



Designation: D94 – 07 (Reapproved 2017)



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Standard Test Methods for Saponification Number of Petroleum Products¹

This standard is issued under the fixed designation D94; 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 These test methods cover the determination of the amount of constituents in petroleum products such as lubricants, additives, and transmission fluids that will saponify under the conditions of the test.

NOTE 1—Statements defining this test and its significance when applied to electrical insulating oils of mineral origin will be found in Guide D117. Experience has shown that for transformer oils, Test Method D94, modified by use of 0.1 M KOH solution and 0.1 M HCl, is more suitable.

1.1.1 Two test methods are described: Method A—Color Indicator Titration (Sections 6 – 13), and Method B—Potentiometric Titration (Sections 14 – 23).

1.2 Because compounds of sulfur, phosphorus, the halogens, and certain other elements that are sometimes added to petroleum products also consume alkali and acids, the results obtained indicate the effect of these extraneous materials in addition to the saponifiable material present. Results on products containing such materials, on used internal-combustion-engine crankcase oils, and on used turbine oils must be interpreted with caution.

NOTE 2—The materials referred to above, which are not normally considered saponifiable matter, include inorganic or certain organic acids, most nonalkali soaps, and so forth. The presence of such materials increases the saponification number above that of fatty saponifiable materials for which the test method is primarily intended. The odor of hydrogen sulfide near the end of the back-titration in the saponification test is an indication that certain types of reactive sulfur compounds are present in the sample. In the case of other reactive sulfur, chlorine, and phosphorus compounds and other interfering materials, no simple indication is given during the test. A gravimetric determination of the actual amount of fatty acids is probably the most reliable method for such compounds. Test Methods D128 or IP Method 284/86 can be used to determine fatty acids gravimetrically.

1.3 The values stated in SI units are to be regarded as the 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.* For specific hazard statements, see Sections 6, 7, 8, 10, 15, 16, 17, and 19.

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:²

- D117 Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Oils of Petroleum Origin
- D128 Test Methods for Analysis of Lubricating Grease
- D1193 Specification for Reagent Water
- D4057 Practice for Manual Sampling of Petroleum and Petroleum Products
- D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products
- D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance
- D6792 Practice for Quality Management Systems in Petroleum Products, Liquid Fuels, and Lubricants Testing Laboratories

2.2 Energy Institute Standards:³

- IP 136 Method of Test for Saponification Number of Petroleum Products
- IP 284 Method of Test for Fatty Acids

¹ These test methods are under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and are the direct responsibility of Subcommittee D02.06 on Analysis of Liquid Fuels and Lubricants.

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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.

³ Available from Institute of Petroleum, 61 New Cavendish St., London, W.I., England. Available from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K., <http://www.energyinst.org.uk>.