
**Styrene-butadiene rubber, raw —
Determination of soap and organic-
acid content**

*Caoutchouc butadiène-styrène brut — Détermination de la teneur en
savons et acides organiques*





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Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Reagents	2
6 Apparatus	2
7 Sampling and sample preparation	3
8 Procedure	3
8.1 Preparation of the test solution.....	3
8.2 Method A — Titration method using indicator reagent.....	3
8.2.1 Procedure for determination of soap content.....	3
8.2.2 Procedure for determination of organic-acid content.....	3
8.3 Method B — Titration method using automatic potentiometric titrator.....	4
8.3.1 Procedure for determination of soap content.....	4
8.3.2 Procedure for determination of organic-acid content.....	4
8.4 Method C — Back titration method using automatic potentiometric titrator.....	4
8.4.1 Preparation.....	4
8.4.2 Sample titration procedure.....	6
8.4.3 Blank titration procedure.....	6
8.4.4 Determination of equivalence points.....	6
9 Expression of results	6
9.1 Soap content.....	6
9.2 Organic-acid content.....	7
10 Precision data	8
11 Test report	8
Annex A (informative) Test for rosin	9
Annex B (informative) Precision data for method C	10
Bibliography	12

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).

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For an explanation on 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 the following URL: 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 fifth edition cancels and replaces the fourth edition (ISO 7781:2008), which has been technically revised.

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

- addition of a new Method C ([8.4](#)) for the back titration using automatic potentiometric titrator;
- update of Method B ([8.3](#)) for the titration method using automatic potentiometric titrator;
- deletion of buffer solutions of pH 7, pH 4 and pH 9 (former 4.6 to 4.8);
- addition of pipette ([6.9](#)) and automatic potentiometric titrator ([6.11](#));
- update of the expression of results ([Clause 9](#));
- addition of precision data in informative [Annex B](#);
- addition of a bibliography.

Styrene-butadiene rubber, raw — Determination of soap and organic-acid content

1 Scope

This document specifies three methods for the determination of the soap and organic-acid content of raw styrene-butadiene rubber (SBR).

- Method A is the titration method using indicator reagent.
- Method B is the titration method using an automatic potentiometric titrator.
- Method C is the back titration method using an automatic potentiometric titrator.

Since the soaps and organic acids present in the rubber are not single chemical compounds, the method gives only an approximate value for the soap and organic-acid content.

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 385, *Laboratory glassware — Burettes*

ISO 648, *Laboratory glassware — Single-volume pipettes*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

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

ISO 4799, *Laboratory glassware — Condensers*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Principle

A weighed test portion of the rubber, in the form of thin strips, is extracted using an ethanol-toluene azeotrope, or, for alum-coagulated rubber, using an ethanol-toluene-water mixture. After making up to a standard volume, an aliquot portion of the extract is withdrawn and titrated with acid-base titration.

- Method A: Titrate with standard acid for the determination of soap and with standard alkali for the determination of organic acid using indicator reagent.
- Method B: Titrate with standard acid for the determination of soap and with standard alkali for the determination of organic acid using automatic potentiometric titrator. The titration equivalence point is determined by inflection point.

- Method C: Back titrate with standard alkali for the determination of soap and organic acid after adding sufficient acid. The titration equivalence point is determined by inflection point.

For methods A and B, there are no precision data available. Therefore their precision is not known. For method C, if the quantity of soap is very low, the standard deviation of the measurement of soap content should be looked at carefully.

5 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

5.1 Ethanol-toluene azeotrope (ETA).

Mix seven volumes of absolute ethanol with three volumes of toluene. Alternatively, mix seven volumes of commercial-grade ethanol with three volumes of toluene, and boil the mixture with anhydrous calcium oxide (quicklime) under reflux for 4 h. Cool to room temperature and decant through No. 42 filter paper.

5.2 Ethanol-toluene-water mixture.

Mix 95 cm³ of ETA ([5.1](#)) and 5 cm³ of water.

5.3 Sodium hydroxide solution, $c(\text{NaOH}) = 0,1 \text{ mol/dm}^3$, accurately standardized.

5.4 Thymol blue indicator.

Dissolve 0,06 g of thymol blue in 6,45 cm³ of 0,02 mol/dm³ sodium hydroxide solution and dilute to 50 cm³ with water.

5.5 Hydrochloric acid, $c(\text{HCl}) = 0,05 \text{ mol/dm}^3$, accurately standardized.

6 Apparatus

Use ordinary laboratory apparatus and the following.

6.1 Balance, accurate to 1 mg.

6.2 Hotplate.

6.3 Wide-mouthed conical flask, of capacity 400 cm³ to 500 cm³.

6.4 Volumetric flask, of capacity 250 cm³, complying with the requirements of ISO 1042.

6.5 Reflux condenser, complying with the requirements of ISO 4799.

6.6 Conical flask, of capacity 250 cm³.

NOTE Alternatively, a Soxhlet extractor can be used instead of a reflux condenser and a conical flask.

6.7 Burette, of capacity 25 cm³, complying with the requirements of ISO 385.

6.8 Pipette, of capacity 100 cm³, complying with the requirements of ISO 648.