



Designation: D2598 – 02(Reapproved 2007)

## Standard Practice for Calculation of Certain Physical Properties of Liquefied Petroleum (LP) Gases from Compositional Analysis<sup>1</sup>

This standard is issued under the fixed designation D2598; 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 practice covers, by compositional analysis, the approximate determination of the following physical characteristics of commercial propane and special-duty propane (covered by Specification **D1835**): vapor pressure, relative density, and motor octane number (MON).

1.2 This practice is not applicable to any product exceeding specifications for nonvolatile residues. (See Test Method **D2158**.)

1.3 For calculating motor octane number, this practice is applicable only to mixtures containing 20 % or less of propene.

1.4 For calculated motor octane number in method, this practice is based on mixtures containing only components shown in **Table 1**.

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

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

**D1267** Test Method for Gage Vapor Pressure of Liquefied Petroleum (LP) Gases (LP-Gas Method)

**D1657** Test Method for Density or Relative Density of Light Hydrocarbons by Pressure Hydrometer

**D1835** Specification for Liquefied Petroleum (LP) Gases

**D2158** Test Method for Residues in Liquefied Petroleum (LP) Gases

**D2163** Test Method for Analysis of Liquefied Petroleum (LP) Gases and Propene Concentrates by Gas Chromatography

**D2421** Practice for Interconversion of Analysis of C<sub>5</sub> and

Lighter Hydrocarbons to Gas-Volume, Liquid-Volume, or Mass Basis

### 3. Summary of Practice

3.1 The composition of a sample of LP-gas is obtained by using Test Method **D2163** or other acceptable method. From the analysis (expressed in liquid volume percent), the vapor pressure, relative density, and motor octane number of the sample may be determined.

3.2 Conversion of a compositional analysis from mole, gas-volume, or weight basis to liquid-volume is obtained by using Practice **D2421** or other suitable method.

### 4. Significance and Use

4.1 Vapor pressure is an important specification property of commercial propane and special duty propane that assures adequate vaporization, safety, and compatibility with commercial appliances. Relative density, while not a specification criterion, is necessary for determination of filling densities and custody transfer. The motor octane number (MON) is useful in determining the products' suitability as a fuel for internal combustion engines.

### 5. Calculation

5.1 *Calculated LP-Gas Vapor Pressure* (see Test Method **D1267**):

5.1.1 Calculate the partial gage vapor pressure due to each component in the mixture as follows:

$$\text{Partial gage vapor pressure} = (vp' \times C)/100 \quad (1)$$

where:

$vp'$  = vapor pressure factor of specific component at 37.8°C (100°F) (see **Table 1**), and

$C$  = liquid volume percent of component in the mixture.

5.1.2 Add the partial gage vapor pressures due to all components, rounding to the nearest 7kPa (1psi). The total is reported as the LP-gas vapor pressure of the sample, kPa gage at 37.8°C (100°F).

5.2 *Calculated Relative Density* (see Test Method **D1657**):

5.2.1 Calculate the relative mass of each component in the mixture as follows:

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee **D02** on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee **D02.H0** on Liquefied Petroleum Gas.

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<sup>2</sup> 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.