



Designation: D 1756 – 96 (Reapproved 2000)

## Standard Test Method for Determination as Carbon Dioxide of Carbonate Carbon in Coal<sup>1</sup>

This standard is issued under the fixed designation D 1756; 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 determination of carbon dioxide in coal in any form, such as mineral carbonate, from which carbon dioxide is released by action of mineral acids. It applies to high-carbonate and low-carbonate coals.

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.*

### 2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water<sup>2</sup>

D 2013 Method of Preparing Coal Samples for Analysis<sup>3</sup>

D 2234 Practice for Collection of a Gross Sample of Coal<sup>3</sup>

### 3. Summary of Test Method

3.1 The determination of carbon dioxide is made by decomposing with acid a weighed quantity of the sample in a closed system and absorbing the carbon dioxide in an absorbent. The increase in weight of the absorbent is a measure of the carbon dioxide in the sample used.

### 4. Significance and Use

4.1 Small amounts of mineral carbonates occur in many coals and comparatively large amounts in some coals. The determination of these carbonates is the purpose of this test method. The value found for carbon dioxide is used to estimate the mineral matter content, particularly  $\text{CaCO}_3$  and  $\text{MgCO}_3$ , of high-carbonate coals.

### 5. Apparatus (see Fig. 1)

5.1 The use of apparatus modified from that shown in Fig.

1 shall be considered permissible so long as results agree within the accepted precision.<sup>4</sup>

5.2 *Air-Purifying Train*, consisting of the following units arranged in the order of passage of air: Any convenient form of flow meter (1) connected to a carbon dioxide absorber (2) filled with an acceptable absorbent. The absorber (2) shall be connected to a trap (3).

5.3 *Reaction Unit*, consisting of a 300-mL wide-mouth flask (5) fitted with a three-hole rubber stopper. One hole is to accommodate a 60-mL open-end separatory funnel (4) extending almost to the bottom of the flask (5). The second hole in the stopper is used to connect the purifying train through the trap (3); the tip of the glass tubing shall extend almost to the bottom of flask (5). The third hole of the stopper shall be fitted to a water-cooled condenser (6).

5.4 *Absorption Unit*, consisting of a water absorber (7) filled with an acceptable desiccant connected to the condenser (6) on the one side and on the other side to absorber (8) containing anhydrous copper sulfate on pumice or granular silver sulfate. The carbon dioxide absorber (9) shall be connected to absorber (8) and to another water absorber (10). The absorber (10) shall be connected to a T-piece stopcock (11) which in turn shall be attached to a filter-flask (12). The system shall be aspirated by a water pump (13).

### 6. Purity of Reagents

6.1 *Purity of Reagents*—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 specifications are available.<sup>5</sup> Other grades may be used, provided it is first ascertained that the reagent is of

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.21 on Methods of Analysis.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 11.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 05.06.

<sup>4</sup> For further information regarding this determination, see Krumin, P. O., "The Meigs Creek No. 9 Coal Bed in Ohio, Part III—Further Study of the Chemical and Physical Properties, and Washability Characteristics, with a Brief Review of New Methods Employed," *Bulletin No. 165*, Ohio State University, Engineering Experiment Station, (1957), pp. 38-46; and Krumin, P. O., and Svanks, K., "Four Methods of Determination of Carbon Dioxide in Solid Fuels," *ASTM Bulletin*, No. 227, January 1958, pp. 51-57.

<sup>5</sup> Reagent Chemicals, American Chemical Society Specifications," Am. Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.