Designation: D2866 – 11

Standard Test Method for Total Ash Content of Activated Carbon[1]

This standard is issued under the fixed designation D2866; 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 describes a procedure for the determination of total ash content of activated carbon.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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 deterrmine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D2867 Test Methods for Moisture in Activated Carbon

D7582 Test Methods for Proximate Analysis of Coal and Coke by Macro Thermogravimetric Analysis

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Summary of Test Method

3.1 An accurately weighed sample of dried activated carbon is placed in a controlled-temperature muffle furnace for a period of several hours. When constant weight has been achieved (±0.5 mg), the crucible is cooled to ambient temperature in a desiccator and reweighed. The weight of the ashed carbon is expressed as a percentage of the weight of the original carbon sample.

4. Significance and Use

4.1 In specific end uses, the amount and composition of the ash may influence the capabilities and certain desired properties of activated carbon.

4.2 Other automated methods for determination of ash content, such as combusting the carbon in a thermogravimetric analyzer (TGA) in flowing air or oxygen, can be used in place of this test method. A suitable method is described in Test Method D7582. For determination of the ash content of activated carbon, follow the procedure in 13.5.3 of Test Method D7582 with the exception that the furnace temperature in 13.4.3 shall be 650 ±25°C. The muffle furnace method shall be considered the reference test method.

5. Apparatus

5.1 *Muffle Furnace*, having air circulation, capable of temperature regulation of ±25°C at 650°C.

5.2 *High-Temperature Crucible*, high-form.

5.3 *Analytical Balance*, having a sensitivity of 0.1 mg.

5.4 *Desiccator*.

5.5 *Oven*, forced-air circulation, capable of temperature regulation between 145 and 155°C.

6. Procedure

6.1 Ignite the crucible in the muffle furnace at 650 ± 25°C for 1 h. Place the crucible in the desiccator. Cool to room temperature and weigh to the nearest 0.1 mg.

6.2 Dry an adequate sample of activated carbon to constant weight (±0.5 mg) at 150 ±5°C (3 h is usually sufficient).

NOTE 1—Some carbons can ignite spontaneously at 150°C. In this case, moist carbon should be used with a correction for moisture (in accordance with Methods D2867) applied in the calculations. In this case, the ashing should be started in a cold muffle furnace.

6.3 Weigh out to the nearest 0.1 mg sufficient dried activated carbon, so that the estimated amount of ash will be 0.1 g, into the ignited crucible and place the crucible in the furnace at 650 ± 25°C. Ashing will require from 3 to 16 h, depending on the size and type of activated carbon. Ashing can be considered complete when constant weight (±0.5 mg) is achieved.

6.4 Place the crucible in the desiccator and allow to cool to room temperature. After the sample has cooled in the desiccator, admit air slowly to avoid loss of ash from the crucible. Weigh to the nearest 0.1 mg.

7. Calculation

7.1 Calculate the ash content as follows:

$$\text{Total ash, \%} = [(D - B)/(C - B)] \times 100 \quad (1)$$

[1] This test method is under the jurisdiction of ASTM Committee D28 on Activated Carbon and is the direct responsibility of Subcommittee D28.04 on Gas Phase Evaluation Tests.

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[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.

TABLE 1 Precision

Material	A	B	C
Average Test Value	7.74	1.88	4.61
95 % Repeatability Limit[A] (Within Laboratory)	0.27	0.22	0.22
95 % Reproducibility Limit[A] (Between Laboratories)	0.41	0.54	0.48

[A] The terms *repeatability limit* and *reproducibility limit* are used in accordance with Practice E177. The respective standard deviations among test results may be obtained by dividing the above limit values by 2.8.

where:

B = weight of crucible, g,
C = weight of crucible plus original sample, g, and
D = weight of crucible plus ashed sample, g.

8. Precision and Bias [3]

8.1 *Precision*:

8.1.1 *Interlaboratory Test Program*—An interlaboratory study was run in which representative samples of three types of activated carbon (coconut-shell based (*A*), coal-based (*B*), and wood-based (*C*)) were tested for ash content by six laboratories with each laboratory making three observations of each activated carbon type over three days. Practice E691 was followed for the design and analysis of the data.

8.1.2 *Test Result*—The precision information given in Table 1 in units of measurement (percent minus weight ash content) is for the comparison of two test results, each of which is the average of three test determinations.

[3] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting RR: RR:D28-1004.