
**Vulcanized rubbers — Determination
of antidegradants by high-
performance liquid chromatography**

*Caoutchouc vulcanisés — Détermination des agents de protection par
chromatographie en phase liquide à haute performance*



This document is a preview generated by ELS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword.....	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Materials	2
6 Apparatus	2
7 Chromatographic conditions	2
8 Procedure	3
8.1 Preparation of the calibration curve.....	3
8.2 Preparation of the sample.....	3
8.3 Sample analysis.....	4
9 Calculation	4
10 Precision	4
11 Test report	4
Annex A (informative) Antidegradants covered by this document	5
Annex B (informative) Calibration	6
Annex C (informative) Examples of chromatograms and UV spectra	9
Annex D (informative) Precision	15
Bibliography	17

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 2, *Testing and analysis*.

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.

Vulcanized rubbers — Determination of antidegradants by high-performance liquid chromatography

WARNING 1 — 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 and to determine the applicability of any other restrictions.

WARNING 2 — Certain procedures specified in this document might 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 describes a procedure for the determination of the following antidegradants in vulcanized rubbers:

- aminoketone group;
- naphthylamine group;
- diphenylamine group;
- p-phenylenediamine;
- monophenol group.

The groups of antidegradants are summarized in [Table A.1](#) with the chemical names, the abbreviated terms and the CAS registry numbers.

Extender oils, when present, can interfere.

For poly-2,2,4-trimethyl-1,2-dihydroquinoline, the method provides only an approximation because of its polymeric nature.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Principle

The antidegradant, following quantitative extraction from the rubber, is separated by high-performance liquid chromatography (HPLC) from other extracted components. Its component peaks