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Rubber, raw synthetic — Determination of the molecular-mass distribution of solution polymers by gel permeation chromatography

Caoutchouc synthétique brut — Détermination de la répartition de la masse moléculaire pour les caoutchoucs polymérisés en solution par chromatographie par perméation de gel

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This second edition cancels and replaces the first edition (ISO 11344:2004), which has been technically revised by replacing the hazardous *o*-dichlorobenzene with BHT (butylated hydroxy toluene) in the procedure. It also incorporates the Technical Corrigendum ISO 11344:2004/Cor.1:2008.

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Rubber, raw synthetic — Determination of the molecular-mass distribution of solution polymers by gel permeation chromatography

WARNING 1 — Persons using this International Standard should be familiar with normal laboratory practice. This International Standard 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.

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

1 Scope

This International Standard describes a method for the determination of the molecular mass, expressed as polystyrene, and the molecular-mass distribution of polymers produced in solution which are completely soluble in tetrahydrofuran (THF) and which have a molecular-mass range from 5×10^3 to 1×10^6.

It is not the purpose of this International Standard to explain the theory of gel permeation chromatography.

2 Principle

The molecular components of a polymer are separated on the basis of macromolecule size on a gel permeation column. A known quantity of a dilute solution of the polymer is injected into a stream of solvent, which carries it through the column at a constant rate. The concentration of the separated molecular components in the solvent stream is measured by a suitable detector. Through the use of a calibration curve, both the number-average molecular mass (M_n) and mass-average molecular mass (M_w) of the material analysed can be determined from the retention time and the corresponding concentration.

3 General

3.1 Gel permeation chromatography (GPC), which is also known as size exclusion chromatography (SEC), is a particular type of liquid chromatography which allows the separation of the various components of a polymer based on molecular size.

3.2 The molecules of a polymer do not all have the same mass, but comprise a range of different masses. For this reason, the usual concept of molecular mass is not applicable to polymeric materials. Instead, different average molecular masses are determined as shown in Table 1.

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