



Standard Test Method for X-ray Spectrometric Analysis of Lime and Limestone¹

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1. Scope

1.1 This test method covers the X-ray emission spectrometric analysis of limestone, quicklime, hydrated lime, and hydraulic lime using wavelength dispersive instruments.

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

1.3 *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.* Specific precautionary statements are given in Section 10.

2. Referenced Documents

2.1 ASTM Standards:

C 25 Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime²

C 50 Methods for Sampling, Inspection, Packing, and Marking of Lime and Limestone Products²

C 51 Terminology Relating to Lime and Limestone (As Used by the Industry)²

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals³

E 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials³

E 305 Practice for Establishing and Controlling Spectrochemical Analytical Curves³

E 456 Terminology Relating to Quality and Statistics⁴

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴

E 1060 Practice for Interlaboratory Testing of Spectrochemical Methods of Analysis⁵

E 1361 Guide for Correction of Interelement Effects in X-Ray Spectrometric Analysis⁵

2.2 NIST Documents:⁶

ANSI-NIST Handbook 114

NIST Standards Catalog

3. Terminology

3.1 Definitions:

3.1.1 *emission spectroscopy*—unless otherwise specified, for definitions of terms used in this test method pertaining to emission spectroscopy, refer to Terminology E 135.

3.1.2 *lime*—unless otherwise specified, for definitions of terms used in this test method pertaining to lime, refer to Terminology C 51.

3.1.3 *statistical*—unless otherwise specified, for definitions of terms used in this test method pertaining to statistics, refer to Terminology E 456.

4. Summary of Test Method

4.1 A briquetted powder specimen or a fused-glass disk specimen is irradiated by a high-energy X-ray beam. The secondary X rays produced are dispersed by means of crystals, and the intensities are measured by suitable detectors at selected wavelengths. Data are collected based on the time required to reach a fixed number of counts, total count for a fixed time, or integration of voltage for a fixed time. Concentrations of the elements are determined by relating the measured radiation of unknown specimens to analytical curves prepared from reference materials of known composition.

5. Significance and Use

5.1 This procedure is suitable for manufacturing control and verifying that the product meets specifications. It provides rapid, multi-element determinations with sufficient accuracy to ensure product quality and minimize production delays. The analytical performance data included may be used as a benchmark to determine whether similar X-ray spectrometers provide equivalent precision and accuracy, or whether the performance of a particular X-ray spectrometer has changed.

6. Interferences

6.1 Interelement effects or matrix effects may exist for some of the elements listed. One way to compensate for these effects is to prepare a series of calibration curves to cover the

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² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 03.05.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ *Annual Book of ASTM Standards*, Vol 03.06.

⁶ Available from National Institute for Standards and Technology (NIST), Gaithersburg, MD 20899.