

Copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, USA. Distributed under ASTM license agreement by China National Institute of Standardization(CNIS)-Tel:86 10 58811350

Designation: D2866 – 11

# Standard Test Method for Total Ash Content of Activated Carbon<sup>1</sup>

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 ( $\varepsilon$ ) 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 determine the applicability of regulatory limitations prior to use.

# 2. Referenced Documents

## 2.1 ASTM Standards:<sup>2</sup>

- 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 ( $\pm 0.5$  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  $\pm$ 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  $\pm 25^{\circ}$ 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  $650 \pm 25^{\circ}$ 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 ( $\pm 0.5$  mg) at 150  $\pm 5^{\circ}$ C (3 h is usually sufficient).

NOTE 1—Some carbons can ignite spontaneously at  $150^{\circ}$ 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  $\pm$  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 ( $\pm$ 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:

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

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

<sup>&</sup>lt;sup>1</sup> 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.

Current edition approved May 1, 2011. Published June 2011.. Originally approved in 1970. Last previous edition approved in 2004 as D2866-94 (2004). DOI: 10.1520/D2866-11.

<sup>&</sup>lt;sup>2</sup> 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.

	D2866	- 11
--	-------	------

TABL	E 1 Precisio	n	
Material	А	В	С
Average Test Value 95 % Repeatability Limit <sup>4</sup> (Within Laboratory)	7.74 0.27	1.88 0.22	4.61 0.22
95 % Reproducibility Limit <sup>A</sup> (Between Laboratories)	0.41	0.54	0.48

<sup>A</sup> 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<sup>3</sup>

8.1 Precision:

<sup>3</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting RR: RR:D28-1004.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/ COPYRIGHT/).

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.