Designation: ~~D847 – 16~~ D847 – 23

Standard Test Method for Acidity of Benzene, Toluene, Xylenes, Solvent Naphthas, and Similar Industrial Aromatic Hydrocarbons[1]

This standard is issued under the fixed designation D847; 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 is intended for the detection of acidity of benzene, toluene, xylenes, solvent naphthas, and similar industrial aromatic hydrocarbons.

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

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~~safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*For specific hazard statements see Section 9.

1.4 *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]

D1193 Specification for Reagent Water

D3437 Practice for Sampling and Handling Liquid Cyclic Products

2.2 *Other Documents:*

OSHA Regulations, ~~29CFR~~29 CFR paragraphs 1910.1000 and 1910.1200[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *acidity, n*—for purposes of this standard, acidity is defined as producing a persistent pink phenolphthalein end point with the addition of two (2) drops or more (0.1 mL) of ~~0.1 N~~ 0.1 N sodium hydroxide solution.

3.1.2 *acid reaction, n*—a characteristic of materials producing the acid-color of the indicator used under the conditions prescribed in this test method.

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[1] This test method is under the jurisdiction of ASTM Committee D16 on ~~Aromatic Hydrocarbons~~ Aromatic, Industrial, Specialty and Related Chemicals and is the direct responsibility of Subcommittee D16.01 on Benzene, Toluene, Xylenes, Cyclohexane and Their Derivatives.

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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 U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

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

3.1.3 *alkaline or basic reaction, n*—a characteristic of the materials producing the alkali-color of the indicator used under the conditions prescribed in this test method.

4. Summary of Test Method

4.1 The acidity of aromatic hydrocarbons is detected using a sodium hydroxide titration and a color change using a phenolphthalein indicator.

5. Significance and Use

5.1 This test method is suitable for setting specifications, for use as an internal quality control tool, and for use in development or research work on industrial aromatic hydrocarbons and related materials. This test method gives an indication of residual acidity and is a measure of the quality of the finished product. It is an indication of the tendency of the product to corrode equipment.

6. Interferences

6.1 Tests for acidity are not applicable in the presence of contaminating acidic or alkaline gases, soaps, salts, or other compounds derived from the atmosphere or apparatus. The container holding the specimen, and the apparatus, water, indicator, and other materials used in the test shall be chosen so that they themselves shall not appreciably affect the results. Since new corks used in specimen bottles often are bleached with oxalic acid, it is advisable to rinse them thoroughly and check them for neutrality with the indicator used in the test. Glassware shall be of acid-resistant and alkali-resistant glass[4] and shall be rinsed with neutral distilled water before use. The room in which the test is performed shall be chosen so as to prevent undue contamination by carbon dioxide, ammonia, or other interfering substances that may be present in the atmosphere.

6.2 The distilled water used in the test shall not alter the composition of the specimen nor otherwise interfere with the purpose of the work. Although inert impurities often may be neglected, care must be exercised to correct for impurities or to eliminate them entirely if they are likely to interfere. When the distilled water does not show an acid or alkaline reaction, it may be used without further adjustment to neutrality. However, if the water shows an acid or alkaline reaction, it shall be brought to a persistent pink end point before use by titration with standard ~~0.01~~ 0.01 *N* NaOH solution (see 8.4) or standard ~~0.01~~ 0.01 *N* H_2SO_4, respectively (see 8.5).

7. Apparatus

7.1 *Graduate,* ~~100-mL.~~100 mL.[4]

7.2 *Bottle,* ~~500-mL~~500 mL, glass-stoppered.[4]

8. Reagents

8.1 *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 sufficiently high purity to permit its use without lessening the accuracy of the determination.

8.2 *Phenolphthalein Indicator Solution*—Dissolve ~~0.5 g~~ 0.5 g of phenolphthalein in 100 mL of ethyl alcohol (95 %). Add ~~0.01~~ 0.01 *N* NaOH solution cautiously until a faint pink color appears; then just remove the color with a drop or two of 0.01 *N* acid.

8.3 *Sodium Hydroxide, Standard Solution* (0.1 *N*).

8.4 *Sodium Hydroxide, Standard Solution* (0.01 *N*).

[4] Borosilicate glass or the equivalent has been found satisfactory for this purpose.

[5] ~~*Reagent Chemicals, American Chemical Society Specifications,*~~*ACS Reagent Chemicals, Specifications and Procedures for Reagents and Standard-Grade Reference Materials,* 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.

8.5 *Sulfuric Acid, Standard* (0.01 *N*).

8.6 *Purity of ~~Water: Distilled Water, Neutral—~~Water—Type I or II of Specification D1193:* ~~Boil vigorously for 30 min, 1 to 2 L of distilled water conforming to Type III of Specification D1193. Insert a stopper carrying a guard tube of soda lime. Rinse a 250-mL flask with this distilled water, add a 100-mL portion, and titrate in a closed system with 0.01 *N* NaOH solution or heat to boiling and titrate immediately, taking care that the temperature does not fall below 80°C during the titration. If more than 1 drop (0.05 mL) of 0.01 *N* NaOH solution is required to obtain an end point with phenolphthalein, adjust the pH of the water to be used by adding the calculated amount of NaOH solution. Repeat the blank titration, and readjust if necessary until the blank titration on 100 mL of the distilled water is 1 drop (0.05 mL) or less of the 0.01 *N* NaOH solution. The distilled water now will be neutral or very slightly acid to the phenolphthalein indicator.~~

8.6.1 Add two drops of phenolphthalein solution to 100 mL of Type I or II water. Verify water is clear, add one drop of 0.01 *N* NaOH titrant, verify color turns pink. If color does not turn pink, go to 8.6.2.

8.6.2 If more than 1 drop (0.05 mL) of 0.01 *N* NaOH solution is required to obtain an end point with phenolphthalein, adjust the pH of the water to be used by adding the calculated amount of NaOH solution. Repeat the blank titration, and readjust if necessary until the blank titration on 100 mL of the water is 1 drop (0.05 mL) or less of the 0.01 *N* NaOH solution. The water now will be neutral or very slightly acid to the phenolphthalein indicator.

9. Hazards

9.1 Consult current OSHA regulations, supplier's Safety Data Sheets, and local regulations for all materials used in this test method.

10. Sampling

10.1 Sample the material in accordance with Practice D3437.

11. Procedure

11.1 Add ~~100~~100 mL ± 5 mL of the sample in a ~~500-mL~~500 mL bottle. Add 100 mL of neutral distilled water (see 8.6) and 2 drops of phenolphthalein indicator solution. Stopper and shake thoroughly. Without separating the layers, titrate the acidity, if any, with standard 0.1 *N* NaOH to the first persistent shade of pink, shake thoroughly after each addition. Record Pass if 2 drops or less of 0.1 *N* NaOH solution produces a persistent pink end point. If more than 2 drops ~~are~~is required to produce a persistent pink end point, record as Fail.

12. Interpretation of Results

12.1 Unless otherwise indicated in the applicable specifications, the test results shall be interpreted as follows:

12.1.1 A specimen shall be said to pass and to contain no free acid, that is, show no evidence of acidity, if 2 drops or less of 0.1 *N* NaOH solution ~~produces~~produce a persistent pink end point in the test bottle.

13. Precision and Bias

13.1 In the case of pass/fail data, no generally accepted method for determining precision is currently available.

14. Quality Guidelines

14.1 In the case of pass/fail data, no generally acceptable method for determining that this test is under statistical control is currently available.

15. Keywords

15.1 acidity; aromatic hydrocarbons