypes.

11. Measure temperature of outside environment.

12. Wait 1 hour and record temperature.

13. Repeat steps 1-12 for cold environment except: Place spacesuit prototypes in freezer.

14. Repeat steps 1-12 for cold environment except: Place spacesuit prototypes in cooler with dry ice.

Which Windmill Blade Angle is Most Efficient?

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project715_57.html)

Purpose

The purpose of this experiment was to find out which blade size and angle is most efficient.

Experimental Design

The constants in this study were:

- Same windmill
- Same fan (wind generator)
- Same DC ampmeter
- Same electricity generator
- Same wind speed
- Same fan distance (1 meter) from the blades

The manipulated variables were the angle and the length (blade area) of the blade.

The responding variable was the electrical output of generator attached to the windmill.

To measure the responding variable, I am going to hook an ampmeter to the motor and record the electrical current output.

Materials

QUANTITY	ITEM DESCRIPTION
2	Electrical wires
1	Rubber band (pulley)
1	Fan (wind source)
1	Tape measure
1	Windmill (Homemade from Tinker-Toys and Erector Set)
1	Ampmeter (Measured current output)
1	Protractor (Measuring blade angle)
1	Electrical generator

8	5cm x 1cm blades
8	10cm x 1cm blades
8	15cm x 1cm blades
8	20cm x 1cm blades

Procedures

1. Build the windmill out of Tinker-Toys and Erector Set.

2. Cut out four of each of these; 1 inch, 2 inch, 3 inch, 4 inch, and 5 inch long blades out of Venetian blind blades.

3. Place fan approximately 1 meter away from windmill.

4. Attach all of one size to the propeller holder.

5. Measure the degree of the blade with a protractor.

6. Make sure the blades are at 0 degrees (parallel with other blades).

7. Attach ampmeter wires to the motor.

8. Turn the fan on and take notes on DC current.

9. Read the voltmeter to tell how much electricity has been produced.

10. Repeat the above but change the angle of the blade to 15, 30, 45, 60, 75, and 90 degrees.

11. Repeat the above with the 5-inch long blades set at 0 degrees.

12. Repeat the above with the 10-inch long blade set at 0 degrees.

13. Repeat the above with the 15-inch long blade set at 0 degrees.

14. Repeat the above with the 5-inch long blade set at 0 degrees.

15. Collect the data and make graphs of current output vs. blade area and angle.