1. **SCOPE**

1.1. **Description of Test**

This method describes the determination of the actual lime content of a lime-treated soil using the pH method.

1.2. **Application of Test**

Determinations are based on comparing the pH of a lime-treated soil to the pH of a similar untreated soil at various known percent lime content.

2. **APPARATUS AND MATERIAL**

2.1. **Equipment**

An electronic pH meter.

Drying apparatus - suitable pans and oven for drying the sample.

Disaggregating apparatus - a mortar and rubber covered pestle, mallet or soils grinder.

Sieve - 400 mm sieve.

Containers - 150 ml jars complete with screw top lids.

Balance - a balance sensitive to 0.01 g.

3. **PROCEDURE**

3.1. **Sample Preparation**

Obtain at least a 5.0 kg representative sample of untreated soil similar in grain size distribution to the lime-treated soil for which the actual lime content is to be determined. Please note that the grain size distribution for both the untreated soil and field lime treated soil have to be similar for this lime content determination analysis to be valid.
3.2. **Test Procedure**

Oven dry the untreated soil sample to constant weight at a temperature not exceeding 60°C.

Break up the oven-dried soil sample, either by using a mortar and rubber covered pestle, a mallet or grinder, to the point where the material could be disaggregated without fracturing the individual grains so as to pass the 400 mm sieve.

Weigh out six samples of soil that passed the 400 um sieve each equalling 20 ± 0.1 grams.

Pour the 20 g soil samples into 150 ml bottles equipped with screw top lids.

Weigh out five different amounts of hydrated lime to the nearest 0.01 g such that when added to the 20 g soil sample will represent a lime content of 1, 2, 3, 4 and 5 percent by weight. The extra soil sample is required to represent a lime content of zero percent. Please note that a lime slaking rate test (STP 209-1) should be done on the hydrated lime prior to being weighed out and used to ensure that the lime being used is of suitable quality.

The lime content is defined as follows:

\[
\text{lime content} = \frac{\text{weight of hydrated lime}}{\text{weight of dried soil sample}} \times 100
\]

Add the different amounts of lime weighed out to the soils samples in the plastic bottles. Identify each bottle with the lime content.

Close the screw top lid and shake the bottle vigorously to mix the lime and soil sample thoroughly.

Add 100 ml of distilled water at 25 ± 1°C to each bottle.

Shake the bottles for 30 seconds every ten minutes for one hour.

After one hour, transfer part of the slurried sample to a beaker.

Measure the pH of the slurried samples using the electronic pH meter.

Record the pH for each lab lime-treated slurry sample.
Plot a graph showing the pH of the lab lime-treated slurry samples along the vertical axis versus the lime content in percent along the horizontal axis.

Obtain approximately a 0.5 kg representative sample of field lime-treated soil for which the actual lime content is to be determined. Please note that the grain size distribution of the field lime-treated soil sample should be similar to the untreated soil sample for this analysis to be valid.

Prepare the field lime-treated soil sample by drying, pulverizing and disaggregating so as to pass the 400 um sieve as was described previously for the untreated soil sample.

Weigh out one sample of field lime-treated soil that passes the 400 mm sieve equalling 20 ± 0.1 grams.

Pour the 20 g sample of field lime-treated soil in a 150 ml plastic bottle.

Add 100 ml of distilled water at 25° ± 1° C to the lime-treated soil sample.

Close lid and shake the bottle for 30 seconds every ten minutes for one hour.

After one hour, transfer part of the slurried sample into a beaker.

Measure the pH of the slurry sample using the pH meter.

Record the pH of the field lime-treated slurry sample.

Use pH of the field lime-treated slurry sample together with the graph showing pH of lab lime-treated slurry samples at various lime contents to determine actual lime content of field lime-treated soil sample.

4. ADDITIONAL INFORMATION

4.1. Fixation Point

The minimum percent lime content to result in the lime-treated soil to have a pH of 12.4 is deemed as the fixation point (ie the addition of extra lime will have limited effect in reducing the plasticity index of the material).

4.2. Reference

"A Quick Test to Determine Lime Requirements for Lime Stabilization" by James L. Eades and Ralph E. Grim.
APPROVAL SHEET

New _ Revision _X_ Date of Previous Document 89-06-27
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- Format of test procedure updated.

Review/Implementation Process:
- Reviewed by the Materials Section of the Technical Standards and Policies Branch.

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_Nil_

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Prepared and Recommended by D. MacLeod 92-05-15
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