



Designation: C 400 – 98

## Standard Test Methods for Quicklime and Hydrated Lime for Neutralization of Waste Acid<sup>1</sup>

This standard is issued under the fixed designation C 400; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the testing of quicklime and hydrated lime for use in the treatment of waste acid solutions and includes the characterization of the liming material and of the acid waste.

NOTE 1—When agreed upon by the manufacturer and the purchaser, this method may be used directly to evaluate the lime requirement for a plant waste acid and in the preparation of the lime slurry; the pH, the time, temperature, and other conditions of treatment may be adjusted to conform to plant practice. Otherwise the test shall be performed as described in this method.

NOTE 2—Under some conditions of test the lime requirement may vary substantially from that indicated by ultimate chemical analysis or by the use of a determination of available alkalinity by titration to a stoichiometric end point.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

- 2.1 *ASTM Standards:*<sup>2</sup>
- C 50 Methods of Sampling, Inspection, Packing, and Marking of Lime and Limestone Products<sup>2</sup>
  - E 70 Test Method for pH of Aqueous Solutions with the Glass Electrode<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *neutralization coefficient*—the number of parts of lime required to neutralize one million parts by weight of sulfuric acid solution (1.5 %) to a pH of 4.4 in 30 min (see Note 1).

3.1.2 *pH*—a measure of the hydrogen ion concentration of a sample and representing the logarithm of the reciprocal (negative logarithm) of the activity of hydrogen ions, calculated as follows:

$$\text{pH} = \log \frac{1}{(\text{H})^+} = -\log(\text{H}^+)$$

where:

$\text{H}^+$  = activity of hydrogen ions.

### 4. Significance and Use

4.1 Since all limes and waste acid solutions are different, this test method evaluates the relative quantity of a given lime needed for the neutralization of a specific quantity of acid.

4.2 Liming materials have a specific basicity factor or measure of alkalinity which can be used for comparing their relative neutralizing power. It avoids dependence on chemical analysis and is determined as grams of calcium oxide equivalents per kilogram of liming material.

4.3 Likewise, specific waste acids have an acid value that can be expressed as grams of hydrochloric acid equivalent per litre of acid waste. This value is related on a stoichiometric basis to lime neutralization requirements of a liquid acid waste.

### 5. Apparatus

5.1 *pH Measuring Apparatus*, conforming to the requirements of Section 5, Apparatus, and Section 6, Reagents and Materials, of Test Method E 70. A time-pH recording device or attachment is desirable but not required.

5.2 *Analytical Balance*, capable of reproducing results within 0.005 g.

5.3 *Stirrer*, motorized, capable of rotating at speeds from 120 to 600 r/min.

5.4 *Miscellaneous Equipment*—Chemically resistant glassware,<sup>4</sup> metal stands for support of the equipment, etc.

### 6. Purity of Reagents

6.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee C-7 on Lime and are the direct responsibility of Subcommittee C07.05 on Chemical Tests.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 15.05.

<sup>4</sup> Borosilicate glass has been found satisfactory for this purpose.