pH & Plant Growth Experiment

The initials pH stand for percent hydronium ion. An ion results from the loss or gain of one or more electrons from an atom, causing either positive or negative ions to form. The pH scale is used as a measure of how acidic or basic a liquid is. But how do liquids become acidic or basic? Isn't a liquid just a liquid?

Distilled water is the only liquid that is neutral. That means it's right in the middle of being acidic or basic—and it's neither. It's just pure water. Water from creeks or streams can have a pH that is not neutral. (Snowy creek had an acidic pH because of acid mine drainage.)

The pH scale starts at zero and ends at 14. The more acidic a liquid is, the lower its number on the pH scale. The less acidic—or more basic a liquid is—the higher its number. Most of the liquids you encounter on a daily basis are just around neutral. They might be a little above or a little below, but most liquids tend to be closer to neutral than at either end of the pH scale. Liquids get their pH level as a result of molecules that split apart to form positive and negative ions. An *ion* is the loss or gain of electrons from an atom. When an atom loses electrons, it forms a positive ion. When an atom gains electrons, it forms a negative ion.

Liquids will be either acidic or basic (also called alkaline), depending on whether they contain positive or negative ions. If there are more positive ions in the water, the water is more acidic. If there are more negative ions in the water, the liquid is more basic.

Some plants prefer acidic soils while other prefer more basic soil. Gardeners often help plants along by making the soil in which they grow either more acidic or more alkaline. There are products available, such as Miracid, that boost the acidity of soil. Garden lime (its chemical name is calcium carbonate) will help make soil alkaline. In this experiment, you'll control the pH of the water you'll use on plants by adding certain substances to make distilled water either acidic or basic.

Experiment Supplies:

7 2 liter bottles of distilled water
pH up and pH down
7 medium to large sized plastic cups or pots
seeds
potting soil
tape
ruler
Data Sheet

Experiment Summary:

Purpose (what): To examine the effect of pH on plant growth

Method (how): We will grow 7 plants under different and water then with different pH water. Some will receive acidic water while others receive basic water. Plant growth data will be collected for 1 month.

Question 1: How tall will the plants grow with basic.

Question 2: Can you mix ph.

Hypothesis: I think that the basic group will grow the best.

Procedure:

1) Fill each cup/planter with the exact same amount of soil.

Q1: How will you assure that you have the exact same amount in each container?

you can messaure the amount using a messaure'ing cup.

2) Plant 3 seeds in each container. Plant them according to the depth recommended on the seedling label.

Q2: What is the recommended planting depth for your seedling?

_____

3) Using the pH up and pH down as well as a pH meter add drops to one of the 7 distilled water bottles to make a pH of 1. Record how many drops you need to add to make that pH. Repeat using a new bottle of distilled water to make a pH of 3, 5, 9, 11 & 13. (one bottle will be the control with a pH of 7)

Q3: Why is it important to record how many drops were used to create water with that pH?

_____

4) Moisten (do not saturate) the soil so that each container has the exact same amount of water. Make sure you only use the water with the pH assigned to your seeds.

Q4: What is a tool can you use to make sure you have the exact same amount of water?

5) Maintain the moisture in the seedlings by checking it every day. If more water is needed, apply water and record how much was added and the date.

Q5: Why should you record when you water the plants?

6) Monitor the soil moisture and water as needed. Make sure to water all the plants with the correct bottle of water.

7) Collect data and record using neat handwriting on your data sheet.

8) Combine data by treatment and analyze the results.

pH& Plant Growth Data Collection Sheet

NAME: Krista

Treatment pH: 5

(1)

DATE	Height (cm)	Water added (ml)	Notes
4-21-15	0	30 ml.	
4-22-15	0	40 ml.	
4-23-15	0	40 ml.	
4-24-15	0	0 ml.	We didn't water plants
4-27-15	0	20 ml.	
4-28-15	5	20 ml.	plant starting to gror
4-29-15	25	20 ml.	plant grew bigger
5-1-15	28	20 ml.	plant grew bigger
5-4-15	31	20 ml.	plant grew bigger
5-5-15	40	10 ml.	plant grew bigger
5-6-15	41	20 ml.	plant grew little bigg

Music & Plant Growth Experiment

In 1973, a woman named Dorothy Retallack published a small book called *The Sound of Music and Plants.* Her book detailed experiments that she had been conducting at the Colorado Woman's College in Denver using the school's three Biotronic Control Chambers. Mrs. Retallack placed plants in each chamber and speakers through which she played sounds and particular styles of music. She watched the plants and recorded their progress daily. She was astounded at what she discovered.

The plants in the laboratory where music was played daily for three hours a day grew twice as large and became twice as healthy as those in a music-free environment. On the other extreme, plants in the laboratory where music was played for eight hours a day died within two weeks of the start of the experiment. This experiment encouraged many individuals and organizations to start playing music to plants. Those experienced with plants and music will warn you about the sort of music that you should play. The plants will grow better if you play soft soothing music of old era instead of heavy metal or rock music.

Although music is not an absolutely proven factor in plant development, several studies, along with Dorothy Retallack's groundbreaking series of experiments, have aided the musical development theory. Protoplasm, the living matter of which all plants are made is in a constant state of movement but science tells us this movement is lowest in early morning and late evening. We are also told sound waves, such as music, speed up protoplasmic movement in plant cells. This stimulation would result in the manufacturing of more food for the plant which in turn leads to more vigorous growth and greater production. Music broadcast daily for about 30 minutes morning and evening over test plots of various vegetables, sugar cane and greenhouse grown flowers has brought about marked results in quality and increased yield.

Experiment Supplies:

Cd Player or Ipod with speaker
Classical Music cd
12 tomato plant seedlings
Larger planting containers
Potting soil
Spoon
Data Sheet

Experiment Summary:

Purpose (what): To examine the effect of music on plant growth

Method (how): We will play music twice a day for 1 group of plants. A second group of plants will be grown in a music-free environment. Plant growth data will be collected for 1 month.

Question 1: How long does it take to grow a head of lettuce with music?

Question 2: How will we measure to collect data?

Hypothesis: I think that the group with music will grow better than the group without music, because other studies show that it did grow better.

Procedure:

1) Fill each planter with the exact same amount of soil.

Q1: How will you assure that you have the exact same amount in each container?

_____

2) Plant 1 seedling in each container. Plant them according to the depth recommended on the seedling label.

Q2: What is the recommended planting depth for your seedling?

_____

3) Moisten (do not saturate) the soil so that each container has the exact same amount of water.

Q2: What is a tool can you use to make sure you have the exact same amount of water?

_____

4) Maintain the moisture in the seedlings by checking it every day. If more water is needed, apply the exact same amount of water to <u>all</u> of the containers.

Music & Plant Growth Data Collection Sheet

NAME: Gracyn

Treatment: No music

DATE	Height (cm)	Notes
4-17-15	8 cm	looks good
4-20-15	10cm	looks good
4-21-15	27 cm	look good
4-22-15	11cm	look good
4-23-15	11cm	it bint groow
4-24-15	12 cm	grown an inch
4-27-15	13 1/2 cm	it is growing good.
4-28-15	13 1/2 cm	it hasend grown
4-29	18 1/2 cm	it is growing good
5-1-15	11 cm	5oml
54-15	13 cm	looks good

1

Music & Plant Growth Data Collection Sheet

NAME: Grace

Treatment: music

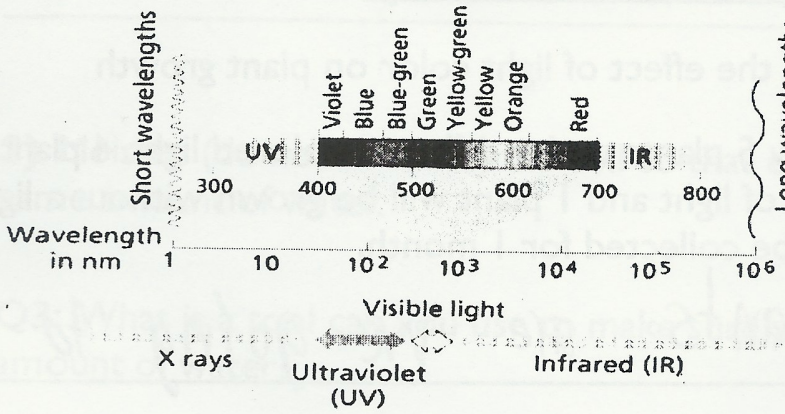
DATE	Height (cm)	Notes
4-17-15	16cm	looks good
4-20-15	16cm	hasent grown tall
4-21-15	17cm	grown inch
4-22-15	16 cm	leaning down
4-23-15	17cm	looks good
4-24-15	17 1/2 cm	looks good
4-27-15	17 1/2 cm	hasent grown
4-28-15	18 1/2	it grown inch 1/2.
4-29-15	17	it shruck
5-1-15	20 1/2 cm	5 cm
5-4-15	1 cm	looks good

Light & Plant Growth Experiment

Sunlight is a kind of energy that travels to the earth in waves. Plants are able to use the energy from the sun to grow through a process called photosynthesis. Photosynthesis uses the energy of light to convert carbon dioxide and water into simple sugar. Those simple sugars help plants grow and reproduce. Several factors can affect the amount of sugar produced by plants.

The brightness of the light and how long plants get sunlight can effect plant growth. Plants need quality light to grow. If plants do not get enough light they will grow slower or possibly die. It is not only the light intensity that effects plants but also the color of the light can effect plant growth.

Light waves can be broken down into different types of rays. Only part of the light spectrum is visible to the human eye. This part of the spectrum is called visible light. Plants can only absorb light from this part of the spectrum as well.



Photosynthesis only occurs in the visible spectrum of light but it does not absorb the different colors of light equally. Certain parts of the visible spectrum will provide a higher production of sugar than other parts.

The reason plants absorb some colors of light better than others has to do with how light is absorbed or reflected. When you see a red tomato it appears red because the color red is being reflected. Pigments in the skin of the tomato reflect the light. The other colors, blue, green and yellow are being absorbed by the tomato. Leaves are green which means that green light is reflected. Chlorophyll is a green pigment in leaves that reflects the green light. The green light is not absorbed and the plants cannot use it to make sugar. The other light colors are absorbed. So what will happen if we try and grow plants under different colored light? Will the plants grow as well if they only get light that is green, red, yellow, or blue?

Experiment Supplies:

4 colors of cellophane -red, blue, green, and yellow
Clear cling wrap
5 medium to large sized plastic cups or pots
5 medium boxes all the same size (Full sized milk cartons will work)
5 small plants
potting soil
scissors
tape
ruler
Data Sheet

Experiment Summary:

Purpose (what): To examine the effect of light color on plant growth

Method (how): We will grow 5 plants under different colored light. 4 plants will be grown under 1 color of light and 1 plant will be grown without a light filter Plant growth data will be collected for 1 month.

Question 1: What plants are we going to plant.

Question 2: What would be a range of time for a pland to grow under the colors.

Hypothesis: I think that the plant under clear will grow the best because it like its neatral. I think that green will be the worst because the leaves are green.

Procedure:

1) Fill each cup/planter with the exact same amount of soil.

Q1: How will you assure that you have the exact same amount in each container?

_____

2) Plant 1 seedling in each container. Plant them according to the depth recommended on the seedling label.

Q2: What is the recommended planting depth for your seedling?

_____

3) Moisten (do not saturate) the soil so that each container has the exact same amount of water.

Q3: What is a tool can you use to make sure you have the exact same amount of water?

_____

4) Maintain the moisture in the seedlings by checking it every day. If more water is needed, apply the exact same amount of water to <u>all</u> of the containers.

Q4: Why must all the containers be watered at the same time?

_____

5) Cut windows into the sides and top of your boxes. Make sure the windows are the exact same size for each box. Cover the widows with a layer of cellophane and tape them shut. One color of cellophane per box.

Q5: Why do we need to make sure the windows are the same size?

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6) The box without colored cellophane should have the windows covered with clear cling wrap.

7)Place plants in the boxes. Only lift the box tops once a day as quickly as possible to check soil moisture and water if necessary.

Q7:Why do we only want to lift the boxes once a day and why should it be quick?

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8)Monitor the soil moisture and water as needed. Make sure to water all the plants in equal amounts and at the same time. Soil should remain moist but not saturated for optimal plant growth.

9) Collect data and record using neat handwriting on your data sheet.

10) Combine data by treatment and analyze the results.

Light & Plant Growth Data Collection Sheet

1

NAME: Abby

Treatment: Red

DATE	Height (cm)	Notes
4-13-15 C	17 cm	first day cabbage
4-13-15 P	7 cm	first day (pansies)
4-16-15 C	20 cm	Cabbage
4-16-15 P	9 cm	pansies
4-17-15 P	10 cm	Green on white
4-17-15 C	21 cm	Green
4-20-15 P	10 cm	Green
4-20-15 C	21 cm	Green
4-21-15 C	22 cm	leaning so hi leaf
4-21-15 P	12 cm	Green
4-22-15 P	10 cm	Green
4-22-15 C	23 cm	Green
4-23-15 C	23	Green
4-23-15 P	12 cm	Green 2 new leave

~~Music & Plant Growth Data Collection Sheet~~
Light and Plant

NAME: Abby

(2)

Treatment: red

DATE	Height (cm)	Notes
4-24-15 p	12 cm	Green
4-24-15 c	23 cm	New leaf
4-27-15 c	23 cm	Ripped leaf
4-27-15 p	13 cm	Green
4-28-15 c	24 cm	Leaf off
4-28-15 p	13 cm	Green and white
4-29-15 c	24 cm	stem of a the Leaf Bro
4-29-15 p	14 cm	White and Green
5-1-15 p	14 cm	dying
5-1-15 c	24 cm	dying
5-4-15 p	14 cm	dying

Music & Plant Growth Data Collection Sheet

Light and plant

NAME: Abby

(3)

Treatment: Red

DATE	Height (cm)	Notes
5-5-15p	15 cm	Looking better
5-6-15p	15cm	Looking alot better