Designation: D 447 – 93

AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race St. Philadelphia, Pa 19103
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM
If not listed in the current combined index, will appear in the next edition.

Standard Test Method for Distillation of Plant Spray Oils[1]

This standard is issued under the fixed designation D 447; 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 volatility of plant spray oils by means of distillation. Its primary purpose is to establish the classification of a spray oil by determining the fraction distilled at specified temperatures. Both a manual method and an automatic method are specified.

1.2 In cases of dispute, the referee test method is the manual test method.

1.3 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety problems, 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.* For specific hazard statements, see Note 3.

2. Referenced Documents

2.1 *ASTM Standards:*

D 850 Test Method for Distillation of Industrial Aromatic Hydrocarbons and Related Materials[2]

D 1078 Test Method for Distillation Range of Volatile Organic Liquids[2]

E 133 Specification for Distillation Equipment[3]

E 220 Method for Calibration of Thermocouples by Comparison Techniques[4]

3. Summary of Test Method

3.1 A 100 mL sample is distilled in a 125-mL flask at a rate of 4 to 6 mL/min. The temperature is recorded at 5 mL distilled intervals.

4. Significance and Use

4.1 To obtain optimum persistence with minimal damage to fruit and foliage, a plant spray oil should possess appropriate volatility characteristics, as indicated by distillation. A narrow range, for example, 55°C, ensures uniform evaporation, while the proper level of initial and final boiling points prevents either too rapid or undesirably prolonged evaporation of the oil.

5. Apparatus

5.1 All items listed in 5.1.1 to 5.1.7 shall conform to Specification E 133. All of the following references are to Specification E 133:

5.1.1 *Distilling Flask*, Flask B (125 mL).

5.1.2 *Condenser and Cooling Bath*, Section 5 and Figs. 1 and 2 of Specification E 133.

5.1.3 *Heater*, Section 7 and Figs. 1 and 2 of Specification E 133.

5.1.4 *Flask Support*, Board C [51 mm (2.0-in.) hole]. An additional board, which will completely cover the top of the shield, is split and recessed to fit the neck of the flask.

5.1.5 *Graduated Cylinder*, Graduate B, 100 mL, as shown in Fig. 4 of Specification E 133. The cylinder must have graduations at the 5 mL level and from 90 to 100 mL in 1-mL increments. For automatic apparatus, the cylinder shall conform to the physical specifications described in this section, with the exception of the graduations.

5.1.5.1 For automatic apparatus, the level follower/recording mechanism of the apparatus will have a resolution of 0.1 mL, with an accuracy of ±1 mL. The calibration of the assembly should be confirmed according to the manufacturer's instructions at regular intervals. The typical calibration procedure involves the verification of the output with the receiver containing 5 and 100 mL of material, respectively.

5.1.6 *Temperature Sensor:*

5.1.6.1 ASTM Thermometer 8C (8F) as prescribed in Section 10 of Specification E 133.

NOTE 1—Thermometers heated to high temperatures, in the range required for spray oil distillations, sometimes develop stresses that may affect the accuracy of calibration. It is recommended that, when thermometers vary from the standard thermometer when checked at any convenient temperature, the thermometers be allowed to rest at room temperature for at least 24 h to relieve stresses.

5.1.6.2 Temperature measurement systems using thermocouples or resistance thermometers must exhibit the same temperature lag and accuracy as the equivalent mercury in glass thermometers. Confirmation of the calibration of these temperature sensors is to be made on a regular basis. This can be accomplished as described in Method E 220, potentiometrically by the use of standard precision resistance, depending on the type of probe. Another technique is to distill pure toluene in accordance with Test Method D 850 and compare the temperature indicated with that shown by the above mentioned mercury in glass thermometers when carrying out a manual test under the same condition.

NOTE 2—Toluene is shown in reference manuals as boiling at 110.6°C under the conditions of Test Method D 1078, which uses a partial immersion thermometer. Because this test method uses total immersion thermometers, the results will be lower. The approximate value for an 8C thermometer is 110.0°C.

---

[1] This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.08 on Volatility.

Current edition approved Feb. 15, 1993. Published May 1993. Originally published as D 447 – 37 T. Last previous edition D 447 – 88.

[2] *Annual Book of ASTM Standards*, Vol 06.04.

[3] *Annual Book of ASTM Standards*, Vols 05.03 and 14.02.

[4] *Annual Book of ASTM Standards*, Vol 14.03.