



Designation: D2421 – 02(Reapproved 2007)

Standard Practice for Interconversion of Analysis of C₅ and Lighter Hydrocarbons to Gas-Volume, Liquid-Volume, or Mass Basis¹

This standard is issued under the fixed designation D2421; 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 practice describes the procedure for the interconversion of the analysis of C₅ and lighter hydrocarbon mixtures to gas-volume (mole), liquid-volume, or mass basis.

1.2 The computation procedures described assume that gas-volume percentages have already been corrected for non-ideality of the components as a part of the analytical process by which they have been obtained. These are numerically the same as mole percentages.

1.3 The procedure assumes the absence of nonadditivity corrections for mixtures of the pure liquid compounds. This is approximately true only for mixtures of hydrocarbons of the same number of carbon atoms, and in the absence of diolefins and acetylenic compounds.

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

1.5 *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. Source of Data

2.1 The basic values for the relative density 15.6/15.6°C (60/60°F) of the pure compounds have been obtained from the Thermodynamics Research Center, Texas A & M University, except where otherwise noted. The values for methane, ethylene, and acetylene are not those of pure materials but are assumed to apply as a component of a liquid mixture.

2.2 The conversion factors for 1 mL of ideal gas at 15.6°C (60°F) and 101.3 kPa (760 mm Hg) to millilitres of liquid at 15.6°C (60°F) have been calculated as follows:

1 mL gas at 15.6°C (60°F), 101.3 kPa (760 mm Hg),

$$L = (273.16/288.72) \times (M/22414) \quad (1)$$

$$\times [1/[(\text{relative density}) \times (0.99904)]]$$

$$4.2251 \times 10^{-5} \times (M/\text{relative density})$$

$$= \text{millilitres liquid at } 15.6^\circ\text{C } (60^\circ\text{F})$$

where:

M = molecular mass of the pure compound,
and

Relative density = relative density, 15.6/15.6°C (60/60°F)
(vacuum), of the pure compound.

2.3 Where ideal gas volumes have been measured at temperatures and pressures different from 15.6°C (60°F) at 101.3 kPa (760 mm Hg), they must be corrected to these conditions.

3. Significance and Use

3.1 For custody transfer and other purposes, it is frequently necessary to convert a component analysis of light hydrocarbon mixture from one basis (either gas-volume, liquid volume, or mass) to another.

3.2 The component distribution data of light hydrocarbon mixtures can be used to calculate physical properties such as relative density, vapor-pressure, and calorific value. Consistent and accurate conversion data are extremely important when calculating vapor, liquid, or mass equivalence.

4. Procedure

4.1 To convert from the original to the desired basis, multiply or divide the percent of each compound in the original basis according to the schedule shown in Table 1. Perform the calculation, using the corresponding factor indicated in Table 2. Carry at least one more significant figure in all of the calculations than the number of significant figures in the original analysis.

NOTE 1—The factors or percentages can be multiplied by any constant number for convenience (such as moving the decimal) without changing the end result.

4.2 Add the products or quotients obtained in accordance with 4.1.

¹ 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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4.3 Multiply the products or quotients obtained in accordance with 4.1 by 100 divided by the sum of the products or