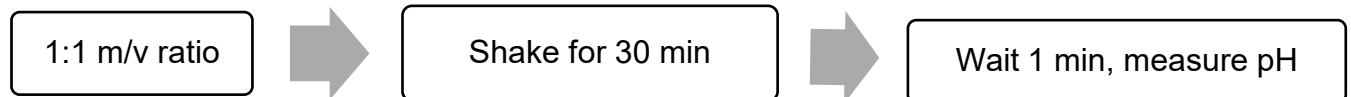


SOP: Soil pH (1:1 in water)

Overview:

This standard operating procedure (SOP) describes a protocol for commonly used to determine the pH of soil. Soils that are air-dried and ground to pass a 2 mm sieve are typically used.



Safety:

All standard safety protocols and online safety training via UIUC [Division of Research Safety \(DRS\)](#) are required.

Instrumentation & Consumables:

Sample preparation

- Analytical balance (two decimal places sensitivity)
- 15 or 50 mL centrifuge tube (depending on scale of samples)
- Horizontal shaker
- Distilled (DI) water or 18.2 MΩ water

Calibration

- pH meter
- 7.00, 4.01, and 10.01 buffer solutions

pH Measurement

- pH meter

Detailed Procedure:

I. Sample Preparation

1. Ensure a 1:1 ratio of air-dried soil : water.
 - i. If there is a large sample mass, measure 20.00 g of air-dried soil into 50 mL centrifuge tube. Record exact weight of soil to at least 1/100th of one gram.

- ii. If there is a small sample mass, measure 2.00 g of air-dried soil into 15 mL centrifuge tube. Record exact weight of soil to at least 1/100th of one gram.

II. Procedure

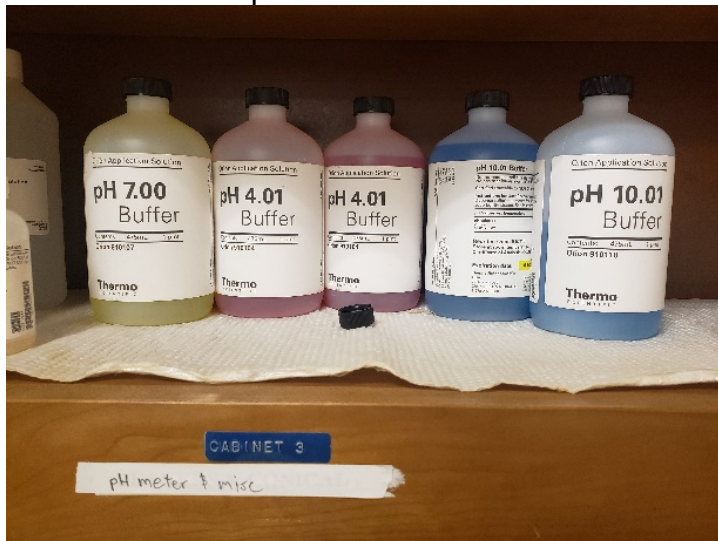
1. Dispense appropriate amount of DI water for 1:1 ratio (20 mL for 20.0 g soil or 2 mL for 2.00 g soil).
2. Place on horizontal shaker for 30 min.
3. Calibrate pH meter with buffers.
 - i. 7.00 (yellow), 4.01 (pink), and 10.01 (blue) buffers can be found in small vials to the right of the pH meter.



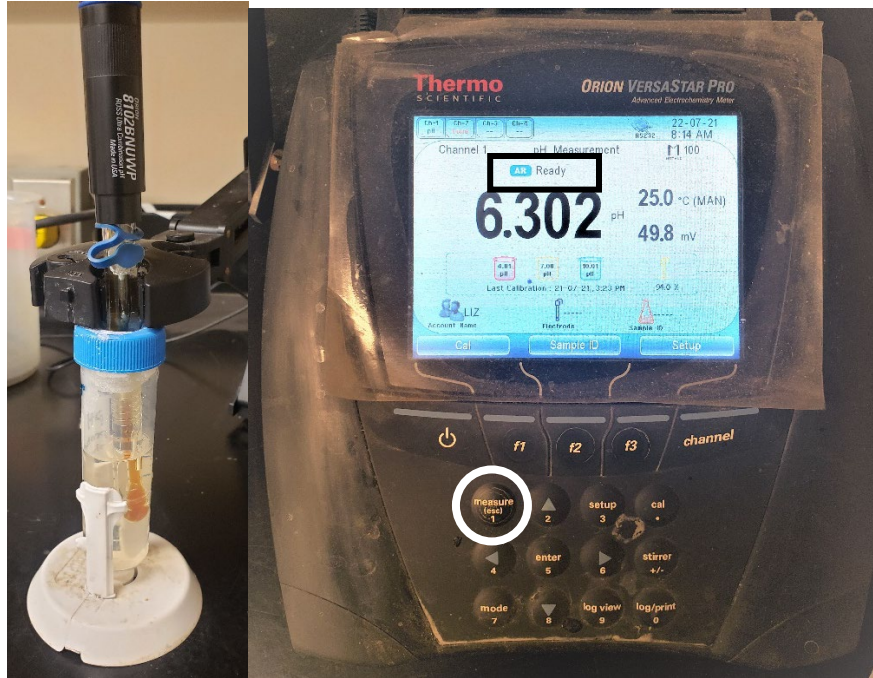
- ii. Should be done in order 7.00, 4.01, 10.01.
- iii. Push cal button on pH meter, place electrode (with hole at the top open) into 7.00 and push start (f3). Wait until the value has settled and reads READY, then press accept (f1) (or override if it is far beyond what it should be, such as 7.1).



- a. If any of the buffers are measuring far off of its intended value, dump it and replace it from the larger buffer solution bottles above the pH meter.



- iv. After all buffers have been used for the calibration, the slope should be $> 96\%$.
- v. If a message appears that the calibration log is full, it will need to be cleared. To clear the calibration log (Admin password: 1993)
 - a. Push F3 to access Setup
 - b. Use arrows to navigate to Log View and push Select
 - c. Use the arrows to navigate to Calibration Log Delete and press Select
 - d. Press F3 to delete
 - e. Press Yes
4. Remove samples from shaker, wait 1 min, rinse electrode with 18.2 M Ω water and place electrode (pictured left) into sample. Press 'measure' and wait for it to stabilize (reads READY) and record value to nearest 0.01 unit.



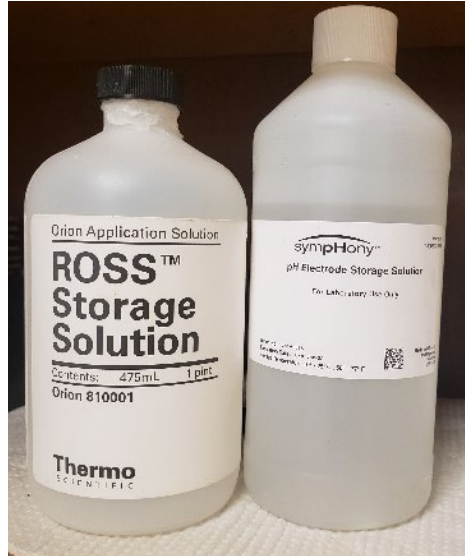
5. Rinse electrode with 18.2 MΩ water and *lightly dap* with KimWipe to dry before placing into the next sample.

III. Clean up

1. Rinse off the pH electrode, place back into Falcon tube with storage solution and cover the hole at the top.
 - i. If the hole is not covered, this solution will evaporate. The pH electrode must be filled with the Reference Electrode Filling Solution (orange) up to the bottom of the hole. To refill, squirt the filling solution into the electrode.



- ii. The Falcon tube must be filled with storage solution (clear) and extra storage solution is located in the cabinet above the pH meter.



2. Discard soil solutions by either placing into a sediment bucket immediately or waiting for soil to settle to then pour the water down the drain (*domestic soil only*) and throw away Falcon tubes or rinse and re-use if needed. Domestic sediment within the bucket can be disposed of in the bins by PSL.

References:

United States Department of Agriculture, Natural Resources Conservation Service. 2004. Soil survey laboratory methods manual. Version No. 4.0. Soil Survey Investigations Report No. 42.

Citation:

SOP: Soil pH. 2021. Soils Lab, University of Illinois Urbana-Champaign. Urbana, IL. Accessed at: <https://margenot.cropsciences.illinois.edu/methods-sops/>

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