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Standard Test Methods for Volatile Loss From Plastics Using Activated Carbon Methods[1]

This standard is issued under the fixed designation D1203; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 These test methods cover the determination of volatile loss from a plastic material under defined conditions of time and temperature, using activated carbon as the immersion medium.

1.2 Two test methods are covered as follows:

1.2.1 *Test Method A, Direct Contact with Activated Carbon*—In this test method the plastic material is in direct contact with the carbon. This test method is particularly useful in the rapid comparison of a large number of plastic specimens.

1.2.2 *Test Method B, Wire Cage*—This test method prescribes the use of a wire cage, which prevents direct contact between the plastic material and the carbon. By eliminating the direct contact, the migration of the volatile components to the surrounding carbon is minimized and loss by volatilization is more specifically measured.

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *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.*

NOTE 1—This standard is similar in content (not technically equivalent) to ISO ~~176-1976~~176~~(E)~~.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

E197 Specification for Enclosures and Servicing Units for Tests Above and Below Room Temperature[3]

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

2.2 *Other Documents:*

~~ISO 176-1976~~ISO 176 Determination of the Loss of Plasticizers from Plastics by the Activated Carbon Method[4]

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminologies D883 and D1600 unless otherwise indicated.

4. Significance and Use

4.1 The test methods are intended to be rapid empirical tests which ~~may~~have been found to be useful in the relative comparison of materials having the same nominal thickness.

NOTE 2—When the plastic material contains plasticizer, loss from the plastic is assumed to be primarily plasticizer. The effect of moisture is considered to be negligible.

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[1] These test methods are under the jurisdiction of ASTM Committee D20 on Plastics and are the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials (Section D20.15.11 on Plasticizers).

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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.

[3] Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

***A Summary of Changes section appears at the end of this standard.**

4.2 Correlation with ultimate application for various plastic materials ~~should~~shall be determined by the user. To obtain accelerated tests that more nearly approach actual service conditions, ~~reference should be made~~refer to Specification E197.

5. Apparatus

5.1 *Balance*—An accurate analytical balance, equipped with Class S weights or better.

5.2 *Oven or Bath*—A thermostatically controlled oven or bath capable of maintaining the temperature to within ±1°C of the test temperature, which normally will be in the range from 50 to 150°C.

5.3 *Containers*—Metal cans or wide-mouth screw-top jars, of cylindrical form, approximately 100 mm in diameter and approximately ½ L in capacity.

NOTE 3—Pint paint cans work well.

5.4 *Micrometer*—A micrometer capable of measuring to the nearest 0.0025 mm for measuring the thickness of the test specimens.

5.5 *Metal Cages (for Test Method B)*—Wire cages constructed from approximately 30-mesh bronze gauze, in cylindrical form, having a diameter of 60 mm and a height of 6 mm, formed by soldering a strip of gauze at right angles to the periphery of a disk of bronze gauze. One of the bases acts as a lid.

5.6 *150 mL Beaker* graduated in 10 mL intervals.

6. Material

6.1 *Activated Carbon, 6/14 Mesh* —It has been found that different types and grades of activated carbon give differing results, thus making it necessary for the purchaser and the seller to agree on the same type and grade in order to obtain concordant results. Care ~~should~~shall be taken that an airtight storage container is used for the activated carbon and that fresh material is used for each ~~test, unless it can be shown that reuse does not affect the results.~~test. The activated carbon shall be screened through a 14-mesh screen immediately prior to use to eliminate fines.

7. Test Specimens

7.1 The test specimens shall be 50 mm diameter disks made of the plastic material to be tested. Three specimens of each formulation shall be tested.

7.2 Thickness of the test specimens shall be 0.25 ± 0.025 mm.

NOTE ~~3—If other thicknesses are~~ 4—If another thickness is desired to be tested due to purchase specifications or other considerations, ~~they may be used, but~~ it shall be specified in the report.

7.3 Direct comparison of values between materials ~~should~~shall not be made unless all specimens so compared do not vary by more than ±10 % from a given nominal thickness.

NOTE 5—This precaution is necessary because of discrepancies that may arise due to edge effects, depletion of volatiles, and the fact that the percent weight loss is an inverse function of thickness.

8. Conditioning

8.1 *Conditioning*—Condition the test specimens at 23 ± 2°C and 50 ± ~~5%~~10 % relative humidity for not less than 20 h prior to test in accordance with Procedure A of Practice D618. Preferably, specimens shall be suspended to assure free air circulation among the specimens. In cases of disagreement, the tolerances shall be ±1°C and ~~±2%~~±5 % relative humidity.

9. Procedure—Test Method A, Direct Contact with Activated Carbon

9.1 Weigh the conditioned specimens individually on the analytical balance and designate this weight as W_1. Weight of individual specimens shall be within a tolerance of ±10 %.

9.2 Spread 120 cm^3 of activated carbon evenly on the bottom of a container. Place one specimen on top of the activated carbon and cover it with 120 cm^3 of activated carbon. Place a second specimen (~~Note 3~~Note 4) on top of the first and cover it with 120 cm^3 of the carbon, followed by a third specimen and then 120 cm^3 more of activated carbon. Place a cover on the container in such a manner that the container will be vented. This is necessary to assure that any possible pressure build-up in the container during heating is relieved. Take care that in no case shall the carbon be packed by pressure other than the weight of the composite sandwich in the container.

NOTE ~~4—Only~~ 6—Only specimens of the same composition or formulation shall be tested in a single container, because of the possibility of cross-migration between varying compositions.

9.3 Place the container upright in the oven or bath. Unless otherwise specified, the temperature of the oven or bath shall be 70 ± 1°C and the duration of the test 24 h.

9.4 At the end of the 24-h period, remove the container from the oven or bath. Then, within 1 h, remove the specimens from the container, brush free of carbon, and recondition in accordance with Section 8.

9.5 After reconditioning, reweigh the specimens and designate this weight as W_2. Weight of individual specimens shall be within a tolerance of ±10 %.