International Standard

ISO 12492

Rubber, raw — Determination of water content by Karl Fischer method

Caoutchouc brut — Détermination de la teneur en eau par la méthode de Karl Fischer

Second edition
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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).

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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 second edition cancels and replaces the first edition (ISO 12492:2012), which has been technically revised.

The main changes are as follows:

— addition of a new method B using a vial type oven in the Scope (Clause 1);

— addition of water standard KF-oven in 5.2;

— addition of a coulometric Karl Fischer titrator with an evaporator of vial type oven in 6.2 and sample vials in 6.6;

— addition of the procedure of method B in 9.2;

— addition of the expression of results in Clause 10;

— addition of the precision data in Annex B.

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.

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Introduction

The water content of raw rubber is one of the important characteristics to be determined as a quality control test. Different synthetic rubbers contain varying amounts of water. Water can affect product quality, texture, shelf life, chemical stability and reactivity. A high amount of water can cause processing difficulties.

Water contamination is a cause for major concern in a large number of applications. In the rubber industry, water is one of the major damaging contaminants and is often overlooked as a primary cause of component failure. For certain applications in the rubber industry, even a small amount of water can have damaging effects on production.

Several methods are available for the determination of water content. A Karl Fischer (KF) coulometric titrator is one of the most accurate methods. Unlike other techniques, it can trace low levels of free, emulsified and dissolved water (which cannot be detected with normal gravimetric methods). The test is capable of measuring water levels as low as 0,01 %.

Unlike gravimetric measurements, which are indirect methods that assume that all volatiles removed are water, the Karl Fischer titration is a direct method that is almost specific for water. The method is especially useful for low moisture levels (< 1 %).

The new test method can help determine the water content of the raw rubber and rubber compounds in the shortest possible time and can be helpful for quality control in laboratories. Coulometric determination of water is an absolute method.

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Rubber, raw — Determination of water content by Karl Fischer method

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.

CAUTION — Certain procedures specified in this document can 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 document specifies two test methods for the determination of water content of raw rubber and compounded rubber using a coulometric Karl Fischer titration method:

— method A uses an evaporator of heating tube type oven;

— method B uses an evaporator of vial type oven.

It applies to the water content range between 0,01 % and 1 %.

In case of dispute, method B is the preferred method.

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

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

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Principle

The water determination test (Karl Fischer method) is designed to determine the water content in substances, utilizing the quantitative reaction of water with iodine and sulfur dioxide in the presence of a lower alcohol such as methanol and an organic base, as shown in the following formulae:

$$H_2O + I_2 + SO_2 + 3\ RN \rightarrow 2(RN{+}H)I^- + RN{\cdot}SO_3$$

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