



## Standard Guide for Analysis of 1,3-Butadiene Product<sup>1</sup>

This standard is issued under the fixed designation D 5274; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 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 given in SI units are to be regarded as the standard. The inch-pound units 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:

- D 1022 Test Method for Peroxide Content of Light Hydrocarbons<sup>2</sup>
- D 1025 Test Method for Nonvolatile Residue of Polymerization Grade Butadiene<sup>3</sup>
- D 1157 Test Method for Total Inhibitor Content (TBC) of Light Hydrocarbons<sup>3</sup>
- D 1550 ASTM Butadiene Measurement Tables<sup>3</sup>
- D 2384 Test Methods for Traces of Volatile Chlorides in Butane-Butene Mixtures<sup>4</sup>
- D 2426 Test Method for Butadiene Dimer and Styrene in Butadiene Concentrates by Gas Chromatography<sup>3</sup>
- D 2593 Test Method for Butadiene Purity and Hydrocarbon Impurities by Gas Chromatography<sup>3</sup>
- D 3246 Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry<sup>4</sup>
- D 3700 Practice for Containing Hydrocarbon Fluid Samples Using a Floating Piston Cylinder<sup>4</sup>
- D 4178 Practice for Calibrating Moisture Analyzers<sup>4</sup>
- D 4423 Test Method for Determination of Carbonyls in C<sub>4</sub> Hydrocarbons<sup>4</sup>

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.D0.04 on C<sub>5</sub> Hydrocarbons.

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<sup>2</sup> Discontinued; see 1982 *Annual Book of ASTM Standards*, Vol 05.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 05.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 05.02.

D 4468 Test Method for Total Sulfur in Gaseous Fuels by Hydrogenolysis and Rateometric Colorimetry<sup>5</sup>

D 4629 Test Method for Trace Nitrogen in Liquid Petroleum Hydrocarbons by Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection<sup>4</sup>

D 4864 Test Method for Determination of Traces of Methanol in Propylene Concentrates by Gas Chromatography<sup>6</sup>

### 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; but, at 20°C (77°F), it increases to 3 to 4 mg/kg mass/h; and at 40°C (104°F), to 14 to 20 mg/kg mass/h. 1,3-butadiene is also classified as toxic and as a potential health hazard, having been found carcinogenic to laboratory animals. Therefore, sampling of 1,3-butadiene must adhere to the following three principles:

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 05.05.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 05.03.