



Routine Soil pH

EQUIPMENT

1. Balance
2. LabFit AS-3000 pH robot

REAGENT

1. CaCl₂ (0.01M)
2. Ca(OH)₂ (0.043M)

PROCEDURE

1. Samples are sorted into sets of 40 and the order is double-checked before samples are given a unique lab number and set ID which are entered into the AESL Laboratory Information Management System.
2. Soil sets are placed in a forced air oven (40°C) overnight, ground in a flail mill, and sieved through a 2-mm screen.
3. Using a 20 mL volumetric scoop (~25 g), soil is placed into 40 mL wax paper cups.
 1. Two QC samples are scooped at the beginning of every set.
 2. The 10th and 20th sample in each set are run in duplicate.
4. CaCl₂ solution (20 mL) is added to each sample in a set and placed onto the Labfit pH robot.
 1. While stirring, samples are measured for pH.
 2. 2.7 mL of Ca(OH)₂ are added to each sample, stirred, and allowed to incubate for 30 minutes.
 3. The samples are measured for pH again.

CALCULATION

1. The 0.01 M CaCl₂ pH readings are converted to water equivalent pH readings (which are reported) by adding a factor of 0.6 pH units.
2. Lime recommendations and Lime buffering capacity at equilibrium (LBC_{Eq}):

$$\text{Lime Recommendation} = \text{LBC}_{\text{Eq}} \times (\text{Target pH} - \text{Initial pH}) \times 2 \times 1.5 \times (8/6)$$

The value of LBC_{Eq} depends on the soil's LBC₃₀. Because LBC has units of ppm, "2" is used to convert to lbs/acre. The conversion from ppm to lbs/acre assumes treatment of a 6-inch soil depth. To convert from a 6-inch depth to an 8-inch depth typical for

agronomic crops, the factor of 8/6 is used. The LBC considers pure CaCO_3 so 1.5 is used to determine an amount of agricultural lime that has lower purity.

REFERENCE

Kissel, D. E., Sonon, L. S., and Cabrera, M. L. (2012). Rapid measurement of soil pH buffering capacity. *Soil Sci. Soc. Am. J.* 76, 694–699. doi: 10.2136/sssaj2011.0091

[Determining Lime Requirement Using the Equilibrium Lime Buffer Capacity](#)