



Standard Test Method for Vapor Pressure of Liquids by Ebulliometry¹

This standard is issued under the fixed designation E1719; 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 procedures for determination of the vapor pressure of liquids by ebulliometry (boiling point measurements). It is applicable to pure liquids and azeotropes that have an atmospheric boiling point between 285 and 575 K and that can be condensed completely and returned to the ebulliometer boiler, that is, all materials must be condensable at total reflux. Liquid mixtures may be studied if they do not contain non-condensable components. Liquid mixtures that contain trace amounts of volatile but completely condensable components may also be studied, but they will produce vapor pressure data of greater uncertainty. Boiling point temperatures are measured at applied pressures of 1.0 to 100 kPa (7.5 to 760 torr).

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 There is no ISO equivalent to this standard.

1.4 *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 Section 8.

2. Referenced Documents

2.1 ASTM Standards:²

D1193 Specification for Reagent Water

D2879 Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscopes

E1 Specification for ASTM Liquid-in-Glass Thermometers

E177 Practice for Use of the Terms Precision and Bias in

¹ This test method is under the jurisdiction of ASTM Committee E37 on Thermal Measurements and is the direct responsibility of Subcommittee E37.01 on Calorimetry and Mass Loss.

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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.

ASTM Test Methods

E1142 Terminology Relating to Thermophysical Properties

E1194 Test Method for Vapor Pressure (Withdrawn 2013)³

E1970 Practice for Statistical Treatment of Thermoanalytical Data

3. Terminology

3.1 Definitions:

3.1.1 The following terms are applicable to this test method and can be found in Terminology E1142; boiling temperature and vapor pressure.

3.1.2 For definitions of other terms used in this test method refer to Terminology E1142.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *ebulliometer*—a one-stage, total-reflux boiler designed to minimize superheating of the boiling liquid.

3.2.2 *manostat*—a device for maintaining constant vacuum or pressure.

3.2.3 *superheating*—the act of heating a liquid above the equilibrium boiling temperature for a particular applied pressure.

3.3 Symbols:

A, B, C = Antoine vapor pressure equation constants ($\log_{10}$, kPa, K) for the Antoine vapor pressure equation: $\log_{10} P = A - B/(T + C)$.

P = vapor pressure, kPa.

T = absolute temperature, K.

4. Summary of Test Method

4.1 A specimen is charged to the ebulliometer boiler. The ebulliometer is connected to a manostat, and coolant is circulated through the ebulliometer condenser. The manostat is set at a low pressure, and the specimen is heated to the boiling temperature. The boiling temperature and manostat pressure are recorded upon reaching a steady-state, and the manostat pressure is raised to a higher value. A suitable number (usually five or more) of boiling temperature points are recorded at successively higher controlled pressures. The pressure-temperature data are fitted to the Antoine vapor pressure

³ The last approved version of this historical standard is referenced on www.astm.org.