Designation: E 897 – 88 (Reapproved 2004)

Standard Test Method for Volatile Matter in the Analysis Sample of Refuse-Derived Fuel[1]

This standard is issued under the fixed designation E 897; 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, in the analysis sample which is released under specific conditions of the test. The knowledge of the volatile matter content assists in predicting burning characteristics of RDF.

1.2 This test method may be applicable to any waste material from which a laboratory analysis sample can be prepared.

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:* [2]

E 180 Practice for Determining the Precision Data of ASTM Methods for Analysis and Testing of Industrial Chemicals

E 790 Test Method for Residual Moisture in a Refuse-Derived Fuel Analysis Sample

E 829 Practice for Preparing Refuse-Derived Fuel (RDF) Laboratory Samples for Analysis

3. Terminology

3.1 *Definition:*

3.2 *refuse-derived fuel* (RDF):

RDF–1—Waste used as a fuel in as-discarded form.

RDF–2—Waste processed to coarse particle size with or without ferrous metal separation.

RDF–3—shredded fuel derived from municipal solid waste (MSW) that has been processed to remove metal, glass, and other inorganics. This material has a particle size such that 95 weight % passes through a 2-in. square mesh screen.

RDF–4—Combustible waste processed into powder form—95 weight % passing a 10–mesh screen.

RDF–5—Combustible waste densified (compressed) into the form of pellets, slugs, cubettes or briquettes.

RDF–6—Combustible waste processed into liquid fuel.

RDF–7—Combustible waste processed into gaseous fuel.

4. Summary of Test Method

4.1 Volatile matter is determined by establishing the loss in weight resulting from heating refuse-derived fuel under rigidly-controlled conditions. The measured weight loss, corrected for moisture as determined in Test Method E 790, establishes the volatile matter content.

5. Apparatus

5.1 *Platinum or Fused Quartz Crucible*, with closely fitting cover. The crucible shall be of not less than 10 nor more than 20 mL capacity, not less than 25 nor more than 35 mm in diameter, and not less than 30 nor more than 35 mm in height.

5.2 *Vertical Electric Tube Furnace*— It shall be regulated to maintain a temperature of 950 ± 20°C in the crucible, as measured by a thermocouple positioned in the furnace.

6. Hazards

6.1 Due to the origins of RDF in municipal waste, common sense dictates that precautions should be observed when conducting tests on the samples. Recommended hygienic practices include use of gloves when handling RDF, wearing dust masks (NIOSH-approved type), especially while milling RDF samples, conducting tests under a negative-pressure hood when possible, and washing hands before eating or smoking. (**Warning**—Exercise care when placing the sample into the volatile furnace. The possibility of an explosion always exists when heating samples of unknown origin.)

7. Procedure

7.1 Weigh to the nearest 0.1 mg about 1 g of thoroughly mixed air-dried analysis RDF sample in a weighed crucible. Close with a cover (Note 1), place on a platinum or Nichrome-wire support and insert directly into the furnace chamber,

[1] This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.03 on Treatment.

Current edition approved March 25, 1988. Published May 1988. Originally published as E 897 – 82. Last previous edition E 897 – 82.

[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.

which shall be maintained at a temperature of 950 ± 20°C. Lower the crucible immediately to the 950°C zone. Regulation of the temperature to within the prescribed limits is critical. After the more rapid discharge of volatile matter has subsided as shown by disappearance of the luminous flame, inspect the crucible to verify that the lid is still seated. If necessary, reseat the lid to guard against the admission of air into the crucible. Do this as rapidly as possible by raising the crucible to the top of the furnace chamber, reposition the lid to more perfectly seal the crucible, then lower immediately back to the 950°C zone.

NOTE 1—The cover should fit closely enough so that the carbon deposit from the refuse-derived fuel does not burn away from the underside.

7.2 After heating for a total of exactly 7 min, remove the crucible from the furnace and, without disturbing the cover, allow it to cool on a metal cooling block. Weigh as soon as cold (Note 2). The percentage loss of weight minus the percentage moisture in accordance with Test Method E 790 is the volatile matter.

NOTE 2—To ensure uniformity of results, the cooling period should be kept constant and should not be prolonged beyond 15 min.

8. Calculation

8.1 Calculate the percentage of volatile matter on an" as–determined" basis, V_{ad} as follows:

$$V_{ad} = \left[\frac{A - B}{A} \times 100\right] - M_{ad} \quad (1)$$

where:

A = weight of sample used, g,
B = weight of sample after heating, g, and
$M_{(ad)}$ = moisture (as–determined), %.

9. Precision and Bias

9.1 *Precision*:

9.1.1 The standard deviation of individual determinations, in percent absolute, is as follows:

Typical Average Value, 69 %
Within-Laboratory, 0.7 %
Between-Laboratories, 2.1 %

9.1.2 The precision estimates in 9.1.1 are based on an interlaboratory study conducted in accordance with Practice E 180.

9.2 *Bias*:

9.2.1 The bias of this test method has not been determined.

9.2.2 Precision estimates are based on ASTM Report No. RR:E 38–1000 which describes the preliminary testing and round–robin tests.[3]

[3] Supporting data are available on loan from ASTM Headquarters. Request RR: E 38–1000.