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Natural rubber latex concentrate — Determination of dry rubber content

Latex de caoutchouc naturel concentré — Détermination de la teneur en caoutchouc sec

Reference number
ISO 126:2005(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 126 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 126:1995), which has been technically revised and a statement of the precision of the method added.

Natural rubber latex concentrate — Determination of dry rubber content

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

1 Scope

This International Standard specifies a method for the determination of the dry rubber content of natural rubber latex concentrate.

The method is not necessarily suitable for latices preserved with potassium hydroxide, latices from natural sources other than *Hevea brasiliensis*, or for compounded latex, vulcanized latex or artificial dispersions of rubber and it is not applicable to synthetic rubber latices.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendments) applies.

ISO 123, *Rubber latex — Sampling*

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

ISO/TR 9272, *Rubber and rubber products — Determination of precision for test method standards*

3 Terms and definitions

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

3.1
natural rubber latex concentrate
natural rubber latex containing ammonia and/or other preservatives and which has been subjected to some process of concentration

4 Principle

A test portion of latex concentrate is diluted to 20 % (by mass) total solids content and acidified with acetic acid. The coagulated rubber is then formed into a sheet and dried at 70 °C ± 5 °C.

5 Reagents

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

5.1 Acetic acid, 20 g/dm^3 aqueous solution, for use with latex concentrate preserved with ammonia.

5.2 Acetic acid, 50 g/dm^3 solution in aqueous propan-2-ol, prepared by adding 50 g of glacial acetic acid to 500 cm^3 of propan-2-ol and then diluting the resultant solution to 1 dm^3 with water. For use with latex concentrate preserved with potassium hydroxide.

5.3 Ethanol, 95 % (by volume).

6 Apparatus

Standard laboratory apparatus plus the following:

6.1 Dish, preferably made of glass or porcelain, approximately 100 mm in diameter and 50 mm deep.

NOTE Dishes made of aluminium are unsuitable for use with latex concentrate containing potassium hydroxide.

6.2 Balance, capable of weighing to an accuracy of 1 mg.

6.3 Circulating-air oven, capable of maintaining a temperature of 70 °C ± 5 °C.

7 Sampling

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

8 Procedure

8.1 If the total solids is not known, determine it in accordance with ISO 124.

8.2 Carry out the procedure in duplicate.

8.3 Weigh by difference from a conical flask fitted with a stopper, to the nearest 1 mg, 10 g ± 1 g of latex concentrate into the dish (6.1). Pour sufficient water down the inside edge of the dish to reduce the solids content of the latex concentrate to (20 ± 1) % (by mass). Carefully rotate the dish on a smooth surface to dilute the latex and ensure homogeneity. Proceed in accordance with 8.4 or 8.5 as appropriate, depending on whether the latex concentrate is preserved with ammonia or potassium hydroxide, respectively.

8.4 In the case of latex concentrate preserved with ammonia, add, over a period of 5 min, 35 cm^3 ± 5 cm^3 of 20 g/dm^3 acetic acid solution (5.1), pouring it down the inside edge of the dish and slowly rotating the dish while the acid is being added.

Gently depress the coagulated sheet of rubber below the surface of the acid. Cover the dish with a watch glass and heat on a steam bath for 15 min to 30 min. If the serum remains milky, add 5 cm^3 of 95 % (by volume) ethanol (5.3). Continue as described in 8.6.

8.5 In the case of latex concentrate preserved with potassium hydroxide, add 25 cm^3 ± 5 cm^3 of 50 g/dm^3 acetic acid solution (5.2). Mix the acidified latex by means of a thin glass rod and wash any latex concentrate remaining on the rod into the dish with a little water.

Gently depress the coagulated sheet of rubber below the surface of the acid. Cover the dish with a watch glass and heat on a steam bath for 15 min to 30 min.

8.6 When the serum is clear, collect any small particles of coagulated rubber by rubbing with the main bulk. Soak the coagulated rubber in several changes of water until the water is no longer acidic to litmus.

Press the coagulated rubber to expel water and obtain a uniform sheet not exceeding 2 mm in thickness. A convenient method is to place the coagulated rubber carefully on a glass plate and with a glass stopper about 45 mm in diameter, or a small photographic roller, to press first around the circumference and then work towards the centre.

Rinse the sheet thoroughly in running water for at least 5 min in the case of latex concentrate preserved with ammonia, or at least 2 h in the case of latex concentrate preserved with potassium hydroxide. Allow the rinsed sheet to drip for a few minutes before transferring it to the drying oven (6.3).

8.7 Dry the sheet at a temperature of 70 °C ± 5 °C until it has no white patches. If the sheet is dried on a watch glass, carefully turn it over two or three times during the first few hours of drying. Allow to cool in a desiccator for 30 min and weigh. Repeat the operation of drying, cooling and weighing until the loss in mass is less than 1 mg after heating for 30 min.

If the sheet becomes excessively sticky and it is suspected that significant oxidation is taking place at 70 °C, then use a lower drying temperature, for example 55 °C.

9 Expression of results

9.1 Calculate the dry rubber content (DRC) of the latex concentrate as a percentage by mass to the second decimal place from the equation:

$$\text{DRC} = \frac{m_1}{m_0} \times 100$$

where

m_0 is the mass, in grams, of the test portion;

m_1 is the mass, in grams, of the dry sheet.

9.2 The results of the duplicate determinations shall agree to within 0,1 % (by mass) of the mean value. If they do not, repeat the determination. Report the mean value.

10 Precision statement

10.1 The precision of this method was determined in accordance with ISO/TR 9272. Please refer to this document for terminology and explanations of statistical concepts. The precision results are given in Table 1. The precision parameters shall not be used for acceptance or rejection of any group of materials without documentation that the parameters are applicable to the particular group of materials and the specific test protocols of this test method. The precision is expressed on the basis of a 95 % confidence level for the values established for repeatability r and reproducibility R.

10.2 The results contained in Table 1 are average values and give an estimate of the precision of this test method as determined in an inter-laboratory test programme (ITP) conducted in 2001. Thirteen laboratories performed triplicate analyses on two samples, A and B, which were prepared from high-ammonia latex. Before the bulk was sub-sampled into 1-litre bottles labelled A and B, it was filtered and homogenized by thorough blending and stirring. Thus, essentially, samples A and B were the same and were treated as such in the statistical computations. Each participating laboratory was required to carry out the test using these two samples on the dates which had been given to the participants in the ITP.

10.3 A Type 1 precision was determined (the test samples used for the ITP were distributed in the prepared state, ready for testing).

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

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

10.6 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, therefore, cannot be determined for this particular test method.

Table 1 — Estimate of precision for DRC test method

Average	Within lab		Between labs	
	s_r	r	s_R	R
60,26	0,029	0,06	0,046	0,13
$r = 2{,}83 \times s_r$ where r is the repeatability (in measurement units) and s_r is the within-laboratory standard deviation. $R = 2{,}83 \times s_R$ where R is the reproducibility (in measurement units) and s_R is the between-laboratory standard deviation.				

11 Test report

The test report shall include the following particulars:

a) a reference to this International Standard;

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

c) the mean value of the dry rubber content (DRC) of the latex concentrate, quoted to the nearest 0,01 % (by mass);

d) the drying temperature, if other than 70 °C ± 5 °C;

e) any unusual features noted during the determination;

f) details of any operation not included in this International Standard or in the International Standards to which reference is made, as well as details of any operation regarded as optional.

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