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Standard Guide for Analysis of 1,3–Butadiene Product¹

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1. Scope

1.1 This guide covers the analysis of 1,3–butadiene products produced in North America. It includes possible components and test methods, both ASTM and other, either actually used or believed to be in use, to test for these components. This guide is not intended to be used or construed as a set of specifications for butadiene products.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

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 practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1025 Test Method for Nonvolatile Residue of Polymerization-Grade Butadiene

D1157 Test Method for Total Inhibitor Content (TBC) of Light Hydrocarbons

D1550 Standard ASTM Butadiene Measurement Tables

D2384 Test Methods for Traces of Volatile Chlorides in Butane-Butene Mixtures

D2426 Test Method for Butadiene Dimer and Styrene in Butadiene Concentrates by Gas Chromatography

D2593 Test Method for Butadiene Purity and Hydrocarbon Impurities by Gas Chromatography

D3246 Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry

D3700 Practice for Obtaining LPG Samples Using a Floating Piston Cylinder

D4178 Practice for Calibrating Moisture Analyzers

D4423 Test Method for Determination of Carbonyls in C₄ Hydrocarbons

D4468 Test Method for Total Sulfur in Gaseous Fuels by Hydrogenolysis and Rateometric Colorimetry

D4629 Test Method for Trace Nitrogen in Liquid Petroleum Hydrocarbons by Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection

D4864 Test Method for Determination of Traces of Methanol in Propylene Concentrates by Gas Chromatography

D5799 Test Method for Determination of Peroxides in Butadiene

3. Terminology

3.1 *Definitions:*

3.1.1 *1,3-butadiene*—hydrocarbon product containing more than 99 % 1,3-butadiene.

3.2 *Symbols:*

3.2.1 *BHT*—butyl hydroxy toluene.

3.2.2 *GC*—gas chromatography.

3.2.3 *pTBC*—paratertiary butyl catechol.

3.2.4 *4VCH-1*—4-vinyl cyclo hexene (1,3-butadiene dimer).

4. Significance and Use

4.1 This guide is intended to provide information on the possible composition of 1,3-butadiene products and possible ways to test them. Since there are currently not enough ASTM standards for determining all components of interest, this guide provides information on other potentially available test methods.

4.2 Although this guide is not to be used for specifications, it can provide a starting point for parties to develop mutually agreed-upon specifications that meet their respective requirements. It can also be used as a starting point in finding suitable test methods for 1,3-butadiene components.

5. Sampling

5.1 *General:*

5.1.1 1,3-butadiene is a very reactive hydrocarbon. It reacts with oxygen to form peroxides and to polymerize. It also dimerizes at a rate that is temperature dependent. Below 10°C (50°F), the dimerization rate is less than 1 mg/kg by mass/h;

¹ This guide is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.D0.04 on C4 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.