



## Soil Sample Analysis for pH: Methods to Determine Soil pH with the pH100

### Overview

The choice of a proper method to measure pH in soils is a contentious issue. Discussions abound concerning large variations in readings, depending upon the method, while others claim the errors are negligible. Regardless, it is widely accepted that there are three recognized methods of analysis:

### Method 1

pH of Soil Suspension Using 1:1 Soil to Water Ratio-Soil Survey Manual (U.S. Department of Agriculture Handbook No. 18).

- For routine work, add 5 grams of soil and 5 mL of distilled water to a 50 mL beaker and stir vigorously. Allow mixture to stand without agitation for 30 minutes. Stir well immediately before immersing electrodes and measure pH.
- For organic soils, a soil water ratio of 1:5 is recommended with a standing time of 2 hours.

### Method 2

pH of Soil Suspension Using a 1:1 Soil to  $\text{CaCl}_2$  Salt Methods of Soil Analysis Part 2, 2nd Edition (American Society of Agronomy, Inc., Soil Science Society of America, Inc.).

- Add 5 grams of soil and 5 mL of distilled water to a 50 mL beaker and mix thoroughly. Let stand 10 minutes and stir again before measuring the pH in water suspension.
- Add one drop of 1 M  $\text{CaCl}_2$  solution and stir intermittently for 30 minutes.
- Immerse the electrodes and record the soil pH in 0.01 M  $\text{CaCl}_2$ , which is called pHs.
- Lime requirement may be performed directly on this preparation of soil.

### Method 3

pH readings of Saturated Soil Paste (U.S. Department of Agriculture Handbook No. 60).

- Prepare a saturated soil paste by adding distilled water to a sample of soil while stirring with a spatula. The soil-water mixture is consolidated from time to time during the stirring process by tapping the container on the workbench. At saturation, the soil paste glistens as it reflects light, flows slightly when the container is tipped, and slides freely and cleanly off the spatula for all soils except those with a high clay content. After mixing, the sample should be allowed to stand for an hour or more, at which time the criteria for saturation should be rechecked. Free water should not collect on the soil surface nor should the paste stiffen markedly or lose its glistening appearance on standing. If the paste does stiffen or lose its glisten, remix with more water. If the paste is too wet, additional soil may be added.
- Insert the electrodes into the paste and raise and lower repeatedly until a reproducible pH reading is obtained.



YSI pH100 instrument and 112-1 flat tipped electrode.

All three of these methods give repeatable results but each method may give slightly different values for the same soil sample. Due to this difference, the method used should be described when reporting soil pH values.

The YSI pH100 instrument with optional 112-1 flat tipped pH electrode with extremely reliable double-junction electrode is ideal for pH soil analysis. The flat tipped electrode does not become clogged by soil particles and is easily wiped clean.

