Designation: D7704 – 11

Standard Test Method for Total Aldehydes in Styrene Monomer by Potentiometric Titration[1]

This standard is issued under the fixed designation D7704; 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.

1. Scope

1.1 This test method covers the wet chemical determination of aldehydes in styrene monomer. Aldehydes are calculated and reported as benzaldehyde. The range of concentration for this test method is 0.001 mass % to 0.030 mass %.

1.2 In determining conformance of the test results using this method to applicable specifications, results shall be rounded off in accordance with the rounding-off method of Practice E29.

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:*[2]

D1193 Specification for Reagent Water

D3437 Practice for Sampling and Handling Liquid Cyclic Products

D6809 Guide for Quality Control and Quality Assurance Procedures for Aromatic Hydrocarbons and Related Materials

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *Other Documents:*

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

3. Summary of Test Method

3.1 An alcoholic solution of hydroxylamine hydrochloride is added to a specimen of styrene monomer. Active aldehydes present react in accordance with Eq 1:

$$RCHO + NH_2OH{\cdot}HCl \rightarrow RCHNOH + H_2O + HCl \quad (1)$$

The amount of hydrochloric acid released, which is equivalent to the aldehyde present in the sample, is titrated with standard alcoholic potassium hydroxide solution.

4. Significance and Use

4.1 This test method is suitable for determining the quantity of aldehydes, both for quality control and quality assurance of the product.

5. Interferences

5.1 Ketones, if present, interfere by partially reacting with the reagent.

5.2 Methanol used in this procedure may partially react with aldehydes to form (hemi)acetals.

6. Apparatus

6.1 *Titration Vessel*, 150 mL.

6.2 *Combined pH – Glass Electrode*, dedicated for non-aqueous liquids.

6.3 *Stirring Bar*, 30 mm.

6.4 *Titration Stand* with stirrer.

6.5 *Pipets*, 25 mL.

6.6 *Volumetric Flasks*, 100 mL.

6.7 *Burets*, 5 mL. (Microburets are preferred.)

6.8 *Exchange Unit*, 5 mL.

6.9 *Thermometers*, capable of differentiating 1°C at ambient.

[1] This test method is under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.07 on Styrene, Ethylbenzene and C_9 and C_{10} Aromatic Hydrocarbons.

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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 Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://dodssp.daps.dla.mil.