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**Rubber, raw, vulcanized - Determination of metal content by  
ICP-OES**

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### foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules for Standardization Documents" drafting.

This document is revised using ISO 19050.2021 "Inductively coupled plasma optical emission spectrometer (ICP-OES) for raw rubber and vulcanized rubber"

Determining Metal Content".

Compared with ISO 19050.2021, this document has made the following structural adjustments.

---Added 5.8~5.11 in Chapter 5;

--- 6.1a)~6.1d) in Chapter 6 correspond to 6.1.1~6.1.4 in ISO 19050.2021;

--- Added 8.3.4.12, 8.3.4.13, 8.3.4.14 corresponding to 8.3.4.12, 8.3.4.13 in ISO 19050.2021;

--- Appendix A of this document corresponds to Appendix B of ISO 19050.2021, and Appendix B corresponds to Appendix A of ISO 19050.2021.

The technical differences between this document and ISO 19050.2021 and their reasons are as follows.

--- For standard use, "this document is applicable to the determination of main metal elements and trace metal content in raw rubber and vulcanized rubber" has been added to the scope.

quantitative analysis. " (see Chapter 1);

---Change "concentrated nitric acid, concentrated hydrochloric acid, concentrated sulfuric acid, the grade is super pure" to "concentrated nitric acid, concentrated hydrochloric acid,

concentrated sulfuric acid, the grade is superior pure",

Make it more in line with domestic reagent usage (see 5.1, 5.2 and 5.3);

--- Increase the concentration of dilute hydrochloric acid and dilute nitric acid to make the reagent preparation process more clear (see 5.8~5.11);

---The "multi-element primary standard solution, single element primary standard solution, the traceable unit is the National Institute of Standards and Technology or any other

"A national metrology institution" was changed to "Multi-element standard solution, single-element standard solution. certified reference material" to make it more in line with domestic testing

Agent usage (see 5.4, 5.5);

---Change "filter paper, model WhatmanNO.44" to "quantitative filter paper" to make it more in line with the use of domestic filter paper

conditions (see 6.11);

--- Increase the "heating to remove acid" step, so that it can also use heating to remove acid to concentrate the sample (see 8.3.4.12);

--- For ease of use, the requirements for "test procedure" and "specimen type used" in the "test report" have been deleted (see Chapter 10).

The following editorial changes have been made to this document.

--- Deleted the footnote of 6.11;

--- Added the note "According to the sample type and the content of metal elements, adjust the weighing quality of the sample and the volume of the reagent added", so that it can be

According to the difference of the sample matrix, adjust the conditions to achieve the purpose of decomposition (see 8.3.2);

--- Added the note "according to the different equipment and the test range of the sample, adjust the concentration range of the standard solution", so that it can be adjusted according to the sample base

If the quality is different, adjust the range of the calibration curve (see 9.5);

---Added the note "Adjust the operating conditions according to the position of the rectangular tube and the peak-shaving treatment of different equipment manufacturers" to make it suitable for different equipment

(see 9.6.2).

Please note that some contents of this document may refer to patents. The issuing agency of this document assumes no responsibility for identifying patents.

## Introduction

Inductively coupled plasma optical emission spectrometer (ICP-OES) is used to determine the content of metal elements in various materials. absorbing light with atoms

Compared with AAS technology, the main advantages of ICP-OES are. simultaneous analysis of multiple elements, wide dynamic range of measurement, and less condensed phase interference. this

In addition, in addition to the elements that are difficult to form compounds, the detection sensitivity is higher for elements such as iodine, phosphorus, and sulfur. ICP-OES is also known as inductive coupling etc.

Ion plasma atomic emission spectrometer (ICP-AES).

ICP-OES was first applied to the analysis of trace elements, and it is an analysis method with the least interference among other common atomic spectroscopy techniques.

The high-temperature environment of the plasma largely eliminates chemical interference. Utilizing the advantages of ICP multi-element simultaneous analysis, the physical interference.

ICP-OES analyzes samples based on the spectra emitted by excited atoms and ions of elements. Since different elements can

Light of different wavelengths is emitted, so the spectrum emitted by the plasma is composite. Use a spectrometer to decompose the emitted light into wavelengths

Spectrum, so that the light intensity of each element can be analyzed without being affected by the spectrum of other elements.

An important feature of ICP that is different from other light sources is that the sample enters the central channel of the plasma in the form of aerosol and is absorbed by the high-temperature plasma.

Surrounded by the daughter body, the residence time of the sample in the ICP light source is about 2ms. This feature makes it possible to reduce matrix effect interference to a great extent.

The assay methods described in this document have important implications for product safety and environmental protection. ICP-OES is an accurate

Advanced instruments for detecting trace metal elements in raw rubber and vulcanized rubber including latex.

Inductively Coupled Plasma Emission for Green and Vulcanized Rubber

Determination of metal content by spectrometer (ICP-OES)

Warning 1 --- Personnel using this document need to have practical experience in formal laboratory work. This document does not identify all possible security

In case of safety issues, the user is responsible for taking appropriate safety and health measures and ensuring compliance with the conditions stipulated in the relevant national laws and regulations.

Warning 2 --- The procedures specified in this document may involve the use or generation of some substances, or may generate some wastes. this

It may cause local environmental hazards, and it is necessary to refer to the corresponding documents for safe handling and disposal after use.

## 1 Scope

This document describes the use of inductively coupled plasma optical emission spectrometry (ICP-OES) for the determination of major metal elements and

Method for the content of trace metal elements.

This document is applicable to the quantitative analysis of main metal elements and trace metal content in raw rubber and vulcanized rubber.

## 2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, dated references

For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document.

ISO 123 latex sampling (Rubberlatex-Sampling)

Note. GB/T 8290-2021 latex sampling (ISO 123.2001, MOD)

Note. GB/T 8298-2017 Determination of total solid content of latex (ISO 124.2014, MOD)

Note. GB/T 15340-2008 Natural and synthetic raw rubber sampling and sample preparation method (ISO 1795.2000, IDT)

Note. GB/T 25269-2010 Guidelines for Calibration of Rubber Test Equipment (ISO 18899.2004, IDT)

## 3 Terms and Definitions

This document does not have terms and definitions that need to be defined.