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Low-protein natural rubber latex concentrate — Specification

Concentré de latex de caoutchouc naturel à faible teneur en protéines — Spécifications

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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*.

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

Natural rubber is one of the many excellent properties materials for the manufacture of specialized medical devices, household utensils and equipment in the industry. Water-resistance, insulation, plasticity, elasticity and environment make products from rubber trees have a lot of benefits. However, one component that exists in latex is the protein that has been shown to be the main cause of unwanted effects.

The allergy to natural rubber latex proteins is a significant occupational health hazard. Natural rubber products with high protein content can cause skin allergies when used in contact with humans, in addition to preserving the protein degradation also causes unpleasant odours. Therefore, the reduction of protein in natural rubber brings many benefits.

For latex, low proteins content will increase elasticity, reduce stress resistance, improve material flexibility, suitable for the production of products such as gloves, latex for footwear, etc. Natural rubber latex with low protein content is highly responsive in denaturing reactions, due to its low protein content, which makes it easier for denaturing agents to interact with the rubber surface. As the protein content decreases, the resistance of the rubber material increases and the ability of the water absorption decreases.

This document covers the specification of low protein natural rubber latex concentrate. The specification of low protein natural rubber is covered by ISO 24376. It proposes a grading system based on the origin of the natural rubber content and differentiated by the enzymatic and non-enzymatic processes applied for removal of the proteins.

Low-protein natural rubber latex concentrate — Specification

1 Scope

This document provides specifications for natural rubber latex concentrate which has low protein content [low protein natural rubber (LPNR) latex], as follows:

— LPNR latex: field latex or concentrated latex pretreated with deproteinising agent, centrifuged and preserved after concentration with ammonia only, with an alkalinity of at least a mass fraction of 0,6 % calculated with respect to the latex.

This document is applicable to medical rubber products and avoids the possibility of allergies.

This document covers requirements for LPNR latex, type HA (high ammonia), and LPNR latex, type LA (low ammonia).

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 35, *Natural rubber latex concentrate — Determination of mechanical stability*

ISO 123, *Rubber latex — Sampling*

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

ISO 125, *Natural rubber latex concentrate — Determination of alkalinity*

ISO 126, *Natural rubber latex concentrate — Determination of dry rubber content*

ISO 127, *Rubber, natural latex concentrate — Determination of KOH number*

ISO 506, *Rubber latex, natural, concentrate — Determination of volatile fatty acid number*

ISO 706, *Rubber latex — Determination of coagulum content (sieve residue)*

ISO 2005, *Rubber latex, natural, concentrate — Determination of sludge content*

ISO 7780, *Rubbers and rubber latices — Determination of manganese content — Sodium periodate photometric methods*

ISO 8053, *Rubber and latex — Determination of copper content — Photometric method*

ASTM D5712, *Standard test method for analysis of aqueous extractable protein in latex, natural rubber, and elastomeric products using them modified lowry method*

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
low-protein natural rubber latex concentrate
purified natural rubber with very low protein content

Note 1 to entry: LPNR stands for low-protein natural rubber.

3.2
LPNR latex, type HA
LPNR latex preserved after concentration with ammonia only, with an alkalinity of at least a mass fraction of 0,60 % calculated with respect to the latex

3.3
LPNR latex, type LA
LPNR latex preserved after concentration with ammonia together with other preservative(s), with an alkalinity of not more than a mass fraction of 0,29 % calculated with respect to the latex

3.4
extractable protein
EP
protein content in latex evaluated by extractable protein content according to modified Lowry method

4 Requirements

The LPNR latex shall conform to the requirements in Table 1.

The nitrogen content in LPNR latex is usually carried out in order to reach an estimate of the total nitrogen content with Kjeldahl method.

5 Sampling

The LPNR latex shall be sampled by one of the methods specified in ISO 123.

Table 1 — Requirements

Characteristic	Type HA	Type LA	Test method
Total solids content, % mass fraction, min. [a]	61,0	61,0	ISO 124
Dry rubber content, % mass fraction, min. [a]	60,0	60,0	ISO 126
Non-rubber solids, % mass fraction, max. [b]	1,70	1,70	—
Alkalinity (as NH_3), % mass fraction calculated with respect to the latex concentrate	0,60 min.	0,29 max.	ISO 125
Mechanical stability, seconds, min.	650	650	ISO 35
Coagulum content, % mass fraction, max.	0,02	0,02	ISO 706
Copper content, mg/kg of total solids, max.	8	8	ISO 8053
Manganese content, mg/kg of total solids, max.	8	8	ISO 7780
Sludge content, % mass fraction, max.	0,06	0,06	ISO 2005
Volatile fatty acid (VFA) number, max.	0,06	0,06	ISO 506
KOH number, max.	0,70	0,70	ISO 127
Extractable protein (µg/g), max.	100	100	ASTM D5712

[a] The requirement is either for total solids content or dry rubber content.

[b] Difference between total solids content and dry rubber content.