Thermo SCIENTIFIC

Print Date: 7/11/2007

Applications Log # 14

Parameter
pH

Sample Type
Soil

Introduction
The pH of soil indicates its alkalinity or acidity strength and thus which crops would be most beneficial in this soil. This measurement can be made by suspending soil in water and measuring pH with the epoxy body Sure-Flow Combination pH electrode.

Result Statistics

# Trials	Average	%CV
5	7.94	+/- 0.03 pH units

Recommended Equipment
3-Star Benchtop pH/ISE meter (Orion 1010117); Epoxy-Body Sure-Flow combination pH electrode (Orion 9165BNWP); ATC probe (Orion 927007MD); Benchtop stirrer (Orion 096019); Electrode stand (Orion 111001)

Required Solutions
pH 4.01, 7.00, and 10.01 Buffers (Orion 910104, 910107 and 910110); Filling Solution (Orion 900011); deionized water (DI).

Solutions Preparation
None required

Meter Setup
Connect the pH electrode, stirrer and ATC probe to the Star Meter. Set measurement mode to pH. In Setup mode of Star Meter, set resolution to 0.01, Buffer Set to USA and read type to continuous. If all steps were followed correctly the meter display will show a number with two decimal places in the top line and "pH" to the right of the top line. The temperature will also be displayed in the top left of the screen.

Electrode Setup
See the electrode manual for preparation of the electrode.

Electrode Performance Check
Check slope at least daily according to the electrode manual. Drift may be checked by comparing a 1-minute to 2-minute reading. Results should agree with desired criteria. See troubleshooting section of manual if slope and/or drift are not acceptable.

Electrode Storage, Soaking, and Rinsing
See electrode manual for storage 1) between measurements, 2) overnight, and 3) for long periods of time. Between measurements, rinse the electrode with DI water and blot dry with lint free tissue before measuring the next sample.

Sample Preservation
None required.

Sample Preparation
Weigh 20g of soil into a beaker. Add 20mL of deionized water to the soil and mix for a 30 minute period. For precise measurements, allow all the standards and the samples to reach the same temperature before analysis.

Calibration
Perform a two point calibration using pH 7.00 and 10.01 buffers as these bracket the expected sample pH. The electrode slope should be between 92 and 102%. Read a fresh portion of buffers to verify calibration. If readings are not acceptable and/or slope is not within range, see troubleshooting section of manual.

Analysis
Rinse electrode, ATC probe and stirrer with DI water and blot dry. Place all probes in sample and measure. The pH value will be displayed. When a stable reading is achieved, the “pH” icon will stop flashing.

Comments
The pH of soil samples can vary greatly depending on the source of the soil. If the pH of the first sample measured is not in the 7.00-10.01 range, it is recommended to re-calibrate the electrode using buffers which will bracket the sample pH.

Quality Control (QC)
Recommended QC procedures include: calibration and calibration verification, sample duplicates, slope, drift and lab control sample.

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Soil Sample	pH
Sample 1	7.96
Sample 2	7.94
Sample 3	7.91
Sample 4	7.98
Sample 5	7.92
Mean	7.94
Standard Deviation	0.03
%CV	0.36