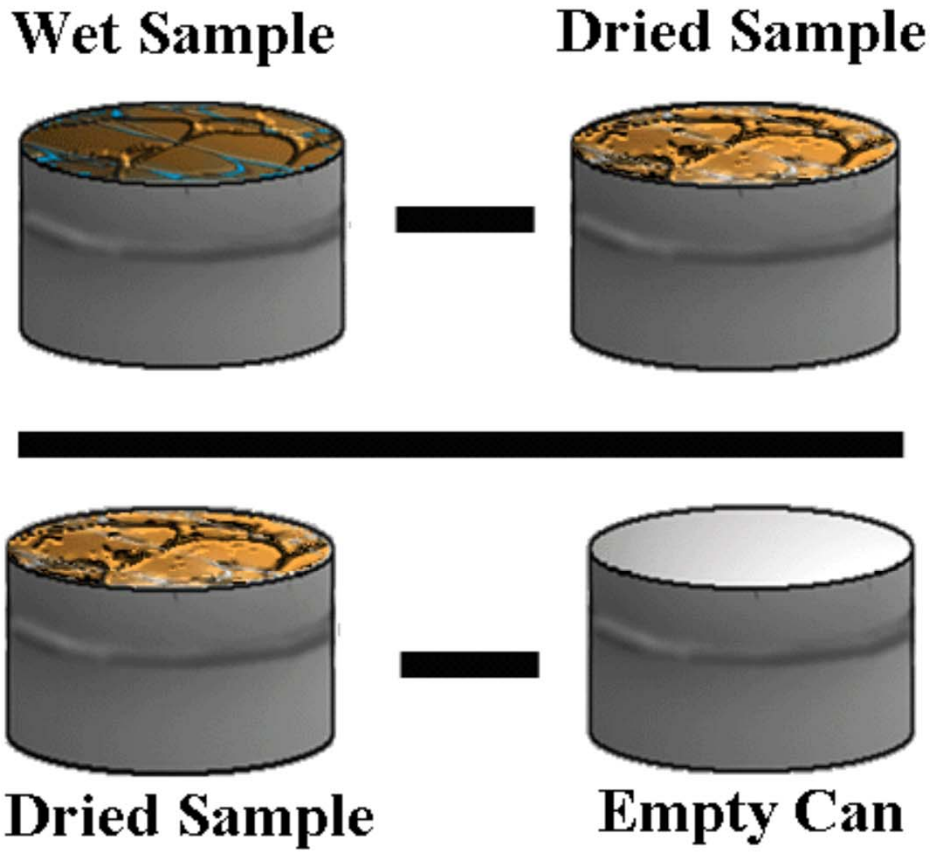
After Drying Your Soil

Get the mass of your dried sample to the nearest 0.1g.

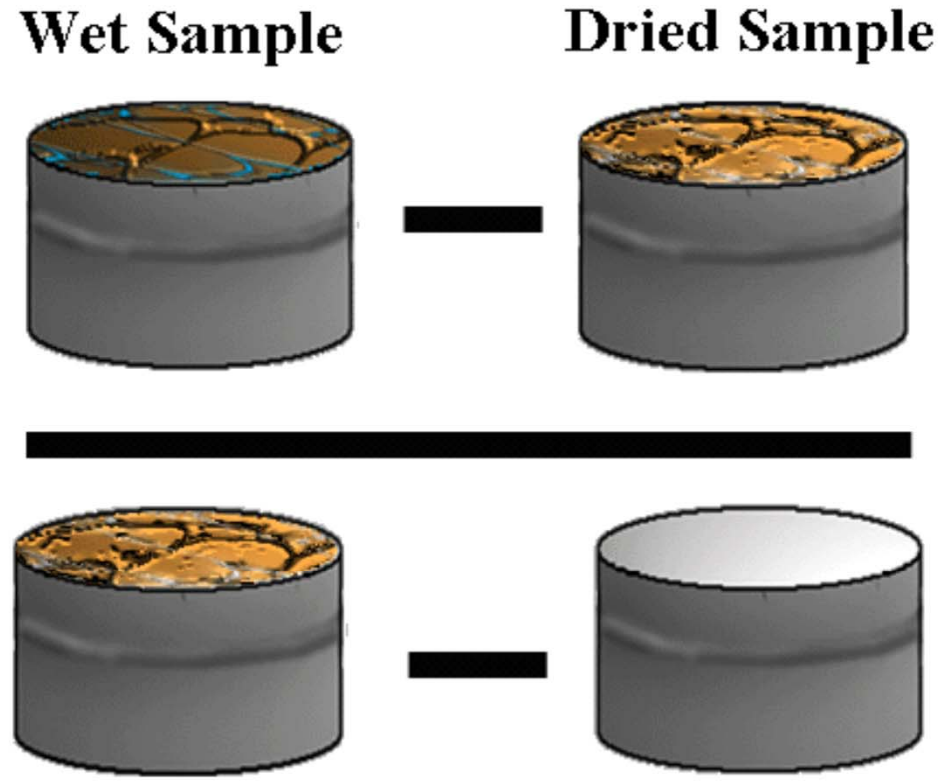
Note the mass on your soil moisture data sheet and complete the formula to learn your soil moisture.

Soil Water Content Formula (GLOBE)



= Soil Water Content

Soil Moisture Formula by Volume (SMAP)



= Soil Moisture, By Volume

Characterization Laboratory Analysis

Basic

- Bulk Density
- pH
- Soil Moisture*

Advanced

- Particle Size Distribution
- Particle Density
- Soil Fertility

* Taught in conjunction with Atmosphere Protocol Sessions

Prepare your dried soil samples for lab work.

Sieve the dry soil to remove rocks. Save the soil material in a labeled, plastic bag use for other measurements

Be careful not to bend the wire mesh by forcing the soil through.

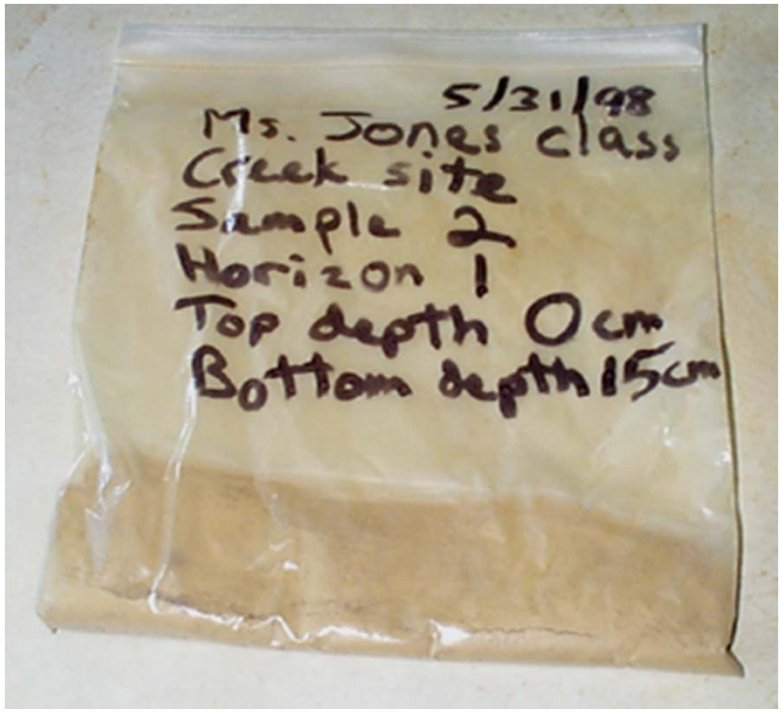
Laboratory Analysis

Preparing Samples for Other Lab Analyses

3. Transfer the rock-free, dry soil from the paper under the sieve into new, clean, dry plastic bags or containers. Seal the containers, and label them the same way that they were labeled in the field (horizon number, top and bottom depth, date, site name, site location, etc.). This is the soil that will be used for the other lab analyses.

On the label, include:

- Class name
- Date
- Site name
- Sample number
- Horizon number
- Top horizon depth
- Bottom horizon depth

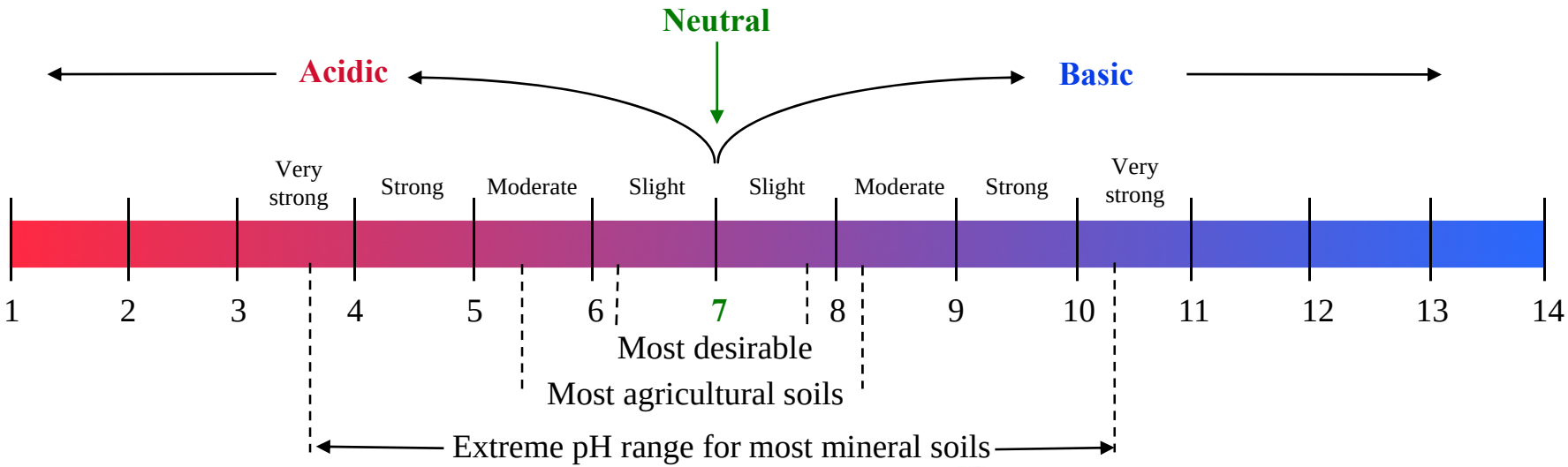


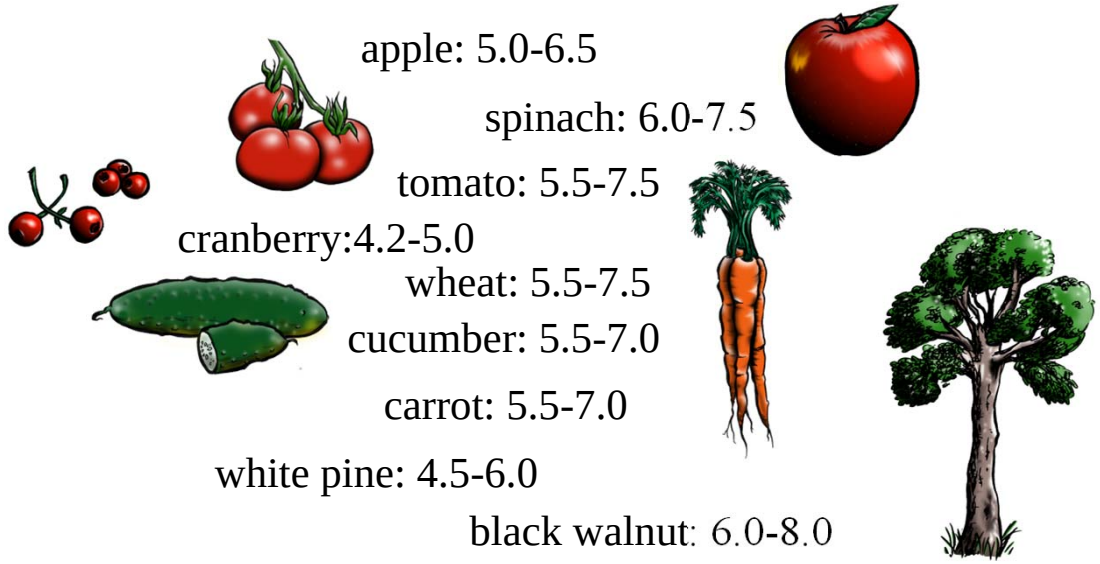
4. Store these samples in a safe, dry place until they are used.

Laboratory Analysis

pH Measurements

Possible pH Ranges Under Natural Soil Conditions





pH Measurements (continued)

1. In a cup or beaker, measure the pH of the distilled water you will be using. Dip the pH paper or calibrated pen or meter, into the water and obtain a reading.

2. In another cup or beaker, mix 25 g of dried and sieved soil with 25 mL of distilled water (or other amount in a 1:1 soil to water ratio. A 2:1 ratio is okay if the soil is high clay) using a spoon or other utensil to transfer the soil. Stir with a spoon or other stirrer until the soil and water are thoroughly mixed.

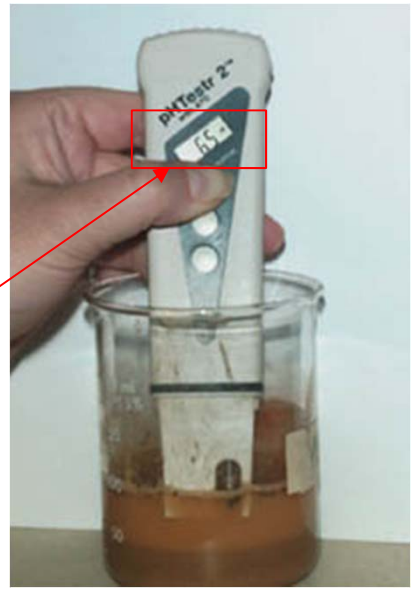
3. Stir the soil-water mixture for 30 seconds every 3 minutes for a total of five stirring/waiting cycles.

Stirring/Waiting Cycle

30 secs.	3 min.	30 secs.	3 min.	30 secs.	3 min.	30 secs.	3 min.	30 secs.	3 min.
Stir	Wait	Stir	Wait	Stir	Wait	Stir	Wait	Stir	Wait

Then, allow the mixture to settle until a supernatant (clearer liquid above the settled soil) forms (about 5 minutes).

4. Measure the pH of the supernatant using the pH paper, pen, or meter.



Place the bottom of the pH pen in the Supernatant (clearer liquid above the settled soil).

The pH of this soil is 6.5

5. Repeat steps 1-4 for each sample from each soil horizon, and record your results on the Soil pH Data Worksheet.

Laboratory Analysis

Soil Fertility Measurements

Follow the directions in the GLOBE soil test kit to determine the fertility of the soil (N, P, and K)

Nitrogen (N)

Plants use Nitrogen to make amino acids and proteins.

Phosphorus (P)

Phosphorus is a source of energy for plant cells.

Potassium (K)

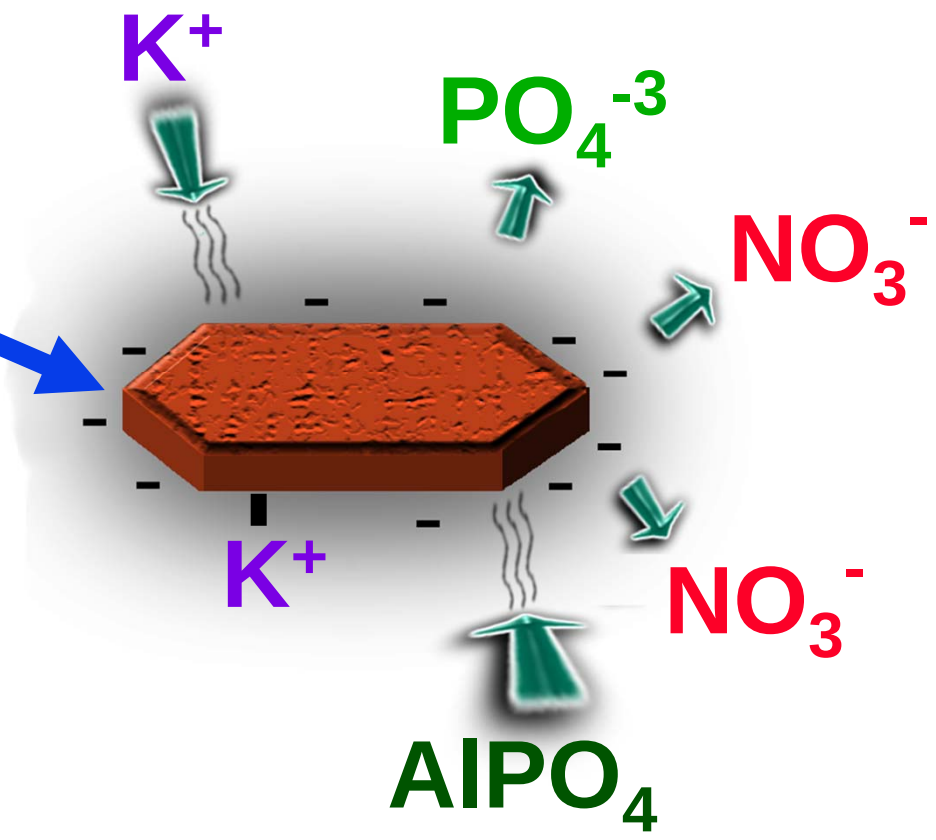
Plants use Potassium to aid in chlorophyll production and other activities

Laboratory Analysis

Soil Fertility Measurements

Soils that have clay particles and organic matter usually have a negative charge.

Soil in low pH (acidic) conditions



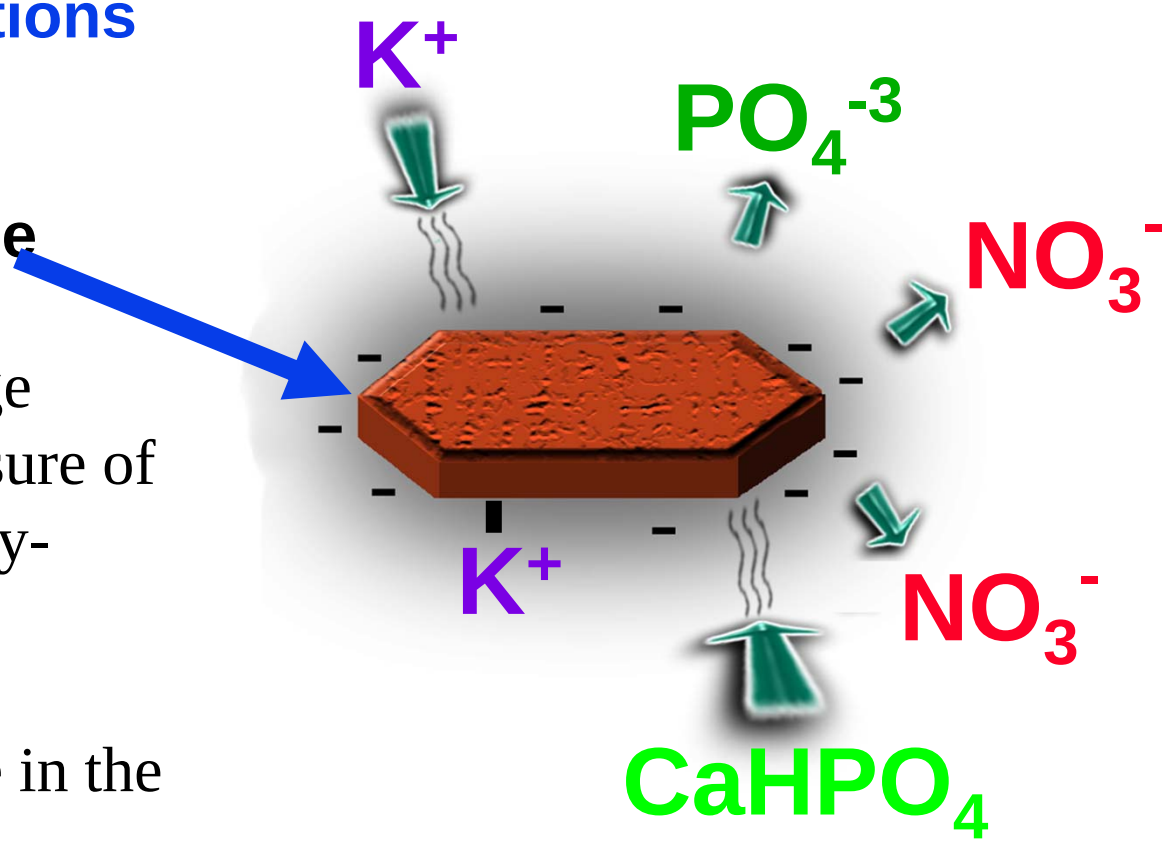
Cations – positively charged particles – will **adsorb** onto clay particles or sometimes organic matter. They can then be made available for plant nutrient uptake.

Laboratory Analysis

Soil Fertility Measurements (continued)

Soils that have clay particles and organic matter usually have a negative charge.

Soil in high pH (basic) conditions



The Cation Exchange Capacity is the measure of how many negatively-charged sites (clay particles or organic matter) are available in the soil.

Part 1: Preparation and Extraction

1. Fill the extraction tube from your Soil Test Kit to the 30 mL line with distilled water.

2. Add 2 Floc-Ex tablets. Cap the tube and mix well until both tablets have disintegrated.

3. Remove the cap and add one heaping spoonful of dry, sieved soil.

4. Cap the tube and shake for one minute.

5. Let the tube stand until the soil settles out (usually about 5 minutes). The clear solution above the soil will be used for the nitrate (N), phosphorus (P), and potassium (K) tests.

Note: For some soils, especially those with a high clay content, there may not be enough clear solution extracted. If more clear solution is needed, repeat steps 1-5.

Part 2: Nitrate Nitrogen (N)

1. Use the pipette to transfer the clear solution above the soil to one of the test tubes in the Soil Test Kit until the tube is filled to the shoulder. (If more solution is needed, repeat Part 1).

2. Add one Nitrate WR CTA Tablet. Be sure that all the pieces of the tablet are added to the test tube and try not to touch the tablet as you place it into the tube. Cap and mix until the tablet disintegrates.

3. Rest the test tube in a cup or beaker. Wait 5 minutes for color to develop. (Do not wait longer than 10 minutes).

4. Compare the pink color of the solution to the Nitrogen Color Chart in the Soil Test Kit. Record your results (High, Medium, Low, or None) on the Soil Fertility Data Work Sheet.

5. Discard the solution and wash the tube and the pipette with distilled water.

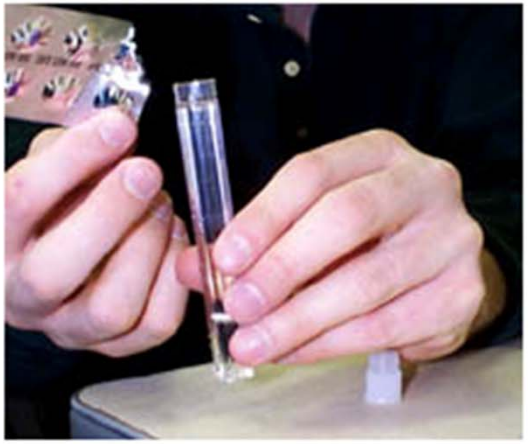
6. Repeat this procedure with the liquid from each of the soil samples. Be sure to rinse the pipette and tube with distilled water after they are used.

Part 3: Phosphorus (P)

1. Use the clean pipette to transfer 25 drops of the clear solution above the soil to a clean test tube. (If more solution is needed, repeat Part 1).

2. Fill the tube to the shoulder with distilled water.

3. Add one Phosphorus Tablet to the tube and cap it. Be sure that all the pieces of the tablet are added to the test tube. Mix until the tablet disintegrates.



4. Rest the test tube in a cup or beaker. Wait 5 minutes (but no more than 10 minutes) for color to develop.

5. Compare the blue color of the solution to Phosphorus on the color chart in the Soil Test Kit. Record your results (High, Medium, Low, or None) on the Soil Fertility Data Worksheet.

6. Discard the solution and wash the tube and the pipette with distilled water.

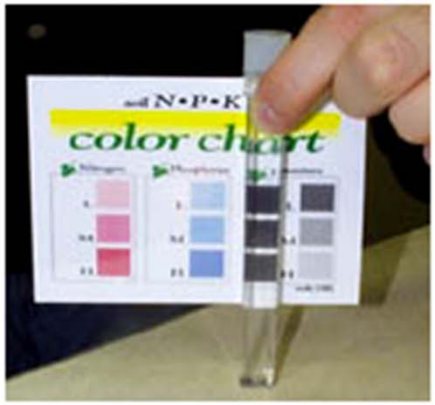
7. Repeat this procedure with the liquid from each of the soil samples. Be sure to rinse the pipette and tube with distilled water after they are used.

Part 4: Potassium (K)

1. Use the clean pipette to transfer the clear solution above the soil to a clean test tube until it is filled to the shoulder. (If more solution is needed, repeat Part 1).

2. Add one Potassium Soil Tablet to the tube. Be sure that all the pieces of the tablet are added to the test tube. Cap and mix until the tablet disintegrates.

3. Hold the tube over the black boxes in the left column of the K portion of the color chart. Look through the "cloudiness" of the solution in the test tube and compare it to the shaded boxes in the right column. Record your results (High, Medium, Low, or None) on the Soil Fertility Data Work Sheet.



4. Discard the solution and wash the tube and the pipette with distilled water.

5. Repeat this procedure with the liquid from each of the soil samples. Be sure to rinse the pipette and tube with distilled water after they are used.