



Standard Test Method for Humidity Calibration (or Conformation) of Humidity Generators for Use with Thermogravimetric Analyzers¹

This standard is issued under the fixed designation E2551; 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 the humidity calibration (or conformance) of humidity generators for use with thermogravimetric analyzers and other thermal analysis apparatus. The humidity range covered is 5 to 95 % relative humidity (% RH) and the temperature range is 0 to 80°C.

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 are no ISO equivalents 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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D1193 Specification for Reagent Water](#)

[E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)

[E473 Terminology Relating to Thermal Analysis and Rheology](#)

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

[E1142 Terminology Relating to Thermophysical Properties](#)

[E1582 Practice for Calibration of Temperature Scale for Thermogravimetry](#)

3. Terminology

3.1 Specific technical terms used in this standard are defined in Terminologies [E473](#) and [E1142](#). These terms include *thermal curve* and *thermogravimetric analysis*.

¹ This test method is under the jurisdiction of ASTM Committee [E37](#) on Thermal Measurements and is the direct responsibility of Subcommittee [E37.10](#) on Fundamental, Statistical and Mechanical Properties.

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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.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *relative humidity, n*—the ratio of actual partial pressure of water to the saturated water vapor pressure at the same temperature, expressed as a percentage.

3.2.2 *water activity, n*—the ratio of actual partial pressure of water to the saturated water vapor pressure at the same temperature, expressed as a decimal fraction.

3.2.2.1 *Discussion*—Water activity is also known as relative pressure in some applications areas.

3.2.3 *first-deviation-from-baseline, n*—the relative humidity or water activity at which a deflection from the established baseline is first observed.

4. Summary of Test Method

4.1 Humidity generators are devices aimed at producing a specific level of humidity in the purge gas used by thermogravimetric analyzers or other thermal analysis apparatus. The requested humidity levels may be held constant (isohum) or increased or decreased in a continuous or stepped fashion.

4.2 The humidified purge gas is submitted to a thermogravimetric analyzer in which the weight of a hygroscopic material is observed. The relative humidity (or activity) of the moisture in the purge gas is stepped or scanned through a humidity range. At a fixed humidity of the purge gas, the test specimen deliquesces and gains weight. In Test Method A, the humidity of the onset of this weight gain is taken as the humidity calibration point. In Methods B and C, the rate of weight change is zero at the humidity calibration point.

5. Significance and Use

5.1 This test method calibrates or demonstrates conformity of the humidity level in a purge gas generated by a humidity generator at a fixed temperature. Such calibration or demonstration of conformity may be required by quality initiatives.

5.2 Conformance demonstrates that the humidified purge gas is within some established limits.

5.3 Calibration provides an offset and or slope value that may be used for establishing the relative humidity scale of the apparatus.