



Designation: E1194 – 17

Standard Test Method for Vapor Pressure¹

This standard is issued under the fixed designation E1194; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This test method describes procedures for measuring the vapor pressure of pure liquid or solid compounds. No single technique is able to measure vapor pressures from 1×10^{-11} to 100 kPa (approximately 10^{-10} to 760 torr). The subject of this standard is gas saturation which is capable of measuring vapor pressures from 1×10^{-11} to 1 kPa (approximately 10^{-10} to 10 torr). Other methods, such as isoteniscope and differential scanning calorimetry (DSC) are suitable for measuring vapor pressures above 0.1 kPa. An isoteniscope (standard) procedure for measuring vapor pressures of liquids from 1×10^{-1} to 100 kPa (approximately 1 to 760 torr) is available in Test Method [D2879](#). A DSC (standard) procedure for measuring vapor pressures from 2×10^{-1} to 100 kPa (approximately 1 to 760 torr) is available in Test Method [E1782](#). A gas-saturation procedure for measuring vapor pressures from 1×10^{-11} to 1 kPa (approximately 10^{-10} to 10 torr) is presented in this test method. All procedures are subjects of U.S. Environmental Protection Agency Test Guidelines.

1.2 The gas saturation method is very useful for providing vapor pressure data at normal environmental temperatures (-40 to $+60^\circ\text{C}$). At least three temperature values should be studied to allow definition of a vapor pressure-temperature correlation. Values determined should be based on temperature selections such that a measurement is made at 25°C (as recommended by IUPAC) ([1](#)),² a value can be interpolated for 25°C , or a value can be reliably extrapolated for 25°C . Extrapolation to 25°C should be avoided if the temperature range tested includes a value at which a phase change occurs. Extrapolation to 25°C over a range larger than 10°C should also be avoided. If possible, the temperatures investigated should be above and below 25°C to avoid extrapolation altogether. The gas saturation method was selected because of its extended range, simplicity, and general applicability ([2](#)). Examples of results produced by the gas-saturation procedure during an interlaboratory

evaluation are given in [Table 1](#). These data have been taken from Reference ([3](#)).

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety problems, 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. Referenced Documents

2.1 *ASTM Standards:*³

[D2879 Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

[E1782 Test Method for Determining Vapor Pressure by Thermal Analysis](#)

2.2 *U.S. Environmental Protection Agency Test Guidelines: Toxic Substances Control Act Test Guidelines; Final Rules, Vapor Pressure*⁴

3. Terminology Definition

3.1 *vapor pressure*—a measure of the volatility in units of or equivalent to kg/m^2 (pascal) of a substance in equilibrium with the pure liquid or solid of that same substance at a given temperature ([4](#)).

4. Summary of Gas-Saturation Method

4.1 Pressures less than 1.33 kPa may be measured using the gas-saturation procedure ([4](#)).

4.2 In this test method, an inert carrier gas (for example N_2) is passed through a sufficient amount of compound to maintain saturation for the duration of the test. The compound may be coated onto an inert support (for example glass beads) or it may

¹ This test method is under the jurisdiction of ASTM Committee [E50](#) on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee [E50.47](#) on Biological Effects and Environmental Fate.

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² The boldface numbers in parentheses refer to the list of references at the end of this test method.

³ 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.

⁴ *Federal Register*, Vol 50, No. 188, 1985, pp. 39270–39273.