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Plastics — Polyethylene (PE) — Determination of co-monomer content by solution state ^{13}C-NMR spectrometry

Plastiques — polyéthylène (PE) — Détermination de la teneur en co-monomères par spectroscopie RMN du carbone 13

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Foreword

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 4504:2023), which has been technically revised.

The main changes are as follows:

— the formula in Annex B has been revised with units of mmol/mol;

— using the revised formula in Annex B, the data in Annex C, Annex D, Annex G and Annex I have been recalculated;

— the test report has been updated (see Clause 12);

— explanations for the numbers and labels above and below Figure C.1 and Figure D.1 in figure key have been added;

— figure key has been added in Figure H.1.

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 — Polyethylene (PE) — Determination of co-monomer content by solution state ^{13}C-NMR spectrometry

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the user's responsibility to establish appropriate safety and health practices.

1 Scope

This document specifies two methods for the determination of co-monomer contents of polyethylene products by solution state ^{13}C-NMR spectrometry (nuclear magnetic resonance spectrometry):

— Method A: inverse gated decoupling method;

— Method B: insensitive nuclei enhanced by polarization transfer method.

This document is applicable to copolymers of ethylene having a content of other 1-olefinic monomers of less than a mass fraction of 50 %.

This document is not applicable to ethylene homopolymers or copolymers in which ethylene is polymerized with two or more type 1-olefin comonomers.

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 472, *Plastics — Vocabulary*
ISO 648, *Laboratory glassware — Single-volume pipettes*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 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 https://www.electropedia.org/

3.1.1
INEPT
insensitive nuclei enhanced by polarization transfer
^{13}C NMR method in which magnetisation is transferred from sensitive nuclei to directly linked insensitive nuclei enhanced by polarisation transfer

Note 1 to entry: See Reference [3].