



Designation: D8236 – 18

Standard Practice for Preparing an Equilibrium Liquid/Vapor Sample of Live Crude Oil, Condensates, or Liquid Petroleum Products Using a Manual Piston Cylinder for Subsequent Liquid Analysis or Gas Analysis¹

This standard is issued under the fixed designation D8236; 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 covers the preparation of an equilibrium gas sample of live crude oil, condensate, or liquid petroleum products, using a Practice D8009 manual piston cylinder (MPC) as a vapor tight expansion chamber to generate an equilibrium vapor/liquid pair at a known temperature and vapor/liquid ratio (V/L). Inert gas such as helium or argon is injected to the equilibrium vapor space of the MPC to provide an equilibrium vapor sample sufficiently above atmospheric pressure for subsequent analysis using a standard refinery gas analyzer (RGA) such as described in Test Method D7833. Other gas analysis methods may be used provided they meet the minimum performance criteria stated in 7.4.1.

1.2 This practice is suitable for UN Class 3 Liquid samples having vapor pressures between 0 kPa and 300 kPa at 50.0 °C, and 0.1:1 to 4:1 vapor/liquid ratio, spanning the nominal range near bubble point (Test Method D6377 VPCr,0.1) to Test Methods D323 (RVP), D4953, and D5191 (V/L=4). The temperature may vary over a wide range, provided that the cylinder is maintained at isothermal and isobaric conditions to prevent condensation of equilibrium vapor upon cooling either in the cylinder or in the injection system of the Refinery Gas Analyzer (RGA, Test Method D7833). The method is best suited for preparation of an equilibrium gas/liquid pair near ambient conditions, typical of routine daily operations in a typical refinery quality assurance or marine terminal laboratory, to routinely monitor the light ends content of crude oil receipts.

1.3 This practice is suitable to prepare an equilibrium liquid/vapor sample pair in a sealed sampling system (no light ends loss from either phase). The equilibrium gas phase is suitable for subsequent gas analysis of both hydrocarbon and fixed/inert gases in the sample, including: hydrogen, oxygen,

nitrogen, carbon dioxide, carbon monoxide, hydrogen sulfide, C1 to C7 hydrocarbons at levels consistent with the Test Method D7833 method used. The equilibrium liquid phase can be subsequently analyzed by Test Method D8003 to obtain paired analytical results on both the equilibrium liquid and vapor pair with a sealed sample system.

1.4 Addition of the diluent gas provides a positive pressure sample to allow the use of a typical RGA-type gas injection system that operates only slightly above barometric pressure. The preferred diluent gas shall be the same as the carrier gas used in the RGA (typically helium or argon). Choice of diluent or carrier gas may affect the ability to detect some inert gases (especially O₂ or H₂) in some RGA configurations conforming to Test Method D7833.

1.5 The VLE gas generation and subsequent RGA output is used as a screening method to identify gas components that can be present in the crude oil affecting the total vapor pressure. The RGA output only represents the equilibrium vapor components present and relative to one another. Due to dilution of the VLE gas with inert gas, the RGA output does not purport to accurately provide the actual vapor composition at VLE conditions and is definitely not representative of the composition of the whole sample.

1.6 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.7 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This practice is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.08 on Volatility.

Current edition approved Dec. 15, 2018. Published February 2019. DOI: 10.1520/D8236-18.