



Standard Test Method for Rapid Determination of Carbonate Content of Soils¹

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1. Scope *

1.1 This test method covers the determination of carbonate content of soils and soft rock which can be readily broken down by mechanical effort. It is a gasometric method that utilizes a simple portable apparatus. Results should be clearly stated as the calcite equivalent in percent because different carbonate species cover a wide range of percent calcite equivalent as shown below for a number of carbonates:

Species	Cation	Calcite Equivalent, %
Magnesite	Mg	117.0
Dolomite	Ca, Mg	108.6
Calcite	Ca	100.0
Aragonite	Ca	100.0
Rhodocrosite	Mn	87.1
Siderite	Fe	86.4
Smithsonite	Zn	79.8
Witherite	Ba	50.7
Cerrusite	Pb	37.5

For example, a 100 % dolomite would be expected to yield 108.6 % calcite equivalent while 100 % siderite would yield only 86.4 % calcite equivalent. Calcite and aragonite reactions will typically complete within about 10 min. This method does not distinguish between the carbonate species and such determination must be made using quantitative chemical analysis methods such as atomic absorption.

1.2 The values stated in SI units are to be regarded as the standard.

1.3 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D 6026.

1.4 The method used to specify how data are collected, calculated, or recorded in this standard is not directly related to the accuracy to which the data can be applied in design or other uses, or both. How one applies the results obtained using this standard is beyond its scope.

1.5 *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 applica-*

bility of regulatory limitations prior to use. For specific precaution statements, see Section 8.

2. Referenced Documents

2.1 ASTM Standards:

- C 25 Methods for Chemical Analysis of Limestone, Quicklime and Hydrated Lime²
- D 653 Terminology Relating to Soil, Rock, and Contained Fluids³
- D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction³
- D 4753 Specification for Evaluating, Selecting and Specifying Balances and Scales for Use in Soil, Rock and Construction Materials Testing³
- D 6026 Practice for Using Significant Digits in Calculating and Reporting Geotechnical Test Data⁴
- E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens⁵

3. Terminology

3.1 For definitions of terms used in this standard see Terminology D 653.

4. Summary of Test Method

4.1 The carbonate content (calcite equivalent) of soil is determined by treating a 1-g dried soil specimen with hydrochloric acid (HCl) in an enclosed reaction cylinder (reactor). Carbon dioxide (CO₂) gas is evolved during the reaction between the acid and carbonate fraction of the specimen. The resulting pressure generated in the closed reactor is proportional (see Fig. 1) to the calcite equivalent of the specimen. This pressure is measured with a suitable pressure gauge, or equivalent pressure-measuring device, that is pre-calibrated with reagent grade calcium carbonate.

5. Significance and Use

5.1 This test method is used to determine the presence and quantity of carbonate in a soil specimen in terms of the calcite equivalent. The method is generally intended for use as an

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² Annual Book of ASTM Standards, Vol 04.01.

³ Annual Book of ASTM Standards, Vol 04.08.

⁴ Annual Book of ASTM Standards, Vol 04.09.

⁵ Annual Book of ASTM Standards, Vol 14.04.

*A Summary of Changes section appears at the end of this standard.