
**Plastics — Thermogravimetry (TG) of
polymers —**

**Part 2:
Determination of activation energy**

Plastiques — Thermogravimétrie (TG) des polymères —

Partie 2: Détermination de l'énergie d'activation



This document is a preview generated by EKO



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Principle.....	2
5 Apparatus.....	2
6 Mass and temperature calibration.....	2
6.1 Mass calibration.....	2
6.2 Temperature calibration.....	2
7 Test specimens.....	2
8 Procedure.....	3
8.1 General.....	3
8.2 Non-oxidative reactions.....	3
8.3 Oxidative reactions.....	3
9 Expression of results.....	3
9.1 Graphical presentation.....	3
9.2 Determination of activation energy.....	3
10 Precision.....	5
11 Test report.....	5
Bibliography.....	6

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

This third edition cancels and replaces the second edition (ISO 11358-2:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the designation of rate of conversion has been changed in order to match that used in ISO 11358-3;
- the purge gas requirements have been changed with a reference to ISO 11358-1.

A list of all parts in the ISO 11358 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics — Thermogravimetry (TG) of polymers —

Part 2:

Determination of activation energy

1 Scope

This document specifies a method for the determination of the activation energy, E_a , in the Arrhenius formula for the decomposition of polymers using a thermogravimetric technique. The method is applicable only if the reaction proceeds by a single mechanism. It is applicable to multistage reactions if they consist of clearly separated single-stage steps.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11358-1, *Plastics — Thermogravimetry (TG) of polymers — Part 1: General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11358-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

Arrhenius formula

formula representing the temperature dependence of the rate constant of a reaction

Note 1 to entry: The rate constant, k , of a reaction is expressed by the Arrhenius formula, as follows:

$$k = A \cdot \exp(-E_a/RT)$$

where

R is the gas constant (= 8,314 J · K⁻¹ · mol⁻¹);

T is the absolute temperature, in kelvins (K);

A is the pre-exponential factor, in reciprocal seconds (s⁻¹);

E_a is the activation energy, in J · mol⁻¹;

k is the rate of reaction (= dC/dt), in reciprocal seconds (s⁻¹).