



Standard Test Method for Melting And Crystallization Temperatures By Thermal Analysis¹

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1. Scope

1.1 This test method describes the determination of melting (and crystallization) temperatures of pure materials by differential scanning calorimetry (DSC) and differential thermal analysis (DTA).

1.2 This test method is generally applicable to thermally stable materials with well-defined melting temperatures.

1.3 The normal operating range is from -120 to 600°C for DSC and 25 to 1500°C for DTA. The temperature range can be extended depending upon the instrumentation used.

1.4 Computer or electronic based instruments, techniques, or data treatment equivalent to those in this test method may be used.

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

1.6 *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:²

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

[E793 Test Method for Enthalpies of Fusion and Crystallization by Differential Scanning Calorimetry](#)

[E967 Test Method for Temperature Calibration of Differential Scanning Calorimeters and Differential Thermal Analyzers](#)

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.

[E1142 Terminology Relating to Thermophysical Properties](#)

3. Terminology

3.1 *Definitions*—Specialized terms used in this test method are defined in Terminologies [E473](#) and [E1142](#).

4. Summary of Test Method

4.1 The test method involves heating (or cooling) a test specimen at a controlled rate in a controlled environment through the region of fusion (or crystallization). The difference in heat flow (for DSC) or temperature (for DTA) between the test material and a reference material due to energy changes is continuously monitored and recorded. A transition is marked by absorption (or release) of energy by the specimen resulting in a corresponding endothermic (or exothermic) peak in the heating (or cooling) curve.

NOTE 1—Enthalpies of fusion and crystallization are sometimes determined in conjunction with melting or crystallization temperature measurements. These enthalpy values may be obtained by Test Method [E793](#).

5. Significance and Use

5.1 Differential scanning calorimetry and differential thermal analysis provide a rapid method for determining the fusion and crystallization temperatures of crystalline materials.

5.2 This test is useful for quality control, specification acceptance, and research.

6. Interferences

6.1 Test specimens need to be homogeneous, since milligram quantities are used.

6.2 Toxic or corrosive effluents, or both, may be released when heating the material and could be harmful to personnel and to apparatus.

7. Apparatus

7.1 Apparatus shall be of either type listed below:

7.1.1 *Differential Scanning Calorimeter (DSC) or Differential Thermal Analyzer (DTA)*—The essential instrumentation required to provide the minimum differential scanning calorimetric or differential thermal analyzer capability for this method includes: