

INTERNATIONAL
STANDARD

ISO
8053

Second edition
1995-04-01

**Rubber and latex — Determination of
copper content — Photometric method**

Caoutchouc et latex — Dosage du cuivre — Méthode photométrique



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Reference number
ISO 8053:1995(E)



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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8053 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

This second edition cancels and replaces the first edition (ISO 8053:1986), of which it constitutes a minor revision.

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Introduction

Copper in certain forms is known to catalyse the oxidative breakdown of natural rubber although the mechanism by which degradation is brought about is not fully understood. It is recognized also that other forms of copper can be present in the rubber even in relatively large amounts, without degradation taking place, but in these cases there is always the possibility that under the influence of some chemicals, notably unsaturated acids, the copper could assume a more aggressive oxidative catalytic role.

Clearly it would be an advantage to distinguish analytically between catalytically active and inactive forms, but no generally accepted method has yet been put forward for doing so. There is no alternative therefore but to determine the total amount of copper in the rubber.

The method specified in this International Standard is applicable to all the commonly used rubbers, including those containing chlorine.

Another method for the determination of the copper content of rubber and latex is given in ISO 6101-3:1988, *Rubber — Determination of metal content by atomic absorption spectrometry — Part 3: Determination of copper content*.



Rubber and latex — Determination of copper content — Photometric method

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

1 Scope

This International Standard specifies a photometric method for the determination of trace amounts of copper in raw rubber, latices and compounded rubber, both natural and synthetic.

This method may be applied to rubbers containing silica, provided that treatment with hydrofluoric acid is included in the procedure.

The method is sensitive down to 1 mg/kg copper.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 123:1985, *Rubber latex — Sampling.*

ISO 247:1990, *Rubber — Determination of ash.*

ISO 648:1977, *Laboratory glassware — One-mark pipettes.*

ISO 1042:1983, *Laboratory glassware — One-mark volumetric flasks.*

ISO 1795:1992, *Rubber, raw, natural and synthetic — Sampling and further preparative procedures.*

3 Principle

A test portion is subjected to ashing or digestion in a mixture of concentrated sulfuric and nitric acids, followed by removal of excessive amounts of calcium (if present) and complexing of any iron present with ammonium citrate. After making alkaline, the aqueous solution is shaken with a solution of diethyldithiocarbamate in 1,1,1-trichloroethane to form and extract the yellow copper complex. Spectrometric measurement of this solution, and comparison of the result with those for standard matching solutions, permit the quantitative determination of copper.

4 Reagents and materials

WARNING — All precautions and safeguards for carrying out trace-metal analysis shall be observed. All recognized health and safety precautions shall be observed when carrying out the procedures specified in this International Standard.

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

4.1 Sodium sulfate, anhydrous.

4.2 Sulfuric acid, concentrated, $\rho = 1,84 \text{ g/cm}^3$.