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An American National Standard

Standard Guide for Analysis of Propylene Concentrates[1]

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1. Scope

1.1 This guide covers a list of the major grades of propylene concentrates 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 properties. This guide is not intended to be used or construed as a set of specifications for any grade of propylene concentrate.

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

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 2163 Test Method for Determination of Hydrocarbons in Liquefied Petroleum (LP) Gases and Propane/Propene Mixtures by Gas Chromatography

D 2384 Test Methods for Traces of Volatile Chlorides in Butane-Butene Mixtures

D 2504 Test Method for Noncondensable Gases in C_2 and Lighter Hydrocarbon Products by Gas Chromatography

D 2505 Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography

D 2712 Test Method for Hydrocarbon Traces in Propylene Concentrates by Gas Chromatography

D 3227 Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)

D 3246 Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry

D 3700 Practice for Obtaining LPG Samples Using a Floating Piston Cylinder

D 4178 Practice for Calibrating Moisture Analyzers

D 4468 Test Method for Total Sulfur in Gaseous Fuels by Hydrogenolysis and Rateometric Colorimetry

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

D 4864 Test Method for Determination of Traces of Methanol in Propylene Concentrates by Gas Chromatography

3. Terminology

3.1 *Definitions:*

3.1.1 *outaging*, *n*—practice of removing a portion of liquid contents from a conventional sampling cylinder after filling to provide expansion room.

3.1.2 *propylene concentrate*, *n*—hydrocarbon product containing more than 50 % propylene.

3.1.2.1 *Discussion*—Grades of propylene concentrates listed in this guide are: polymer, 99.0 % minimum propylene content; chemical, 92.0 %; and refinery, 60 %.

3.2 *Abbreviations:*

3.2.1 *AgDDC*, *n*—silver diethyldithiocarbamate.

3.2.2 *GC*, *n*—gas chromatograph.

3.2.3 *GC-AED*, *n*—gas chromatography atomic emission detector.

3.2.4 *GC-ECD*, *n*—gas chromatography electron capture detector.

3.2.5 *GC-FPD*, *n*—gas chromatography flame photometric detector.

3.2.6 *GC-PID*, *n*—gas chromatography photoionization detector.

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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.

3.2.7 *GC-SCD*, *n*—gas chromatography sulfur chemiluminescent detector.

3.2.8 *IC*, *n*—ion chromatography.

3.2.9 *ICP-MS*, *n*—inductively coupled plasma-mass spectrometry.

3.2.10 *LPG or LP gases*, *n*—liquefied petroleum gas.

4. Significance and Use

4.1 This guide is intended to provide information on the likely composition of propylene concentrates and on probable ways to test them. Since there are currently no ASTM test methods 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 which meet their respective requirements. It can also be used as a starting point in finding suitable test methods for determining various components of propylene.

5. Sampling

5.1 *General*—Sample propylene concentrates are to be analyzed for trace components by a technique that minimizes or eliminates losses of light components and concentration of heavy ones. The sections below list some different sampling methods and principles. However, it is not the intent of this guide to list procedures that are applicable to all sampling situations. It is strongly recommended that samples be obtained under the supervision of a person with wide knowledge and experience in sampling olefinic liquefied petroleum gases. Also, even though this guide does not address the location of a sampling point in a line or vessel, the importance of the proper sampling location cannot be overemphasized.

5.2 *Floating Piston Cylinder*—Test Method D 3700 meets the criterion of minimizing or eliminating loss of light compounds and concentration of heavy ones. However, some labs have safety codes preventing use of rupture-disc piston containers. Alternative procedures must be used in these labs.

5.3 *Conventional Outaging Method*—The widely used outaging technique (that is, the practice of removing a portion of the fluid contents from a conventional sampling cylinder after filling in order to provide expansion room) causes a loss of light components into the vapor space. Subsequent handling to recapture these light ends in the liquid phases of the sample, such as repressurization of the cylinder contents with an inert gas, will not completely effect their recovery, especially the permanent gases. However, the loss is not significant to some users.

5.4 *Vaporization Methods*—Vaporization of the sample, either at the source or in the lab prior to analysis, can cause loss of heavier components, if present, and concentration of lighter ones. Test Method D 2712 describes a low pressure vaporization sampling technique that is suitable to determine trace compounds through butadiene.

5.5 *Reactive and Polar Components*:

5.5.1 Determination of reactive components, such as certain sulfur compounds and arsine, is generally believed to require special sample containers, such as TFE-fluorocarbon lined cylinders, or containers that have been specially passivated.

5.5.2 It is very difficult to obtain a valid sample to determine traces of polar compounds, such as water and ammonia, in the lab. Online analyzers, if available, or sorption of the analyte at the sample source for subsequent lab analysis, are believed to yield the most accurate results.

6. Composition and Test Methods

6.1 Table 1 indicates possible composition ranges and ASTM test methods for different grades of propylene concentrates. Table 2 lists other test methods known or believed to be in use.

6.2 Listing of any given component in Table 1 does not mean that the component will be present in all, or even any, propylene products. Inclusion in the list is definitely not a recommendation that all propylene products should be tested for the component.

7. Keywords

7.1 propylene; propylene product concentrations; propylene test methods