



Designation: D974 – 22



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Standard Test Method for Acid and Base Number by Color-Indicator Titration^{1,2}

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 (ϵ) indicates an editorial change since the last revision or reapproval.

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

1. Scope*

1.1 This test method covers the determination of acidic or basic constituents (**Note 1**) in petroleum products³ 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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:⁴

- D117** Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Liquids
- D664** Test Method for Acid Number of Petroleum Products by Potentiometric Titration
- D1193** Specification for Reagent Water
- D4057** Practice for Manual Sampling of Petroleum and Petroleum Products
- D4175** Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- D4177** Practice for Automatic Sampling of Petroleum and Petroleum Products

¹ This test method is under the jurisdiction of ASTM International Committee **D02** on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of ASTM Subcommittee **D02.06** on Analysis of Liquid Fuels and Lubricants. The technically equivalent standard as referenced is under the jurisdiction of the Energy Institute Subcommittee SC-C-4.

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This test method was adopted as a joint ASTM-IP standard in 1965.

² This test method has been developed through the cooperative effort between ASTM and the Energy Institute, London. ASTM and IP standards were approved by ASTM and EI technical committees as being technically equivalent but that does not imply both standards are identical.

³ 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**.

⁴ 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.

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