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Standard Test Method for Moisture in the Analysis Sample of Coal and Coke[1]

This standard is issued under the fixed designation D3173; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of moisture in the analysis sample of coal or coke. It is used for calculating other analytical results to a dry basis. When used in conjunction with the air drying loss as determined in accordance with Method D2013 or Practice D346, each analytical result can be calculated to an as-received basis:

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:*[2]

D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis
D2013 Practice for Preparing Coal Samples for Analysis
D3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases
D3302 Test Method for Total Moisture in Coal

3. Summary of Test Method

3.1 Moisture is determined by establishing the loss in weight of the sample when heated under rigidly controlled conditions of temperature, time and atmosphere, sample weight, and equipment specifications.

4. Significance and Use

4.1 Moisture as determined by this test method is used for calculating other analytical results to a moisture free basis using procedures in Practice D3180. Moisture percent determined by this test method may be used in conjunction with the air-dry moisture loss determined in Method D2013 and Test Method D3302 to determine total moisture in coal. Total moisture is used for calculating other analytical results to "as received" basis using Practice D3180. Moisture, ash, volatile matter, and fixed carbon percents constitute the proximate analysis of coal and coke.

5. Analysis Sample

5.1 The analysis sample is that sample which has been pulverized to pass 250-μm (No. 60) sieve as prepared in accordance with Practice D346 or Method D2013.

6. Apparatus

6.1 *Drying Oven*, for coal samples:

6.1.1 For determining the moisture of coal, the oven shall be so constructed as to have a uniform temperature in all parts, have a minimum of air space, and be capable of temperature regulation between the limits of 104 and 110°C. It may be of the form shown in Fig. 1. Provision shall be made for renewing the preheated air in the oven at the rate of two to four times a minute, with the air dried as defined in 7.1.

6.1.2 In the oven shown in Fig. 1, the door should contain a hole of approximately 3.2 mm (⅛ in.) in diameter near the bottom to permit a free flow of air through the oven space.

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[1] 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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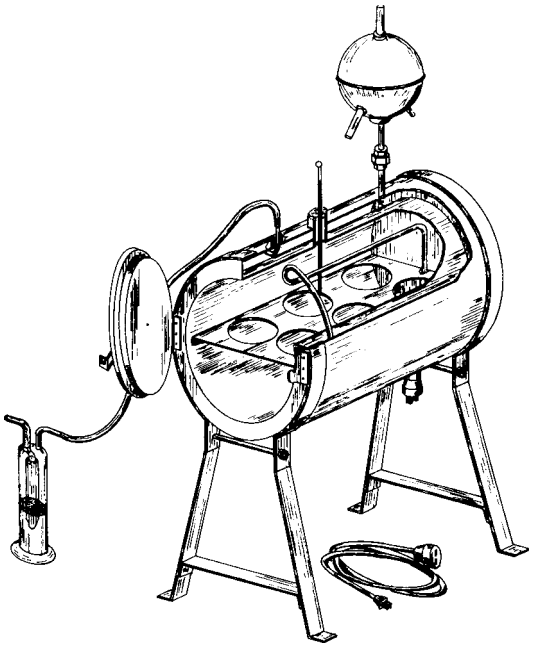
~~[2] An interlaboratory study, designed consistent with Practice E691, was conducted in 1995. Twelve labs participated. Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D05-1020.~~

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



NOTE 1—Details in U.S. Bureau of Mines Bulletin No. 492, 1951, p 6.

FIG. 1 Moisture Oven

6.2 *Drying Oven*, for coke samples. For determining the moisture of coke, an ordinary drying oven with openings for natural air circulation and capable of temperature regulation between limits of 104 and 110°C may be used.

6.3 *Capsules*, with covers. A convenient form, which allows the ash determination to be made on the same sample, is a porcelain capsule, 22 mm (⅞ in.) in depth and 44 mm (1¾ in.) in diameter, or a fused silica capsule of similar shape. These capsules shall be used with a well-fitting flat aluminum cover, illustrated in Fig. 2. Platinum crucibles or glass capsules with ground-glass caps may also be used. They should be as shallow as possible, consistent with convenient handling.

7. Reagents

7.1 *Dry Air*—Air used to purge the drying oven should be dried to a moisture content of 1.9 mg/L or less. (Dew point – 10°C or less.) Any desiccant or drying method capable of achieving this degree of dryness is suitable.

7.2 *Desiccants*—Materials suitable for use in the desiccator may be chosen from the following:

7.2.1 *Anhydrous Calcium Sulfate* (0.004 mg/L).

7.2.2 *Silica Gel*.

7.2.3 *Magnesium Perchlorate* (0.0005 mg/L).

7.2.4 *Sulfuric Acid, Concentrated* (0.003 mg/L).

7.2.5 The desiccant must be kept fresh enough to assure that the air in the desiccator is dry as defined in 7.1. Values in parentheses ( ) are literature values for the residual amount of moisture in air at equilibrium with these desiccants. (**Warning**: Sulfuric acid is corrosive and can cause severe damage to eyes, skin, and clothing. Magnesium perchlorate is a strong oxidant and can react violently with organic materials.)

8. Procedure for Sample Passing a 250-µm (No. 60) Sieve

8.1 Heat the empty capsules under the conditions at which the sample is to be dried, place the stopper or cover on the capsule, cool over a desiccant for 15 to 30 min, and weigh. Dip out with a spoon or spatula from the sample bottle approximately 1 g of the sample. Put this quickly into the capsule, close, and weigh at once to the nearest ±0.1 mg.

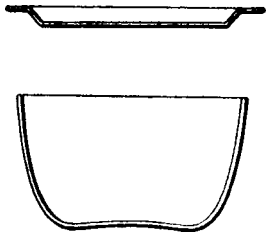


FIG. 2 Capsule for Use in Determining Moisture