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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Plastics — Thermogravimetry of polymers — Temperature scanning method

Plastiques — Thermogravimétrie des polymères — Méthode par examen de la température

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7111 was prepared by Technical Committee ISO/TC 61, *Plastics*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Plastics — Thermogravimetry of polymers — Temperature scanning method

1 Scope and field of application

1.1 This International Standard defines the general conditions for making thermogravimetric measurements on polymers.

1.2 Thermogravimetric data may be used to determine the initial temperature and rate of decomposition of polymers; at the same time, the amounts of volatiles, additives, and fillers can also be measured.

1.3 This International Standard is applicable to polymers in the form of powders and to fabricated shapes reduced to appropriate particle size (see 7.1).

1.4 The normal operating temperature range is from ambient temperature up to 600 or 800 °C (depending on the apparatus).

2 Definition

thermogravimetry (TG) : A technique in which the mass of a substance is measured as a function of temperature while the substance is subjected to a controlled temperature programme. (ICTA¹⁾.)

3 Principle

The change in mass of a sample as a function of temperature is measured as the sample is heated at a constant rate. The data are recorded on a TG curve, with mass as the ordinate (Y-axis) and temperature as the abscissa (X-axis).

4 Significance

4.1 The thermal stability of a material is associated with the degree and rate of loss or gain of mass as a function of temperature. TG data can be used to evaluate the relative thermal behaviour of polymers of the same generic family, on the basis of measurements made under the same test conditions.

4.2 TG data may be used for process control, process development and material evaluation.

4.3 Long-term thermal stability is a complex function of service and environmental conditions. TG data alone will not describe the thermal capability of a polymer.

5 Apparatus

Any calibrated²⁾ instrument capable of performing the measurements that meet the requirements of this International Standard may be used.

6 Basic test conditions

The following test conditions shall be used :

a) Mass of sample : up to 500 mg, measured with an accuracy of 0,4 %.

b) Gas flow during the measurement :

Gas flow during the measurement : 50 to 100 ml/min of a gas selected according to the oxidative conditions required (see 8.5) as follows :

1) Procedure A — Non-oxidative conditions : an inert gas which is dry and free from oxygen shall be used as the purging gas, unless the material under test is not susceptible to oxidation, in which case dry air may be used as an alternative purging gas.

For reference purposes, the purging gas shall be nitrogen containing less than 0,001 % (m/m) of water and less than 0,001 % (V/V) of oxygen.

2) Procedure B — Oxidative conditions : air containing less than 0,001 % (m/m) of water shall be used as the purging gas.

c) Heating rate : 10 ± 1 °C/min. A slower or faster rate may be used, which shall be noted in the test report.

NOTE — Since the specifications of various instruments are different, only ranges of the experimental conditions can be given. The actual parameters should be selected according to the instrument used so that they fall within the prescribed range.

1) ICTA = International Confederation for Thermal Analysis.

2) Standard materials have been developed by ICTA for calibration of thermogravimetric testing equipment and are available from the Office of Certified Reference Materials, National Bureau of Standards, Washington, D.C. 20234. See also ASTM E 37.