



Standard Test Method for Amyl Nitrate in Diesel Fuels¹

This standard is issued under the fixed designation D 1839; 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 approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Editorial corrections were made throughout in April 2000.

1. Scope

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

1.2 The preferred units are acceptable metric units.

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.*

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.

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water²

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³

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 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 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 ± 0.002 -cm light path.

6.2 *Distillate Collector*,⁴ 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.

6.8 *Shaking Machine*, automatic, capable of 250 oscillations/min.

6.9 *Spectrophotometer*, capable of measuring absorption in the region of 452 nm.

7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.⁵ Other grades may be used, provided it is first ascertained that the reagent is of

¹ This method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.03 on Elemental Analysis.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 05.02.

⁴ Obtainable from Corning Glass Co., Corning, NY, Catalog No. 3320.

⁵ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.