



Designation: D 1015 – 99

An American National Standard

Standard Test Method for Freezing Points of High-Purity Hydrocarbons¹

This standard is issued under the fixed designation D 1015; 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 test method describes a procedure for the precise measurement of the freezing points of high-purity hydrocarbons.

1.2 The values stated in SI units are to be regarded as the standard. The values 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.* For specific hazard statements, see 5.1, 6.1 and 6.2.

NOTE 1—For the calculation of the molal purity of essentially pure compounds from measured freezing points and for procedures to be used for the sampling and determination of purity of certain specific compounds, see Test Method D 1016.

2. Referenced Documents

2.1 ASTM Standards:

- D 1016 Test Method for Purity of Hydrocarbons from Freezing Points²
- D 1265 Practice for Sampling Liquefied Petroleum (LP) Gases (Manual Method)²
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³

3. Summary of Test Method

3.1 The precise experimental measurement of the freezing point is made from interpretation of time-temperature freezing or melting curves.⁴

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04.OD on Physical Methods.

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² Annual Book of ASTM Standards, Vol 05.01.

³ Annual Book of ASTM Standards, Vol 05.02.

⁴ For details not given here, see Glasgow, A. R., Jr., Rossini, F. D., and Streiff, A. J., "Determination of the Purity of Hydrocarbons by Measurement of Freezing Points," *Journal of Research*, JNBAA, National Institute of Standards and Technology, Vol 35, No. 6, 1945, p. 355.

4. Significance and Use

4.1 The freezing point measured by this test method, when used in conjunction with the physical constants for the hydrocarbons listed in Test Method D 1016, allows the determination of the purity of the material under test. A knowledge of the purity of these hydrocarbons is often needed to help control their manufacture and to determine their suitability for use as reagent chemicals or for conversion to other chemical intermediates or finished products.

5. Apparatus

5.1 *Freezing-Point Apparatus*,⁵ as shown in Fig. 1, Fig. 2, and Fig. 3, comprising a freezing tube, a metal sheath for the freezing tube, a Dewar flask for the cooling bath, a Dewar flask for the warming bath, a stirring mechanism, suitable clamps and holders for the parts, and the absorption tubes. The outer walls of all Dewar flasks can be covered with adhesive tape to minimize danger from glass in case of breakage. (**Warning:** When using liquid nitrogen as a refrigerant, provide a means to prevent condensation of oxygen in the space between the freezing tube and the metal sheath and subsequent sealing of the space by ice forming on the asbestos collar. Provide the metal sheath with suitable openings in the *sides* and *bottom*. Failure to do this may result in breakage of the freezing tube when the liquefied oxygen evaporates within the sealed space.)

5.2 *Resistance Bridge*,⁶ Mueller type, reading from 0.0001 to 50 Ω , in steps of 0.001 Ω .

⁵ A suitable apparatus is available from Reliance Glass Works, Inc., Bensenville, IL, Cat. No. R6878–100.

⁶ Apparatus described in 5.2, 5.3, 5.4 and 5.5 was manufactured by the Leeds and Northrup Co., Philadelphia, PA, under the following catalog numbers: resistance bridge, No. 8069 B; platinum resistance thermometer, No. 8163 B; galvanometer, highest precision, No. 2284 D; galvanometer, routine precision, No. 2430 A; lamp and scale, No. 2100. The galvanometer, routine precision, No. 2430-A, and the lamp and scale, No. 2100, are still available from Leeds and Northrup. The platinum resistance thermometer, No. 8163-B, is no longer available from Leeds and Northrup, but is available with the same part number from Yellow Springs Instrument Co., Yellow Springs, OH. The resistance bridge No. 8069-B, and the galvanometer, highest precision, No. 2284-D, are no longer available; however, they may be obtainable from instrument exchanges or used equipment suppliers. If other available instrumentation is substituted for the original, the precision statement of Section 13 will not apply.