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## Textiles — Determination of certain benzotriazole compounds

*Textiles — Détermination de certains composés benzotriazole*



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## 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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 38, *Textiles*.

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](http://www.iso.org/members.html).

## Introduction

Benzotriazole compounds, which have a phenolic group attached to benzotriazole structure, can absorb the full spectrum of UV light and are mainly used as UV-stabilizer for polymers such as textiles, plastics, polyurethanes and constituent in formulations used for coating of surfaces such as sun-protective clothing and parasols. Certain benzotriazole compounds including UV-320, UV-327, UV-328 and UV-350 are toxic. UV-320 and UV-328 have been identified as PBT-substances, while UV-327 and UV-350 have been identified as vPvB-substances.

Human exposure to certain benzotriazole compounds can occur through diverse sources such as skin contact. A series of studies have shown the occurrence of certain benzotriazole compounds in aquatic, terrestrial, atmospheric environment and as a result of anthropogenic activities. Considering their toxicity on several animal species, minimization of exposure to certain benzotriazole compounds is recognized as important to the preservation of human health. This document provides a method for the determination of certain benzotriazole compounds including UV-320, UV-327, UV-328 and UV-350 in textiles.

The method described in this document is based on the use of liquid chromatography-tandem mass spectrometry (LC-MS/MS), liquid chromatography-diode array detector (LC-DAD) or gas chromatography with mass spectrometry (GC-MS) for textile materials (fibres and fabrics). Further investigations regarding the extraction efficiency of solvents are needed in connection to accessories (for example, plastic buttons) on textile products.



# Textiles — Determination of certain benzotriazole compounds

**WARNING** — This document calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage. The execution of its provisions is entrusted to appropriately qualified and experienced people.

## 1 Scope

This document specifies a method for determining the amount of certain benzotriazole compounds (UV-320, UV-327, UV-328, UV-350) in textiles by using liquid chromatography-tandem mass spectrometry (LC-MS/MS) or liquid chromatography-diode array detector (LC-DAD) or gas chromatography with mass spectrometry (GC-MS).

The method is applicable to all kinds of textile materials (fibres and fabrics).

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

## 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 <https://www.electropedia.org/>

## 4 Principle

Extract the benzotriazole compounds from textile specimen by ultrasonic generator with acetonitrile. Determine and identify the benzotriazole compounds in the specimen by liquid chromatography-tandem mass spectrometry (LC-MS/MS) or liquid chromatography-diode array detector (LC-DAD) or gas chromatography with mass spectrometry (GC-MS).

## 5 Reagents

Unless otherwise specified, use only reagents of recognized analytical grade.

**5.1 2-(3-sec-butyl-5-tert-butyl-2-hydroxyphenyl) benzotriazole (UV-350)**, CAS No. 36437-37-3.

**5.2 2-(3,5-di-tert-butyl-2-hydroxyphenyl) benzotriazole (UV-320)**, CAS No. 3846-71-7.

**5.3 2-(3,5-di-tert-amyl-2-hydroxyphenyl) benzotriazole (UV-328)**, CAS No. 25973-55-1.