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Rubber latex, synthetic — Determination of mechanical stability —

Part 1: High-speed method

Latex de caoutchouc synthétique — Détermination de la stabilité mécanique —

Partie 1: Méthode à vitesse élevée

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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 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 2006-1:2009), which has been technically revised.

The main changes are as follows:

— addition of 45 µm ± 5 µm preliminary filter and test filter in 6.2 and 6.3;

— addition of the applicable situation for 45 µm ± 5 µm filter in 8.1;

— modification of Formula (1) and Formula (2) in 9.2 and 9.3;

— addition of the specification of the filter in the test report in Clause 11;

— correction of data in Table A.3;

— addition of the precision data for 45 µm ± 5 µm filter in Annex A.

A list of all parts in the ISO 2006 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.

Introduction

The mechanical stability of synthetic latices is important in a variety of manufacturing processes, and a number of empirical methods are used for testing. This document provides a method of determining the mechanical stability by stirring a test portion of latex at a high speed without applying pressure.

Rubber latex, synthetic — Determination of mechanical stability —

Part 1:
High-speed method

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

WARNING — Certain procedures specified in this document will possibly 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 document specifies a method for the determination of the high-speed mechanical stability of synthetic rubber latex.

The method is not applicable to compounded synthetic rubber latices.

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 123, *Rubber latex — Sampling*

ISO 124, *Latex, rubber — Determination of total solids content*

ISO 1652, *Rubber latex — Determination of apparent viscosity by the Brookfield test method*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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
mechanical stability
resistance to coagulation of latex when subjected to mechanical shear under specified conditions

Note 1 to entry: The greater the percentage of coagulum formed [w_c (A) and w_c (B) as defined in 9.2 and 9.3], the poorer the mechanical stability.

4 Principle

A test portion of latex is stirred at a high speed for a given time, and the coagulum formed is separated and weighed. The mass of coagulum formed is inversely proportional to the mechanical stability. Latices with a viscosity of over 200 mPa·s require dilution.

5 Reagents

During the analysis, use only carbonate-free distilled water or water of equivalent purity.

5.1 Surfactant solution, 50 g/kg solution of potassium oleate of pH value 10 ± 0,5 or, for use with a latex which is coagulated by potassium oleate solution, a 50 g/kg solution of a synthetic anionic or non-ionic surfactant.

6 Apparatus

Ordinary laboratory apparatus, and the following.

6.1 Mechanical stability measuring apparatus, consisting of the items specified in 6.1.1 and 6.1.2.

6.1.1 Latex container, flat-bottomed, cylindrical, at least 100 mm high, with an internal diameter of 58 mm ± 2 mm and a wall thickness of about 2,5 mm. The inner surface shall be smooth, and a glass container is preferred.

6.1.2 Stirring apparatus, consisting of a vertical stainless-steel shaft of sufficient length to reach the bottom of the latex container (6.1.1) and tapering to approximately 6,3 mm diameter at its lower end. A horizontal, smooth, stainless-steel disc 36,12 mm ± 0,03 mm in diameter and 1,57 mm ± 0,05 mm thick is attached to the shaft by means of a threaded stud at the exact centre of the disc. The apparatus shall maintain a stirring speed of 14 000 min^{-1} ± 200 min^{-1} throughout a test, at which frequency the shaft shall not run out of true by more than 0,25 mm.

NOTE The specified stirring disc has a diameter greater than that specified for natural rubber latex concentrate in ISO 35.

6.1.3 Holder, for the latex container (6.1.1). The holding arrangement shall ensure that the axis of the rotating shaft is concentric with the axis of the latex container and that the bottom of the stirring disc is at 13 mm ± 1 mm from the inner surface of the bottom of the latex container.

6.2 Preliminary filter, of stainless-steel wire cloth with an average aperture width of 180 µm ± 10 µm and/or 45 µm ± 5 µm, in accordance with ISO 3310-1.

6.3 Test filter, consisting of a disc of stainless-steel wire cloth with an average aperture width of 180 µm ± 10 µm and/or 45 µm ± 5 µm, in accordance with ISO 3310-1, dried to constant mass and weighed to the nearest 1 mg, firmly clamped between two stainless-steel rings of equal internal diameter between 25 mm and 50 mm.

7 Sampling

Carry out sampling in accordance with one of the methods specified in ISO 123.

8 Procedure

8.1 To determine the latex with good mechanical stability, such as latex intended for high-speed coating application or paper industry, the filter with an average aperture width of 45 µm ± 5 µm should be used.

8.2 If the total solids content of the latex is not known, it shall be determined in accordance with ISO 124. If the viscosity of the latex, determined with the L instrument in accordance with ISO 1652, exceeds 200 mPa·s, dilute it to this or a lower value with an amount of water (see Clause 5) which reduces the concentration of the latex by no more than 10 % (by mass) total solids content.

NOTE Dilution of the latex can decrease its stability since the balance of free and absorbed soap is changed.

8.3 Adjust the temperature of the latex to 25 °C ± 3 °C by means of a suitable heating device, then pass it through the preliminary filter (6.2) into a beaker and accurately transfer 50 g ± 0,5 g to the latex container (6.1.1), recording the mass, *m*.

8.4 Secure the latex container in the holder (6.1.3) of the apparatus and start the stirrer, ensuring that the stirring speed (see 6.1.2) is 14 000 min^{-1} ± 200 min^{-1}. Stir the latex for a time between 1 min and 30 min, as agreed between the interested parties, but of duration such that the latex does not increase in temperature to more than 60 °C and does not rise to a height exceeding 100 mm in the container. In the case of a latex which contains ammonia, the duration of stirring shall be limited since loss of ammonia by evaporation during the test can cause additional destabilization. If it is necessary to control foaming, a paste of a silicone defoamer shall be smeared around the upper part of the inner surface of the container.

8.5 Immediately after the termination of stirring, remove the latex container and wash the stirrer shaft and disc free from latex deposits with surfactant solution (5.1) or water (see Clause 5). Collect the washings in a beaker.

8.6 Wet the test filter (6.3) with surfactant solution or water and pour the latex and washings onto the test filter. Use surfactant solution or water to ensure quantitative transfer of all latex and deposits of coagulum, including skin.

8.7 Wash the residue on the test filter with surfactant solution or water until it is free from latex and no longer cloudy, then wash with water until the washings are clear.

8.8 Carefully remove the test filter containing the wet solid matter and blot the underside with filter paper. Place the filter on a watch glass.

8.9 Dry the watch glass with the test filter containing the coagulum at 100 °C ± 5 °C. After 15 min of drying, transfer to a desiccator and allow to cool to ambient temperature. Then carefully remove the filter from the watch glass and weigh. Repeat the drying procedure for periods of 15 min until the loss in mass between two successive weighings is less than 1 mg.

8.10 Carry out the procedure described in 8.3 to 8.9 in duplicate.

9 Expression of results

9.1 General

There are two methods of expressing the test result, as described in 9.2 and 9.3.

9.2 Method A

The mechanical stability of the latex is expressed as the percentage by mass of formed coagulum, w_c (A), relative to the mass of the test portion of latex, calculated using Formula (1):

$$w_c(\mathrm{A}) = \frac{m_2 - m_1}{m} \times 100 \quad (1)$$

where

m_2 is the mass of the formed coagulum and the test filter, in grams;

m_1 is the mass of the test filter, in grams;

m is the mass of the test portion, in grams.

NOTE The greater the percentage of coagulum formed, the poorer the mechanical stability.

9.3 Method B

The mechanical stability of the latex is expressed as the percentage by mass of formed coagulum, w_c (B), relative to the total solids content of the latex, calculated using Formula (2):

$$w_c(\mathrm{B}) = \frac{m_2 - m_1}{m_o} \times 100 \quad (2)$$

where

m_2 is the mass of the formed coagulum and the test filter, in grams;

m_1 is the mass of the test filter, in grams;

m_o is the total solids mass of the test portion calculated using Formula (3), in grams.

$$m_o = \frac{m \times \omega_{TS}}{100} \quad (3)$$

where

m is the mass of the test portion, in grams;

ω_{TS} is the total solids content of the latex sample, as a percentage by mass (see 8.2).

NOTE The greater the percentage of coagulum formed, the poorer the mechanical stability.

10 Precision

See Annex A.

11 Test report

The test report shall include the following:

a) a reference to this document, i.e. ISO 2006-1:2022;

b) all details necessary for the identification of the sample;

c) the specification of the filter used for determination, such as 180 µm or 45 µm;