

Transformed

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1397

DETERMINATION OF MANGANESE IN COMPOUNDED RUBBER

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BRIEF HISTORY

The ISO Recommendation R 1397, *Determination of manganese in compounded rubber*, was drawn up by Technical Committee ISO/TC 45, *Rubber*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1397 which was circulated to all the ISO Member Bodies for enquiry in December 1967. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Ireland	Sweden
Austria	Israel	Switzerland
Czechoslovakia	Italy	U.A.R.
France	Japan	United Kingdom
Greece	Netherlands	U.S.A.
Hungary	New Zealand	Yugoslavia
India	Poland	
Iran	Spain	

The following Member Body opposed the approval of the Draft :

Germany

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in April 1970, to accept it as an ISO RECOMMENDATION.

DETERMINATION OF MANGANESE IN COMPOUNDED RUBBER

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 in the rubber compound, even in relatively large amounts, without degradation taking place, but in these cases there is always the possibility 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 no alternative therefore to determining the total amount of manganese in the rubber compound.

Little is known concerning the influence of manganese on the catalytical oxidation of synthetic rubbers, although it is widely accepted that its effect is less severe than is the case with natural rubber. Possibly for this reason the determination of manganese in compounds based on the synthetic rubbers is less frequently carried out; nevertheless the methods recommended in this ISO Recommendation are applicable to all the commonly used elastomers except those which contain chlorine.

Of the two recommended procedures, the first, known as the general method, is believed to be applicable to all compounded rubbers not containing chlorine. In this method, the ash from the rubber is taken through a fusion stage in order to obtain the manganese in a soluble form; it is most suited to those rubber compounds which contain heavy loadings of inert fillers such as clay, or materials which form insoluble phosphates, for example titanium dioxide. The second, known as the restricted method, is shorter and suitable for all other rubber compounds and will probably be more frequently used.

1. DETERMINATION OF MANGANESE – GENERAL METHOD

1.1 Scope

This section describes a method suitable for the determination of trace amounts of manganese in compounded or vulcanized rubbers which do not contain chlorine. The method is not intended for compounded rubber latex. It is not affected by heavy loadings of fillers such as synthetic and natural silicates, calcium carbonate in various forms, or by the presence of compounding ingredients which form an insoluble phosphate under the conditions of the test.

1.2 Principle of method

Ten grammes of the rubber are ashed in a platinum crucible and the ash fused with sodium fluoroborate. After treating with dilute sulphuric and nitric acids, insoluble matter is removed and the manganese oxidized to permanganate by boiling with sodium periodate. The colour of the solution is measured photometrically and is proportional to the concentration of manganese.