How different pH levels in plant's water affect the health and growth of pea plants research proposal

Question:How do different pH levels in water given to pea plants affect the health and growth?

How our question is relevant to Environmental Chemistry:

Our question is relevant because currently air pollution levels continue to rise at an alarming rate of 8 percent in 5 years according to The Guardian. and because of this there is more of a chance for acid rain. Acid rain forms when there is a lot of air pollution from burning fossil fuels. Acid rain starts the process of being formed by a chemical reaction that begins when compounds like sulfur dioxide and nitrogen oxides are released into the atmosphere. They then rise very high into the atmosphere where they mix and react with water, oxygen, and other chemicals to form acidic pollutants, known as acid rain.. The two main chemicals that cause acid rain are sulfur dioxide and nitrogen oxides. This will benefit us as humans because we will know that when rain gets to a pH of 3 or below the plant will die or not grow as fast. This can be beneficial to agriculture as well because then farmers will know if the pH of rain is getting to low for their crops to grow well and have the highest yield. By knowing this information we will know about what effect pH has on plants and how serious of a problem low pH rain water is.

Materials:

- Rain water [Jawad's grandmas rain barrel]
- 3 pea plants [Ms.Roston will get the plants]
- Vinegar to decrease the pH level [Noah will get it]
- Borax to increase the pH level [Noah will get it]
- Measuring cup to measure the amount of substance we are using [Noah will get it]

- Spoon to mix the mixture [Noah will get it]
- Electronic pH tester [Ms.Roston will get it]
- UV light [Mrs.Roston will get it]

We will be conducting the experiment at school. The jobs will be equally divided.

Variables:

Manipulated-pH of the water
Controlled-how much water each plant is given, the pH level is the same each day, type of plant, where the water is obtained from, the location of the plants
Responding-how much the plant has grown and how healthy the plant is

Procedure:

1. Put the plants in a position where they are secure and won't fall or get knocked over.
2. Set up the UV light above the plants
3. Make sure that there is enough rainwater to water plant #1[amount of water differs depending on the size of the plant].
4. Mix water and vinegar until it reaches the desired pH which is 4.0[amount of substance differs depending on size of the plant].
5. Mix water and borax until it reaches the desired pH level which is 9.2 [amount of substances differs depending on size of the plant.
6. Mix the substances very well to ensure a consistent pH throughout the mixture.
7. Test the 2 mixtures to make they match their desired pH level.
8. Apply the rainwater to plant #1.
9. Apply the mixture of water and vinegar to plant #2.
10. Apply the mixture of water and borax to plant #3.
11. Record your data by taking pictures of each plant and noticing the difference of each plant.
12. Repeat steps 2 - 9 until you you have finished your experiment or project.

References:

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