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.

Designation: D2593 – 23

Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by Gas Chromatography[1]

This standard is issued under the fixed designation D2593; 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 determination of butadiene-1,3 purity and impurities such as propane, propylene, isobutane, *n*-butane, butene-1, isobutylene, propadiene, *trans*-butene-2, *cis*-butene-2, butadiene-1,2, pentadiene-1,4, and, methyl, dimethyl, ethyl, and vinyl acetylene in polymerization grade butadiene by gas chromatography. Impurities including butadiene dimer, carbonyls, inhibitor, and residue are measured by appropriate ASTM procedures and the results used to normalize the component distribution obtained by chromatography.

NOTE 1—Other impurities present in commercial butadiene must be calibrated and analyzed. Other impurities were not tested in the cooperative work on this test method.

NOTE 2—This test method can be used to check for pentadiene-1,4 and other C_5s instead of Test Method D1088.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific warning statements, see 6.1 and 9.3.

1.3.1 *The user is advised to obtain LPG safety training for the safe operation of this test method procedure and related activities.*

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]

D1088 Method of Test for Boiling Point Range of Polymerization-Grade Butadiene (Withdrawn 1983)[3]

2.2 *Energy Institute Standards:*[4]

IP 194 Analysis of Butadiene-1,3 Polymerization Grade

3. Summary of Test Method

3.1 A representative sample is introduced into a gas-liquid partition column. The butadiene and other components are separated as they are transported through the column by an inert carrier gas. Their presence in the effluent is measured by a detector and recorded as a chromatogram. The chromatogram of the sample is interpreted by applying component attenuation and detector response factors to the peak areas or peak heights and the relative concentration determined by relating individual peak response to total peak response. Impurities including butadiene dimer, carbonyls, inhibitor, and residue are measured by appropriate ASTM procedures and the results used to normalize the distribution obtained by gas chromatography.

4. Significance and Use

4.1 The trace hydrocarbon compounds listed can have an effect in the commercial use of butadiene. This test method is suitable for use in process quality control and in setting specifications.

5. Apparatus

5.1 *Chromatograph*—Any chromatograph having either a thermal-conductivity or flame ionization detector can be used provided the system has sufficient sensitivity and stability to obtain a recorder deflection of at least 2 mm at signal-to-noise ratio of at least 5:1 for 0.01 % by mass of impurity.

[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.D0.04 on C4 and C5 Hydrocarbons.

This test method was adopted as a joint ASTM-IP Standard, IP 194, in 1972.

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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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Obsolete. Contact Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K., http://www.energyinst.org.uk.

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

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