



Designation: D1839 – 14 (Reapproved 2019)

## Standard Test Method for Amyl Nitrate in Diesel Fuels<sup>1</sup>

This standard is issued under the fixed designation D1839; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of 0.1 % to 0.5 % by volume amyl nitrate in diesel fuels.

NOTE 1—This test method has been used for the determination of hexyl nitrate in diesel fuels, but has not been cooperatively tested for such samples. For the determination of hexyl nitrate, use standards containing nitrate esters of primary hexanol. Use a density of 0.97 in calculating results.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

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

D1193 Specification for Reagent Water

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

### 3. Summary of Test Method

3.1 This test method is based on the simultaneous hydrolysis of the ester in 62.5 % sulfuric acid and nitration of *m*-xylenol by the nitric acid liberated. The nitroxylenol is distilled from the reaction mixture and reacted with sodium

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.03 on Elemental Analysis.

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<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.

hydroxide to form the yellow sodium salt. Residual diesel fuel is removed by ether extraction. The color is measured spectrophotometrically at 452 nm, and the concentration of amyl nitrate is determined by reference to a standard curve.

### 4. Significance and Use

4.1 In diesel fuel, the presence of alkyl nitrates such as amyl nitrate, hexyl nitrate, or octyl nitrate causes a higher residue value than observed in untreated fuel, which can lead to erroneous conclusions as to the coke forming propensity of the fuel. The presence of such alkyl nitrate in the fuel can be determined using this test method. This test method can be used to determine the amount of amyl nitrate that has been added to diesel fuels to improve cetane number. This test method is applicable as a basis for judging compliance with specifications covering amyl nitrate.

### 5. Interferences

5.1 Nitrate esters, inorganic nitrate ions, and nitrogen oxides will interfere to give high results.

### 6. Apparatus

6.1 *Absorption Cells*, matched, having a 1.000 cm  $\pm$  0.002 cm light path.

6.2 *Distillate Collector*,<sup>3</sup>borosilicate glass with standard taper joints and sealed-in funnel (Fig. 1).

6.3 *Electric Heating Mantle*, to fit a 300 mL round-bottom flask, and having a variable transformer.

6.4 *Lunge-type Pipet*, 2 mL capacity.

NOTE 2—A 2.5 mL hypodermic syringe, with scabbard, can be used instead of the Lunge pipet.

6.5 *Reflux Condenser* (Allihn-type), borosilicate glass, 300 mm long, with standard-taper joints.

6.6 *Round-Bottom Flask*, of borosilicate glass and having a 300 mL capacity.

6.7 *Separatory Funnel*, Squibb-type, 125 mL capacity.

<sup>3</sup> The sole source of supply of the apparatus known to the committee at this time is obtainable from Corning Glass Co., Corning, NY, Catalog No. 3320. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.