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Natural rubber latex concentrate — Determination of alkalinity

Latex concentré de caoutchouc naturel — Détermination de l'alcalinité

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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 seventh edition cancels and replaces the sixth edition (ISO 125:2011), which has been technically revised. The main changes are as follows:

— addition of 5.2.1 on the standardization of sulfuric acid;

— update of 8.3 to include titration with sulfuric acid;

— update of the precision statement in Annex A.

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.

Natural rubber latex concentrate — Determination of alkalinity

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 determine the applicability of regulatory limitations.

1 Scope

This document specifies a method for the determination of the alkalinity of natural rubber latex concentrate.

The method is not necessarily suitable for latices from natural sources other than *Hevea brasiliensis* or for synthetic rubber latices, compounded latex, vulcanized latex or artificial dispersions of rubber.

NOTE A method for the determination of the alkalinity of polychloroprene latex is specified in ISO 13773.

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 976, *Rubber and plastics — Polymer dispersions and rubber latices — Determination of pH*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

A test portion of latex concentrate is titrated with acid to pH 6 in the presence of a stabilizer to prevent coagulation, either electrometrically or with methyl red as a visual indicator. The alkalinity is calculated from the quantity of acid required.

5 Reagents

Use distilled water or water of equivalent purity, wherever water is specified, and reagents of recognized analytical quality.

5.1 Stabilizer solution: 5 % (by mass) solution of a non-ionic stabilizer of the alkyl phenol polyethylene oxide condensate type. Before use, the pH of the solution shall be adjusted to a value of 6,0 ± 0,05.

5.2 Sulfuric acid, $c(H_2SO_4)$ = 0,05 mol/dm^3, or **hydrochloric acid**, c(HCl) = 0,1 mol/dm^3, standard volumetric solution.

5.2.1 Standardization of sulfuric acid, standardize 0,05 mol/dm^3 H_2SO_4 by pipetting 10 cm^3 of 0,05 mol/dm^3 Na_2CO_3 solution (5.5) into a flask and titrating with 0,05 mol/dm^3 H_2SO_4, using methyl orange (5.4) as indicator.

5.2.2 Standardization of hydrochloric acid, standardize 0,1 mol/dm^3 HCl by pipetting 10 cm^3 of 0,05 mol/dm3 Na_2CO_3 solution (5.5) into a flask and titrating with 0,1 mol/dm^3 HCl, using methyl orange (5.4) as indicator.

5.3 Methyl red, 0,1 % solution in ethanol of minimum purity 95 % (by volume).

5.4 Methyl orange, 0,1 % solution in ethanol of minimum purity 95 % (by volume).

5.5 Sodium carbonate solution, $c(Na_2CO_3)$ = 0,05 mol/dm^3.

Dry the Na_2CO_3 used to prepare this solution at 120 °C ± 5 °C for 2 h before preparing the solution.

6 Apparatus

Standard laboratory equipment together with:

6.1 Electrical stirrer, with earthed (grounded) motor and non-metallic propeller-type blade, or **magnetic stirrer**.

6.2 pH-meter, equipped with a combined electrode suitable for use in solutions up to pH 12, as specified in ISO 976, and capable of being read to 0,02 pH-units.

6.3 Balance, capable of being read to 0,01 g.

7 Sampling

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

8 Procedure

8.1 General

Carry out the determination in duplicate.

Add, while stirring, 10 cm^3 of stabilizer solution (5.1) to about 200 cm^3 of water in a 400 cm^3 beaker.

Weighing to the nearest 10 mg, add between 5 g and 10 g of the latex concentrate by difference from a weighing bottle and stir until thoroughly mixed.

Ensure that the latex is added so that none runs down the side of the beaker (which could result in loss of ammonia) or down the side of the weighing bottle.

Titrate the resulting mixture either by the method described in 8.2 or by that described in 8.3.

8.2 Potentiometric titration

Insert the electrode of the pH-meter and, with continual stirring, add sulfuric acid or hydrochloric acid solution (5.2) from a burette, adding the acid drop by drop on approaching the end point of pH 6,0 ± 0,05.

8.3 Titration using a visual indicator

Add two or three drops of methyl red (5.3) to the mixture and titrate with 0,05 mol/dm^3 H_2SO_4 or 0,1 mol/dm^3 HCl (see 5.2), taking as the end point the colour change from yellow to pink.

9 Expression of results

9.1 Depending on whether the latex concentrate has been preserved with ammonia or potassium hydroxide, calculate the alkalinity as specified in 9.2 or 9.3, respectively.

9.2 If the latex concentrate is preserved with ammonia, calculate the alkalinity (as NH_3), A_{NH3}, as the percentage (by mass) of ammonia (NH_3) in the latex concentrate, according to Formula (1):

$$A_{NH3} = \frac{F_1\, c\, V}{m} \tag{1}$$

where

F_1 is a factor: 1,7 for hydrochloric acid or 3,4 for sulfuric acid;

c is the actual concentration, expressed in moles of HCl or H_2SO_4 per cubic decimetre of acid used;

V is the volume of acid used, in cubic centimetres;

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

Report the result as the mean of the duplicate determinations. If the individual results differ by more than 0,01 units from the mean where the actual alkalinity is above 0,5 units, or by more than 0,005 units from the mean where the actual alkalinity is 0,5 units or less, repeat the determination.

9.3 If the latex is preserved with potassium hydroxide, calculate the alkalinity (as KOH), A_{KOH}, as the percentage (by mass) of potassium hydroxide in the latex concentrate, according to Formula (2):

$$A_{KOH} = \frac{F_2\, c\, V}{m} \tag{2}$$

where

F_2 is a factor: 5,61 for hydrochloric acid or 11,22 for sulfuric acid;

c, V and m are defined in 9.2.

Report the result as the mean of the duplicate determinations. If the individual results differ by more than 0,015 units from the mean, repeat the determination.

10 Precision

See Annex A.

11 Test report

The test report shall include the following:

a) a reference to this document, i.e. ISO 125:2020;

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

c) the mean of the determinations, and the units in which it is expressed;

d) full details of any incident likely to have affected the result;

e) full details of any operation not included in this document or in any of the documents to which reference is made, together with details of any operation regarded as optional;

f) the date of the test.

Annex A
(informative)

Precision data

A.1 General

The following interlaboratory testing programme (ITP) was organized in October 2018. All calculations to provide repeatability and reproducibility values were performed in accordance with ISO/TR 9272[1)]. Precision concepts and nomenclature are also given in ISO/TR 9272.

A.2 Precision details

10 laboratories participated in the ITP organized in October 2018 by the Malaysian Rubber Board (MRB). Homogenized samples of low ammonia (LA) latex concentrate were sent to each laboratory.

A "type 1" precision was evaluated based on the method of preparation of the latex samples used for the ITP. The time period for repeatability and reproducibility was on a scale of days.

The precision data are given in Table A.1. The precision parameters shall not be used for acceptance or rejection of any group of materials without documentation stating that the parameters are applicable to those particular materials and specific test protocols that include these test methods. The precision is expressed on the basis of a 95 % confidence level for the values established for repeatability r and reproducibility R.

— **Repeatability:** The repeatability r (in measurement units) of the test method has been established as the appropriate value tabulated in Table A.1. One single test result, obtained in the same laboratory under normal test method procedures that differ by more than the tabulated r (for any given level) shall be considered to have come from different, or non-identical, sample populations.

— **Reproducibility:** The reproducibility R (in measurement units) of the test method has been established as the appropriate value tabulated in Table A.1. One single test result, obtained in different laboratories under normal test method procedures that differ by more than the tabulated R (for any given level) shall be considered to have come from different, or non-identical, sample populations.

— **Bias:** In test method terminology, bias is the difference between an average test value and the reference (or true) test property value.

Reference values do not exist for this test method since the value (of the test property) is exclusively defined by the test method. Bias cannot therefore be determined for this particular method.

1) This document has been withdrawn and replaced by ISO 19983.