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Styrene-butadiene rubber (SBR) — Determination of the microstructure of solution-polymerized SBR

with attenuated total reflection (ATR) method

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National foreword

This British Standard is the UK implementation of ISO 21561-2:2024. It supersedes BS ISO 21561-2:2016, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/50, Raw materials (including latex) for use in the rubber industry.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Styrene-butadiene rubber (SBR) — Determination of the microstructure of solution-polymerized SBR —

Part 2: Fourier transform infrared spectrometry (FTIR) with attenuated total reflection (ATR) method

Caoutchouc styrène-butadiène (SBR) — Détermination de la microstructure du SBR polymérisé en solution —

Partie 2: Méthode par spectrométrie infrarouge à transformée de Fourier (FTIR) à réflexion totale atténuée (RTA)

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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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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 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry.*

This second edition cancels and replaces the first edition (ISO 21561-2:2016), which has been technically revised.

The main changes are as follows:

— Clause 3 has been added;

— the units of styrene content and microstructure content of butadiene have been changed to SI units;

— the conditions of FTIR spectrum have been moved to 8.1;

— a description of regression formulae has been added in 9.2.5 and 9.2.6;

— in Table A.1, one cell has been replaced by the correct value;

— in C.3.1, the measurement conditions for ^{13}C-NMR have been corrected.

A list of all parts in the ISO 21561 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.

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Part 2: Fourier transform infrared spectrometry (FTIR) with attenuated total reflection (ATR) method

WARNING 1 — 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 responsibility of the user to establish appropriate safety and health practices and to determine the applicability of any other restrictions.

WARNING 2 — Certain procedures specified in this document can involve the use or generation of substances, or the generation of waste, that can constitute a local environmental hazard. Reference should be made to appropriate documentation on safe handling and disposal after use.

1 Scope

This document specifies procedures for the quantitative determination of the microstructure of the butadiene portion and the content of styrene in solution-polymerized SBR (S-SBR) by Fourier transform infrared spectrometry (FTIR) with attenuated total reflection (ATR) method. The styrene content is expressed in mass fraction relative to the S-SBR. The contents of three microstructure types, i.e. vinyl, trans and cis, are expressed in mol fraction relative to the butadiene portion in the S-SBR. This method is only applicable to raw rubbers.

NOTE 1 Precision as shown in Annex A is not always possible to obtain for S-SBRs containing polystyrene block or styrene content more than 45 %.

NOTE 2 Only “vinyl”, “trans” and “cis”, are used in this document. However, the expression of vinyl, trans and cis mean as follows in general:

— vinyl: vinyl unit, vinyl bond, 1,2-unit, 1,2-bond, 1,2-vinyl-unit or 1,2-vinyl-bond;

— trans: 1,4-trans unit, 1,4-trans bond, trans-1,4 unit or trans1,4 bond;

— cis: 1,4-cis unit, 1,4-cis bond, cis-1,4 unit or cis-1,4 bond.

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 1382, *Rubber — Vocabulary*

ISO 1795, *Rubber, raw natural and raw synthetic — Sampling and further preparative procedures*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1382 apply.

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