INTERNATIONAL STANDARD

ISO 13885-1

Third edition
2020-07

Gel permeation chromatography (GPC) —

Part 1: Tetrahydrofuran (THF) as eluent

Chromatographie par perméation de gel (GPC) —

Partie 1: Utilisation de tétrahydrofurane (THF) comme éluant

Reference number
ISO 13885-1:2020(E)

© ISO 2020



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

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 ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Principle **2**

5 Apparatus **2**
5.1 Eluent supply 2
5.2 Pump 3
5.3 Injection system 3
5.4 Separation columns 3
5.5 Column temperature control 5
5.6 Detector 5

6 Reagents **5**

7 Calibration of the apparatus **6**
7.1 General 6
7.2 Requirements for the calibration standards 6
7.3 Preparation of the calibration solutions for injection 7
7.4 Conditions for calibration runs 7
7.5 Measurement of elution volume 7
7.6 Plotting the calibration curve 7

8 Sampling **8**

9 Preparation for the test **8**
9.1 Preparation of the injection solution 8
9.2 Preparation of the apparatus 9

10 Analytical parameters **9**

11 Data acquisition and evaluation **9**
11.1 General 9
11.2 Calculation of the net chromatogram from the raw data 10
11.2.1 Determination of the baseline 10
11.2.2 Correction of the measured values and of the net chromatogram 10
11.2.3 Evaluation limits 10
11.3 Calculation of the average values 10
11.4 Calculation of the distribution curves 11

12 Precision **12**
12.1 General 12
12.2 Repeatability 12
12.3 Reproducibility 12

13 Test report **13**
13.1 General 13
13.2 General data on the equipment and settings 13
13.2.1 Data on the equipment used 13
13.2.2 Calibration 13
13.2.3 Evaluation 14
13.3 Special data on the sample 14

Annex A (informative) **Conversion of experimental parameters for variant column sizes** **16**

Annex B (informative) **Example of a data sheet for a polymer standard** **17**

Annex C (informative) **Explanations** **18**

© ISO 2020 – All rights reserved

Bibliography **23**

 © ISO 2020 – All rights reserved

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 35, *Paints and varnishes*.

This third edition cancels and replaces the second edition (ISO 13885-1:2008), which has been technically revised. The main changes compared to the previous edition are as follows:

— this document has been adapted to the actual state of the art, especially with regards to software engineering;

— the scope has been revised;

— the definition for gel-permeation chromatography has been revised;

— the text has been revised editorially.

A list of all parts in the ISO 13885 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.

© ISO 2020 – All rights reserved

Gel permeation chromatography (GPC) —

Part 1:
Tetrahydrofuran (THF) as eluent

WARNING — This document can involve hazardous materials, operations or equipment. It does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

1 Scope

This document specifies the determination of the molar-mass distribution and the average molar mass values M_n (number average) and M_w (weight average) of polymers that are soluble in tetrahydrofuran (THF) by gel permeation chromatography (GPC).

NOTE Also known as size exclusion chromatography (SEC).

Even though the chromatograms obtained show good repeatability, it is possible that this method cannot be used with certain polymer types because of specific interactions (e.g. adsorption) within the sample/eluent/column system.

The conditions specified in this document are not applicable to the GPC analysis of polymer samples with M_w values greater than 10^6 g/mol and/or of polymers with elution limits outside the calibration range (see 7.6 and Annex C).

This document includes no correction method (e.g. for the elimination of peak broadening. If absolute molar-mass values are required, an absolute method (e.g. membrane osmometry for M_n or light scattering for M_w) can be used.

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 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 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/

© ISO 2020 – All rights reserved