



Standard Test Method for Base Number of Petroleum Products by Potentiometric Perchloric Acid Titration¹

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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 basic constituents in petroleum products by titration with perchloric acid in glacial acetic acid.

1.2 Procedures A and B use different titration solvent volumes and sample weights.

NOTE 1—A round robin on a series of new and used oils and additive concentrates has shown that the two procedures give statistically equivalent results.

1.3 **Appendix X2** provides the use of an alternative solvent system which eliminates the use of chlorobenzene in this test method. The use of the alternative solvent gives statistically equivalent results; however, the precision is worse. Paragraph **X2.5.5** provides guidance when comparing results using the two different solvents.

1.4 The constituents that may be considered to have basic characteristics include organic and inorganic bases, amino compounds, salts of weak acids (soaps), basic salts of poly-acidic bases, and salts of heavy metals.

NOTE 2—This test method is applicable to both fresh oils and used oils as described in Sections 16, 17, and 19 and **Appendix X1**.

1.5 This test method can be used to determine base number >300 mg KOH/g. However, the precision statement in Section 19 has been obtained only on base number $\leq$ 300 mg KOH/g.

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

1.7 *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 applica-*

bility of regulatory limitations prior to use. For specific warning statements, see Section 7, Section 10, and X2.2.

2. Referenced Documents

2.1 *ASTM Standards*:²

D1193 Specification for Reagent Water

3. Terminology

3.1 *Definitions*:

3.1.1 *base number*—the quantity of a specified acid, expressed in terms of the equivalent number of milligrams of potassium hydroxide per gram of sample, required to titrate a sample in a specified solvent to a specified endpoint using a specified detection system.

4. Summary of Test Method

4.1 The sample is dissolved in an essentially anhydrous mixture of chlorobenzene and glacial acetic acid and titrated with a solution of perchloric acid in glacial acetic acid using potentiometric titrimeter. A glass indicating electrode and a reference electrode are used, the latter being connected with the sample solution by means of a salt bridge. The meter readings are plotted against the respective volumes of titrating solution, and the end point is taken at the inflection in the resulting curve.

4.2 Procedure A uses 120 mL of titration solvent. Procedure B uses 60 mL of titration solvent. In addition, the two procedures use different equations for the calculation of appropriate sample weights. Since many portions of the test method are identical for Procedures A and B, only the unique sections will be described separately for the two versions of the test method.

4.3 Occasionally certain used oils give no inflection in the forward titration mode, in which case a back titration modification with sodium acetate titrant is employed.

¹ 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 D02.06 on Analysis of Liquid Fuels and Lubricants.

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This test method has been approved by the sponsoring committees and accepted by the cooperating societies in accordance with established procedures.

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.