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Standard Terminology Relating to Thermal Analysis and Rheology [1]

This standard is issued under the fixed designation E 473; 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 terminology is a compilation of definitions of terms used in ASTM documents relating to thermal analysis and rheology. This terminology includes only those terms for which ASTM either has standards or is contemplating some action. It is not intended to be an all-inclusive listing of terms related to thermal analysis and rheology.

1.2 This terminology specifically supports the single-word form for terms using thermo-as a prefix, such as thermoanalytical or thermomagnetometry, while recognizing that for some terms a two-word form can be used, such as thermal analysis. This terminology does not support, nor does it recommend, use of the grammatically incorrect, single-word form using thermalas a prefix, such as, thermalanalytical or thermalmagnetometry.

1.3 Definitions that are similar to those published by another standards body are identified with the abbreviation of the name of the organization: for example, ICTAC is the International Confederation for Thermal Analysis and Calorimetry.

1.4 A definition is a single sentence with additional information included in notes. It is reviewed every five years, and the year of the last review or revision is appended.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

E 1445 Terminology Relating to Hazard Potential of Chemicals

3. Terminology

adiabatic, *adj*— no heat exchange with the surroundings.

combined, *adj*—the application of two or more techniques to different samples at the same time. (ICTAC) (1999)

controlled-rate thermal analysis, (*CRTA* **),** *n*—a family of techniques that monitors the temperature versus time profile needed to maintain a chosen, fixed rate of change of a property of a substance. (ICTAC) (1999)

NOTE 1—Compared to controlled-temperature experiments, where the reaction rate tends to increase exponentially and the rate can become limited by heat or mass transfer, CRTA experiments are more likely to involve the chemical reaction as the limiting step. This technique can also improve the resolution of multiple reactions. For example, in controlled rate experiments, power to the furnace is controlled to ensure a fixed rate of mass loss (or gain).

controlled-temperature program, *n*— the temperature history experienced by a sample during the course of a thermal analysis experiment.

NOTE 2—In contrast to controlled-rate experiments, power to the furnace is controlled to ensure a fixed rate of temperature change for controlled-temperature experiments. The program may include heating or cooling segments in which the temperature is changed at a fixed rate, isothermal segments in which time becomes the explicit independent variable, or any sequence of these individual segments. If the atmosphere (or vacuum) around the sample is changed by some external action (depending on the independent variable only—temperature or time) during the course of the experiment, that too becomes part of the controlled-temperature program.

curve, thermal, *n*—the plot of a dependent parameter against an independent parameter such as temperature or time. (ICTAC) (1999)

dielectric thermal analysis, (*DETA or DEA***),** *n*—a technique in which the dielectric constant (permittivity, or capacitance) and dielectric loss (conductance) of a substance under oscillating electric field are measured as a function of temperature or time while the substance is subjected to a controlled-temperature program in a specified atmosphere. (ICTAC) (1999)

derivative, *adj*—pertaining to the first derivative (mathematical) of any curve with respect to temperature or time.

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[1] This terminology is under the jurisdiction of ASTM Committee E37 on Thermal Measurements and are the direct responsibility of Subcommittee E37.03 on Nomenclature and Definitions.

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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.