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Designation: 139/98

## Standard Test Method for Acid and Base Number by Color-Indicator Titration<sup>1</sup>

This standard is issued under the fixed designation D974; 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.

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

<sup>ε1</sup> NOTE—Corrected terminology in 7.7.1 to match the rest of the standard text editorially in July 2010.

### 1. Scope\*

1.1 This test method covers the determination of acidic or basic constituents (Note 1) in petroleum products<sup>2</sup> and lubricants soluble or nearly soluble in mixtures of toluene and isopropyl alcohol. It is applicable for the determination of acids or bases whose dissociation constants in water are larger than  $10^{-9}$ ; extremely weak acids or bases whose dissociation constants are smaller than  $10^{-9}$  do not interfere. Salts react if their hydrolysis constants are larger than  $10^{-9}$ .

NOTE 1—In new and used oils, the constituents considered to have acidic characteristics include organic and inorganic acids, esters, phenolic compounds, lactones, resins, salts of heavy metals, and addition agents such as inhibitors and detergents. Similarly, constituents considered to have basic properties include organic and inorganic bases, amino compounds, salts of weak acids (soaps), basic salts of polyacidic bases, salts of heavy metals, and addition agents such as inhibitors and detergents.

NOTE 2—This test method is not suitable for measuring the basic constituents of many basic additive-type lubricating oils. Test Method D4739 can be used for this purpose.

1.2 This test method can be used to indicate relative changes that occur in an oil during use under oxidizing conditions. Although the titration is made under definite equilibrium conditions, the method does not measure an absolute acidic or basic property that can be used to predict performance of an oil under service conditions. No general relationship between bearing corrosion and acid or base numbers is known.

NOTE 3—Oils, such as many cutting oils, rustproofing oils, and similar compounded oils, or excessively dark-colored oils, that cannot be analyzed for acid number by this test method due to obscurity of the

color-indicator end point, can be analyzed by Test Method D664. The acid numbers obtained by this color-indicator test method need not be numerically the same as those obtained by Test Method D664, the base numbers obtained by this color indicator test method need not be numerically the same as those obtained by Test Method D4739, but they are generally of the same order of magnitude.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>3</sup>

D117 Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Oils of Petroleum Origin

D664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration

D1193 Specification for Reagent Water

D4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants

D4739 Test Method for Base Number Determination by Potentiometric Hydrochloric Acid Titration

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *acid number,  $n$* —the quantity of base, expressed in milligrams of potassium hydroxide per gram of sample that is required to titrate a sample to a specified end point.

3.1.1.1 *Discussion*—In this test method, the indicator is *p*-naphtholbenzein titrated to a green/green-brown end point in a toluene-water-isopropanol solvent.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.06 on Analysis of Lubricants.

In the IP, this test method is under the jurisdiction of the Standardization Committee. This test method was adopted as a joint ASTM-IP standard in 1965.

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<sup>2</sup> Statements defining this test method, its modification, and its significance when applied to electrical insulating oils of mineral origin will be found in Guide D117.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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