INTERNATIONAL
STANDARD

ISO
7780

Second edition
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Rubber and rubber latices — Determination of manganese content — Sodium periodate photometric methods

Caoutchoucs et latex de caoutchouc — Dosage du manganèse — Méthodes photométriques au periodate de sodium

Reference number
ISO 7780:1998(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 7780 was prepared by Technical Committee ISO/TC 45*, Rubber and rubber products*.

This second edition cancels and replaces the first edition (ISO 7780:1987) which has been technically revised.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Introduction

Manganese 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 manganese can be present, even in relatively large amounts, without degradation taking place. However, there is always the possibility in the case of compounded rubbers that, under the influence of some constituents of the compound (notably the unsaturated acids), the manganese could assume a more aggressive 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 therefore no alternative to determining the total amount of manganese in the rubber.

Little is known about the influence of manganese on the catalytic oxidation of synthetic rubbers, although it is widely accepted that its effect may be less severe than is the case with natural rubber. Possibly for this reason, the determination of manganese in synthetic rubbers and in compounds based on synthetic rubbers is less frequently carried out; nevertheless, the methods specified in this International Standard are applicable to all the commonly used elastomers.

The first of the two specified methods, referred to as the *general method*, is believed to be applicable to all rubbers and compounded rubbers in all forms. In this method, the ash from the rubber is taken through a fusion stage in order to obtain the manganese in soluble form; it is most suited to rubber compounds containing heavy loadings of inert fillers such as clay, or materials which form insoluble phosphates, for example titanium dioxide. The second method, referred to as the *restricted method*, is shorter and suitable for raw rubbers, their corresponding latices, and rubber compounds not containing a heavy loading of the fillers referred to above. It is expected that the second method would be used more frequently.

For those equipped with atomic absorption equipment, ISO 6101-4:1997, *Rubber — Determination of metal content by atomic absorption spectrometry — Part 4: Determination of manganese content,* may be used in place of ISO 7780. Both standards should be consulted because there may be some background material in each which could be useful before choosing the most desirable method for the determination of manganese in raw and vulcanized rubbers and latices.

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WARNING — Persons using this International Standard should 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 photometric methods for the determination of manganese, after oxidation with sodium periodate, in rubbers and rubber latices. Both methods contain provisions for analysis of chlorine-containing rubber.

Clause 3 specifies a method for compounded or vulcanized rubbers which is not affected by heavy loadings of fillers such as synthetic and natural silicates or calcium carbonates in various forms, or by the presence of compounding ingredients which form an insoluble phosphate under the conditions of the test.

Clause 4 specifies a method for raw and compounded natural and synthetic rubbers and latices which do not contain heavy loadings (more than about 10 %) of inert silicate fillers or any ingredient such as titanium dioxide which under the conditions of test will form an insoluble phosphate.

2 Normative references

The following standards contains 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:—[1], *Rubber latex — Sampling.*

ISO 124:1997, *Latex, rubber — Determination of total solids content.*

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

ISO 4793:1980, *Laboratory sintered (fritted) filters — Porosity grading, classification and designation.*

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1) To be published. (Revision of ISO 123:1985)