Designation: D 5832 – 98 (Reapproved 2003)

Standard Test Method for Volatile Matter Content of Activated Carbon Samples[1]

This standard is issued under the fixed designation D 5832; 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 the percentage of gaseous products, exclusive of moisture vapor, present in virgin and used activated carbons which are released under specific conditions of the test.

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:*

D 2652 Terminology Relating to Activated Carbon[2]

D 2867 Test Method for Moisture in Activated Carbon[2]

D 3175 Test Method for Volatile Matter in the Analysis Sample of Coal and Coke[3]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method relating to activated carbon, refer to Terminology D 2652.

4. Summary of Test Method

4.1 Volatile matter is determined by establishing the loss in mass resulting from heating an activated carbon sample under rigidly controlled conditions. The measured mass loss, corrected for moisture as determined in Test Method D 2867, establishes the volatile matter content of the activated carbon sample.

5. Significance and Use

5.1 Volatile matter, when determined as herein described, may be used as a relative measure of the extent of carbonization in an activated carbon and the extent of loading of volatile material on an activated carbon that has been used in an adsorption application.

5.2 Combined with other information, the volatile matter of an activated carbon may be useful in evaluating its performance in an adsorption application.

5.3 Other automated methods for the determination of the volatile content of solids, such as using a thermogravimetric analyzer (TGA), can be used in place of this test method with equally reliable results.

6. Apparatus

6.1 *Crucible and Cover*, high temperature porcelain, high form, 30 cc capacity.

6.2 *Oven*, forced-air circulation, capable of temperature regulation up to 250°C.

6.3 *Moisture Determination Apparatus*, as described in Test Method D 2867.

6.4 *Muffle Furnace*, gravity circulation, capable of temperature regulation at 950 ± 25°C. An electric furnace similar to the one described in Test Method D 3175 is suitable for use in this test method.

6.5 *Desiccator*, glass with indicating type desiccant.

6.6 *Balance*, analytical, capable of 0.1 mg sensitivity.

7. Hazards

7.1 The furnace used in this test method should be located in a well ventilated area to eliminate exposure to possible toxic vapors that may evolve from the carbon sample during the high temperature heating.

7.2 Exercise care when working with the high temperature furnace to eliminate the possibility of burns.

8. Procedure

8.1 Determine the moisture content of an as-received representative portion of the sample using the Xylene-Extraction Test Method described in D 2867. If the as-received sample is wet, drain it of all free liquid before the representative sample is taken.

8.2 Weigh to 0.1 mg accuracy a crucible and cover that have been ignited in a muffle furnace regulated at 950°C for 30 min and cooled in a desiccator. Record the weight.

8.3 Using a spoon or spatula, dip from the sample bottle approximately 1 g of the as-received sample and place it in the pre-dried and tared crucible. Cover it with a lid and immediately weigh it to the nearest 0.1 mg.

---

[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.

Current edition approved March 10, 2003. Published July 2003. Originally approved in 1995. Last previous edition approved in 1998 as D 5832 – 98.

[2] *Annual Book of ASTM Standards*, Vol 15.01.

[3] *Annual Book of ASTM Standards*, Vol 05.05.

8.4 Place the covered crucible in the muffle furnace regulated at 950 ± 25°C for 7 min ± 10 s.

8.5 Remove the covered crucible from the muffle furnace and cool to room temperature in a desiccator.

8.6 Weigh the covered crucible to the nearest 0.1 mg. Record the weight.

9. Calculation

9.1 Calculate the weight loss percent as follows:

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

where:

B = mass of crucible and cover, g,
C = mass of crucible, cover, and sample, g, and
D = mass of crucible, cover, and de-volatilized sample, g.

9.2 Calculate the volatile matter content of the sample as follows:

$$VM, \% = E - F \quad (2)$$

where:

VM = volatile matter content of as-received sample, %,
E = weight loss, % (as defined in 9.1), and
F = moisture, % (as measured in 8.1).

10. Precision and Bias

10.1 An interlaboratory study of this test method was conducted in 1996. Each of seven laboratories tested three randomly drawn specimens from each of three different activated carbons containing volatile matter content. Carbon A was a coconut shell gas phase carbon containing gasoline vapors. Carbon B was a coal based liquid phase carbon containing organic components from gasoline. Carbon C was a coconut shell vapor phase carbon containing chlorinated organic compounds. The average volatile matter contents were 24.7 %, 9.1 % and 12.9 %, respectively. In order to determine the volatile matter content of the samples, their moisture contents were determined according to Test Method D 2867 and were found to be 3.54 %, 35.2 % and 3.87 %, respectively. Practice E 691 and E 691 computer software were used to design the study and analyze the resulting data.

10.2 *95 % Limit on Repeatability (Within Laboratory), %*:

	Activated Carbon		
	A	B	C
Voltatile Matter Content, %	1.38	0.63	0.44

10.3 *95 % Limit on Reprodicibility (Between Laboratories), %*:

	Activated Carbon		
	A	B	C
Volatile Matter Content, %	1.54	1.32	1.47

NOTE 1—The terms “limit on repeatability” and “limit on reproducibility” are used as specified in Practice E 177.

11. Keywords

11.1 activated carbon; volatile matter