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Rubber, raw natural, and rubber latex, natural — Determination of nitrogen content by Micro Dumas combustion method

Latex de caoutchouc brut — Détermination de la teneur en azote par la méthode de combustion de Micro Duma

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

Introduction

The Dumas combustion method has become the most frequently used method worldwide for the accurate and fast determination of nitrogen. Compared to the wet chemical Kjeldahl method, it is superior in terms of speed, safety, and environmental friendliness. The representative analysis of a natural product requires a larger sample size of up to 1 g or more.

The nitrogen content of natural rubber is related to the protein level. The protein content of natural rubber varies depending upon its source and methods used in its processing. Generally, raw natural rubber is expected to have a nitrogen content in the range of 0,3 % to 0,6 %. The normal latex grades have lower levels of nitrogen than the “dry” rubbers, with values around 0,2 %. However, “skim” rubber, with its high protein content, will have appreciably higher values, in the range of 1,5 % to 2,5 %.

This test method will help determine the nitrogen content of the raw natural rubber in the shortest possible time and will be helpful for laboratory quality control testing.

Rubber, raw natural, and rubber latex, natural — Determination of nitrogen content by Micro Dumas combustion method

WARNING 1 — Persons using this International Standard should be familiar with normal laboratory practice. This International 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.

WARNING 2 — Certain procedures specified in this International Standard might 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 International Standard specifies a test method for the determination of nitrogen content of raw natural rubber using the Micro Dumas combustion method. This method is also applicable to natural rubber latex.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 124:2014, *Latex, rubber — Determination of total solids content*

ISO 1795, *Rubber, raw natural and raw synthetic — Sampling and further preparative procedures*

ISO 18899:2013, *Rubber — Guide to the calibration of test equipment*

3 Principle

In the combustion process (furnace at ca. 1 000 °C), nitrogen is converted to nitrogen gas/oxides. If other elements are present, they will also be converted to different combustion products. A variety of absorbents are used to remove these additional combustion products.

The combustion products are swept out of the combustion chamber by an inert carrier gas such as helium and passed over heated (about 600 °C) high purity copper. This copper can be situated at the base of the combustion chamber or in a separate furnace. The function of this copper is to remove any oxygen not consumed in the initial combustion and to convert any oxides of nitrogen to nitrogen gas. The gases are then passed through the absorbent traps.

Detection of the gases can be carried out in a variety of ways, including the following:

a) GC separation followed by quantification using thermal conductivity detection;

b) partial separation by GC ("frontal chromatography") followed by thermal conductivity detection;

c) series of separate infrared and thermal conductivity cells for detection of individual compounds.

