PRELIMINARY ACTIVITY FOR

Soil pH

When you think of pH, you probably think of acidic and basic solutions. But soil can be acidic or basic, too. Soil pH, sometimes referred to as soil acidity, can be expressed using the *pH* scale. The pH scale ranges from 0 to 14. Soils with pH above 7 are basic or *sweet*. Soils with pH below 7 are acidic or *sour*. A soil with a pH of 7 is neither acidic nor basic, but is *neutral*.

Plant Nutrients	
Macronutrients	**Micronutrients**
Nitrogen	Iron
Phosphorus	Manganese
Potassium	Zinc
Sulfur	Copper
Calcium	Molybdenum
Magnesium	Cobalt
	Chlorine

The pH of soil is an important factor in determining which plants will grow because it controls which nutrients are available for the plants to use. Three primary plant nutrients – nitrogen, phosphorus, and potassium – are required for healthy plant growth. Because plants need them in large quantities, they are called *macronutrients*. They are the main ingredients of most fertilizers that farmers and gardeners add to their soil. Other nutrients such as iron and manganese are also needed by plants, but only in very small amounts. These nutrients are called *micronutrients*.

The availability of these nutrients depends not only on the amount but also on the form that is present, on the rate they are released from the soil, and on the pH of the soil. In general, macronutrients are more available in soil with high pH and micronutrients are more available in soil with low pH. Figure 1 shows the effect of pH on the availability of nutrients in the soil.

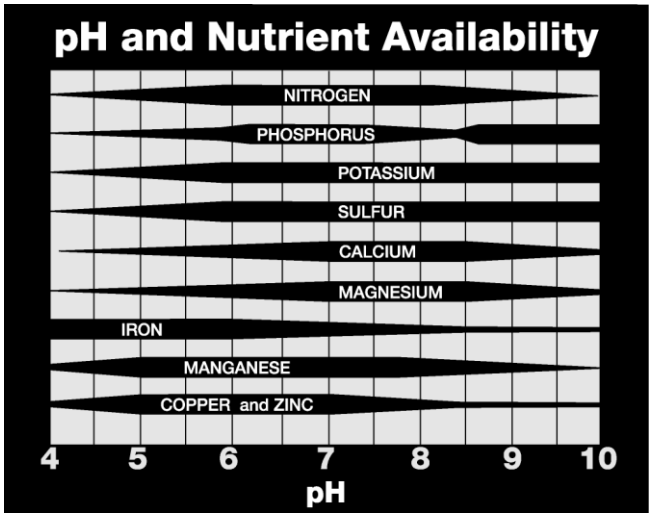


Figure 1

In the Preliminary Activity, you will gain experience using a pH Sensor and learn soil pH measuring technique as you determine the pH of a soil sample.

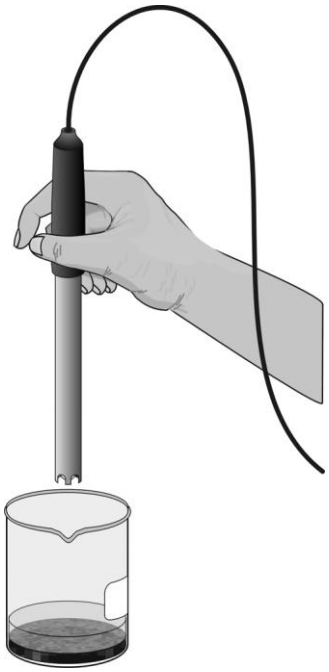
After completing the Preliminary Activity, you will first use reference sources to find out more

about soil pH before you choose and investigate a researchable question dealing with soil pH. Some topics to consider in your reference search are:

- soil pH
- soil acidity
- soil nutrients
- soil components
- soil horizons
- soil types
- buffers
- effects of acid deposition on soil

PROCEDURE

1. Prepare the water-soil mixture.
   a. Place 50 g of soil into a 250 mL beaker.
   b. Add 100 mL 0.01 M $CaCl_2$ and stir thoroughly.
   c. Stir once every three minutes for 15 minutes.
   d. After the final stirring, let the mixture settle for about five minutes. This allows the soil to settle out, leaving a layer of water on top for you to take your pH measurement. Proceed with Step 2 while you are waiting.



2. Connect the pH Sensor and the data-collection interface. **Important:** For this experiment, your teacher already has the pH Sensor in pH soaking solution in a beaker; be careful not to tip over the beaker when connecting the sensor to the interface.
3. Rinse the pH Sensor with distilled water.
4. Measure the pH.
   a. Carefully place the tip of the pH Sensor into the liquid part of the beaker contents. Make sure the glass bulb at the tip of the sensor is covered by the water. Stir gently.
   b. Continue gentle stirring. Note and record the pH value when the reading stabilizes.
5. Rinse the pH Sensor with distilled water and return it to its storage container.

QUESTIONS

1. What is the pH of the soil sample you tested? Is the soil classified as sweet, sour, or neutral?

2. How is soil pH important to plants?

3. How is soil pH important in a discussion of the acid deposition and its influence on plant growth?

4. List at least one researchable question for this experiment.