# Soil pH

Driving Question

Does soil taken from different locations have the same pH?

Materials and Equipment

|  |  |
| --- | --- |
| * Data collection system
 | * Wash bottle
 |
| * pH sensor
 | * Hand trowel or shovel
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| * Beaker, 250-ml (3)
 | * Sealable plastic bag, quart/liter size (3)
 |
| * Graduated cylinder 100-mL
 | * Distilled water, 400 mL
 |
| * Marking pens
 |  |

Background

pH is one of the limiting factors in the agricultural ecosystem and must be monitored to keep our crop healthy and vigorous. Chemically speaking, pH is the measure of hydrogen ions (H+) in the soil. This scale ranges from 0 (highly acidic) to 14 (highly alkaline). Distilled water, with a pH of 7, is a neutral solution.

Safety

Follow these important safety precautions in addition to your regular classroom procedures:

* Wear safety goggles at all times

Procedure

1. Using a clean hand trowel dig at least eight centimeters deep. Collect three 60 mL soil samples. Place each sample into a sealed plastic bag.

2. Label the bags of soil with the location where each sample was collected.

3. Connect to the pH sensor.

4. Crush the soil that is in the bag so that the particles are as uniform as possible.

5. Place 60mL of each soil sample into each of the three 250 mL beakers. Label each beaker indicating the location it was collected.

6. Add 60mL of distilled water to each beaker, mix it, thoroughly. Let the samples stand for several minutes prior to data collection to promote hydrogen ion (H+) dissociation.

7. Calibrate pH sensor. Rinse the sensor with distilled water.

8. Place the sensor into the first beaker and monitor data without recording. Stir the mixture until the reading stabilizes (as much as 60 seconds). Do this for all three samples.

9. Rinse the sensor with distilled water after each sample and before taking the reading for the next sample.

10. Record the pH in Table1 below.

Table 1: Stabilized pH readings for soil samples

|  |  |  |
| --- | --- | --- |
|  | Soil sample location and observations | pH |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

Analysis

1. Record your observations in table 1 as well as the pH. Your observations may show; soil color, texture, organism, rocks or anything that is unusual.

2. Why did we add water to the soil sample?

3. Why did we rinse the sensor with distilled water before testing each sample?

4. Why was the soil crushed?

5. Based on your pH results only, would any of the soil samples from your three collection sites be capable of supporting a healthy agricultural crop?

6. How could you safely alter your soil in order to improve it ability to support agricultural crops

7. What did you notice about the different types and numbers of living organisms in your soil samples? What might this indicate about the health of soil in your area?

8. What evidence of human interaction or interference could you identify when collecting your samples? How do you think this interaction has altered the original condition of the soil?