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Fourth edition
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Rubber latex, natural, concentrate — Determination of volatile fatty acid number

Latex concentré de caoutchouc naturel — Détermination de l'indice d'acide gras volatil

Reference number
ISO 506:2020(E)

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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 fourth edition cancels and replaces the third edition (ISO 506:1992), which has been technically revised.

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

— in 5.3,the recommendation for re-standardization of the standard solution has been added;

— in 5.5, silicone antifoaming agent has been added;

— in 6.6, qualitative filter paper has been added;

— two new subclauses, 5.6 and 6.7 have been added;

— a sentence has been added in 8.2 to precise the change of colour according to the indicator used;

— precision data have been added 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.

Rubber latex, natural, concentrate — Determination of volatile fatty acid number

1 Scope

This document specifies a method for the determination of the volatile fatty acid number of natural rubber latex concentrate. The method is not necessarily suitable for latices from natural sources other than *Hevea brasiliensis* and is not applicable to compounded latex, vulcanized latex, artificial dispersions of rubber or 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 126, *Natural rubber latex concentrate — Determination of dry rubber content*

3 Terms and definitions

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

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/

3.1
volatile fatty acid number
VFA
number of grams of potassium hydroxide equivalent to the volatile fatty acids in latex concentrate containing 100 g of total solids

Note 1 to entry: If the substances have been added to the latex which produce volatile acids on acidification with sulfuric acid, the volatile fatty acid number is high and does not represent the volatile fatty acid content without correction.

4 Principle

A test portion is coagulated with ammonium sulfate and a portion of the resultant serum is separated and acidified with sulfuric acid. The acidified serum is steam-distilled and the volatile acids present in the test portion are determined by titration of the distillate with a standard volumetric barium hydroxide solution.

5 Reagents

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

5.1 Ammonium sulfate, approximately 30 % (mass fraction) solution.

5.2 Sulfuric acid, approximately 50 % (mass fraction) solution.

5.3 Barium hydroxide, standard volumetric solution, $c[Ba(OH)_2] = 0{,}005\ mol/dm^3$, standardized by titration with potassium hydrogen phthalate and stored in the absence of carbon dioxide. In case of finding barium carbonate sediment in the standard solution, re-standardization is recommended.

5.4 Indicator solution, either bromothymol blue or phenolphthalein solution, 0,5 % (mass fraction) in a mixture of approximately equal volumes of ethanol and water.

5.5 Silicone antifoaming agent, if necessary.

5.6 Calcium hydroxide, approximately 5 % (mass fraction) solution.

6 Apparatus

Use ordinary laboratory apparatus and the following.

6.1 Steam-jacketed distillation apparatus (Markham still), as presented in Figure 1 and Table 1. As an alternative to the one-piece apparatus illustrated in Figure 1, a ground-glass joint may be inserted between the distillation vessel and the condenser.

6.2 Steam-bath.

6.3 Water-bath, capable of being maintained at a nominal temperature of 70 °C.

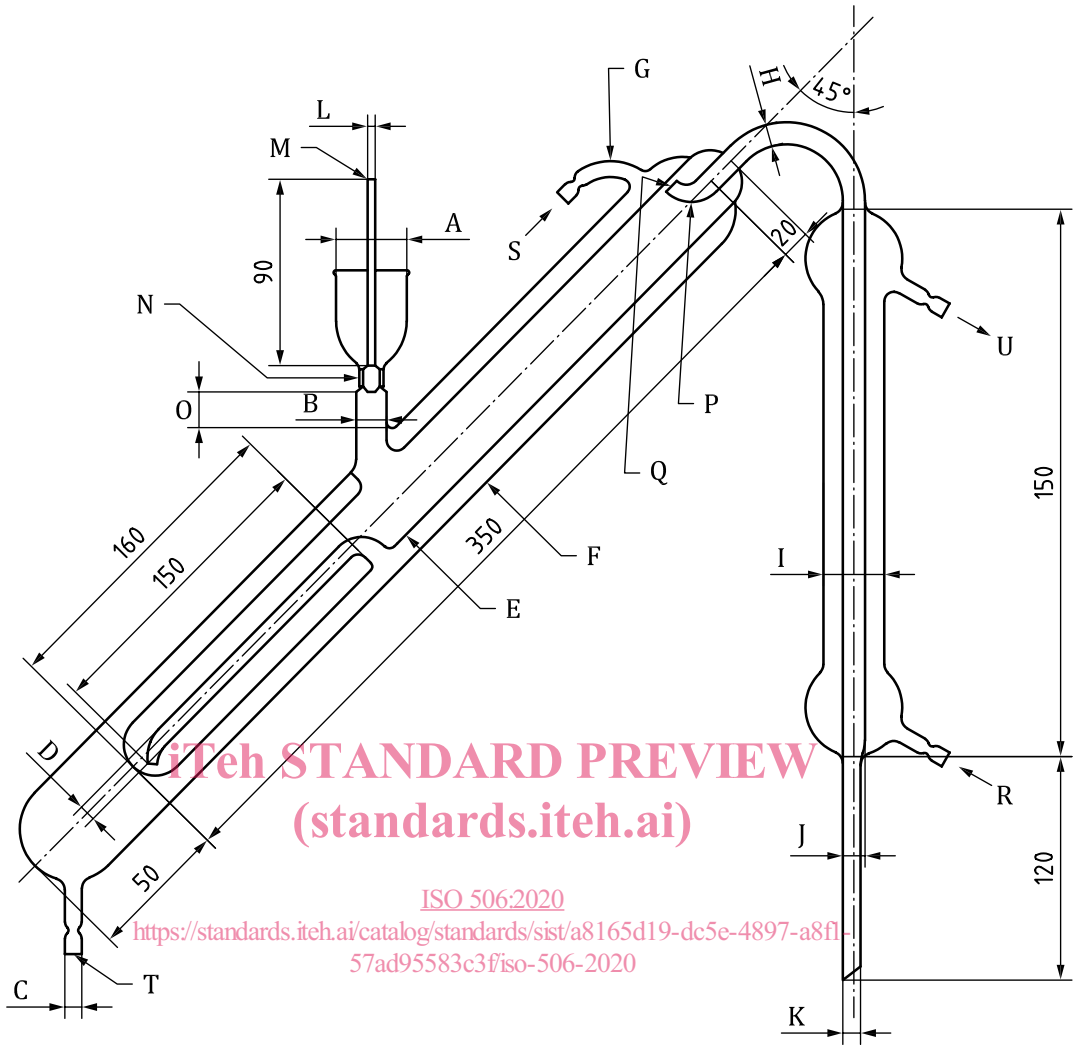
6.4 Pipettes, of capacity 5 cm^3, 10 cm^3, 25 cm^3 and 50 cm^3.

6.5 Burette, of suitable capacity.

6.6 Qualitative filter paper, of medium particle retention and medium flow rate.

6.7 Air pump, of air flow at least 200 cm^3/min.

Dimensions in millimetres



Key

L	rod Ø7 to Ø8	Q	orifice Ø5
M	stooper	R	water inlet
N	ground-glass joint	S	steam inlet
O	12 to 15	T	steam outlet
P	hole Ø3	U	water outlet

NOTE The dimensions are given in Table 1.

Figure 1 — Steam-jacketed distillation apparatus (Markham still)

Table 1 — Dimensions of the steam-jacketed distillation apparatus

Dimensions in millimetres

Symbol	A	B	C	D	E	F	G	H	I	J	K
External diameter	29 to 32	13 to 14	9 to 10	5 to 6	25 to 27	44 to 48	9 to 10	15 to 17	20 to 22	11 to 12	9 to 10
Wall thickness	1,0 to 1,5	1,0 to 1,5	0,75 to 1,25	0,75 to 1,25	1,0 to 1,5	1,0 to 2,0	0,75 to 1,25	1,5 to 2,0	1,0 to 1,5	0,75 to 1,25	0,75 to 1,25

7 Sampling

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

8 Procedure

8.1 If the total solids content and dry rubber content of the latex concentrate are not known, determine them in accordance with ISO 124 and ISO 126, respectively.

8.2 Into a beaker weigh, to the nearest 0,1 g, about 50 g of latex concentrate. Accurately add 50 cm^3 of the ammonium sulfate solution (5.1) from a pipette (6.4), while stirring the latex concentrate. Either place the beaker on the steam-bath (6.2) or in the water-bath (6.3), maintained at 70°C, and continue stirring the latex concentrate until it coagulates. Cover the beaker with a watch-glass and leave it on or in the bath for a total period of 15 min.

Decant the serum which exudes through a dry filter paper (6.6). Transfer the coagulum to a mortar and press out more serum by kneading it with a pestle. Filter this serum through the same filter. Pipette 25 cm^3 of the filtered serum in a dry 50 cm^3 conical flask and acidify it by accurately adding 5 cm^3 of the sulfuric acid solution (5.2). Mix well by swirling the flask.

With certain latex concentrates, in particular those preserved with potassium hydroxide, a fine precipitate may form during the acidification step. This precipitate shall be removed by filtration through a fresh dry filter paper before proceeding with the distillation process.

Pass steam through the apparatus (6.1) for at least 15 min. With steam passing through the outer jacket of the apparatus (steam outlet open), introduce into the inner tube 10 cm^3 of the acidified serum by pipette (6.4). If foaming is a difficulty, one drop of a suitable antifoaming agent (5.5) may be added. Place a 100 cm^3 graduated cylinder under the tip of the condenser to receive the distillate. Partially close the steam outlet to divert steam into the inner tube. Pass steam gently at first, then fully close the steam outlet and continue distilling at a rate of 3 cm^3/min to 5 cm^3/min until 100 cm^3 of distillate has been collected.

Transfer the distillate to a 250 cm^3 conical flask and eliminate any dissolved carbon dioxide from the distillate by using air pump (6.7) which outlet air at a rate of 200 cm^3/min to 300 cm^3/min passes into calcium hydroxide saturated solution (5.6) before passing through the distillate for approximately 3 min. Titrate with the barium hydroxide solution (5.3), using one of the indicators specified (5.4). If bromothymol blue is used as indicator, the colour changes from yellow to blue and, if phenolphthalein is used as indicator, the colour changes from colourless to pale pink.

8.3 Carry out a duplicate determination (see 8.2) with a fresh 50 g test portion of latex concentrate.

9 Expression of results

Calculate the volatile fatty acid (VFA) number using Formula (1).

$$\left[\frac{134{,}64cV}{m \times TSC}\right] \times \left[50 + \frac{m(100 - DRC)}{100\rho}\right] \quad (1)$$

where

c	is the actual concentration, expressed in moles per cubic decimetre, of the barium hydroxide solution (5.3);
V	is the volume, in cubic centimetres, of barium hydroxide solution required to neutralize the distillate;
m	is the mass, in grams, of the test portion;
DRC	is the dry rubber content, expressed as a percentage by mass, of the latex concentrate;
TSC	is the total solids content, expressed as a percentage by mass, of the latex concentrate;
ρ	is the density, in megagrams per cubic metre, of the serum (ρ = 1,02 Mg/m^3 for centrifuged or creamed latex concentrates);
134,64	is a factor derived from the relative molecular mass of potassium hydroxide, its equivalence to barium hydroxide and those parts of the serum acidified and distilled.

Repeat the test if the results of the duplicate determination do not agree to

— within 0,01 units when the actual VFA number is 0,10 units or less;

— within 10 % when the actual VFA number is greater than 0,10 units.

10 Precision data

See Annex A.

11 Test report

The test report shall include the following:

a) a reference to this document, i.e. ISO 506:2020;

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

c) the results and the units in which they have been expressed;

d) any unusual features noted during the determination;

e) any operations not included in this document or in the international standards to which reference is made, and any operations regarded as optional.

