



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 19941.1-2025

Replacing GB/T 19941.1-2019

**Leather and fur - Determination of formaldehyde content - Part
1: High-performance liquid chromatography method**

皮革和毛皮 甲醛含量的测定 第1部分：高效液相色谱法

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020 "Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents".

This document is Part 1 of GB/T 19941 "Leather and fur -- Determination of formaldehyde content". The following parts of GB/T 19941 have been issued:

- Part 1: High performance liquid chromatography method;

This document replaces GB/T 19941.1-2019 "Leather and fur -- Determination of formaldehyde content - Part 1: High performance liquid chromatography method".

Compared with GB/T 19941.1-2019, apart from structural adjustments and editorial changes, the main technical changes are as follows:

with DNPH have been changed (see 8.2.2 of this Edition; 6.3 of Edition 2019);

formaldehyde stock solution to create a standard working curve has been modified (see 8.2.4.1 of this Edition; 6.5.1 of Edition 2019);

working curve using DNPH-formaldehyde solution has been deleted (see 6.5.2 of Edition 2019);

- "Precision" and "Recovery rate" have been added (see 10.2 and 10.3 of this Edition).

The modification of this document adopts ISO 17226-1 :2021 "Leather -- Determination of formaldehyde content -- Part 1: Method using high-performance liquid chromatography".

Compared with ISO 17226-1:2021, this document has undergone several structural adjustments. A summary table of the structural numbering changes between the two documents is provided in Annex A.

Compared with ISO 17226-1:2021, this document contains several technical differences. These differences are indicated by a vertical single line (|) in the margin outside the relevant clauses. A summary of these technical differences and their reasons is provided in Annex B.

The following editorial changes have been made to this document:

- To harmonize with existing standards, the standard name has been changed to "Leather and fur -- Determination of formaldehyde content -- Part 1: Highperformance liquid chromatography method".

17226-1:2021 and the reasons thereof" has been added.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The issuing authority shall not be held responsible for identifying any or all such patent rights.

This document was proposed by China National Light Industry Council.

This document shall be under the jurisdiction of National Technical Committee on Leather Industry of Standardization Administration of China (SAC/TC 252).

Metrology and Quality Inspection, Sichuan University, China Leather and Footwear Research Institute Co., Ltd., Coach Trading (Shanghai) Co., Ltd., Xinji North America Leather Co., Ltd., Wenzhou Footwear and Leather Industry Research Institute, China Light Industry Inspection and Certification Co., Ltd.

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Versions of standard substituted by this document are:

- This is the second revision.

Introduction

In the processing of leather and fur, formaldehyde or chemicals with formaldehyde as a precursor are frequently used for sterilization, tanning, retanning, and finishing, which may introduce formaldehyde into the leather, fur, and their products. This formaldehyde slowly hydrolyzes and releases during product use, posing a threat to human health. As a highly toxic protoplasmic poison, formaldehyde can cause irreversible coagulation of proteins in cell protoplasm, resulting in significant health hazards. These hazards manifest as sensitization, genotoxicity, induction of dermatitis and asthma, and potential carcinogenicity. Therefore, the determination of formaldehyde content in leather and fur is a crucial step in assessing the quality of leather, fur, and their products. It is of great significance for identifying the quality of leather and fur products, directly impacting product inspection and the normal operation of daily trade. GB/T 19941 aims to provide a basis for the determination of formaldehyde content in leather and fur. It consists of three parts.

- Part 1: High-performance liquid chromatography method. The purpose is to establish a test method for determining the formaldehyde content in leather and fur using high performance liquid chromatography.
- Part 2: Colorimetric method. The purpose is to establish a spectrophotometric method for determining formaldehyde content in leather and fur. This method is widely used in the industry.
- Part 3: Formaldehyde emissions. The purpose is to establish a test method for formaldehyde release from leather and fur, which is particularly applicable to leather and fur products used in furniture and automobiles.

1 Scope

This document specifies a test method for determining the content of free and hydrolyzed formaldehyde in leather and fur using high performance liquid chromatography.

This document applies to the determination of formaldehyde content in various types of leather, fur, and their products.

making it particularly suitable for the precise quantification of formaldehyde content.

2 Normative references

The following referenced documents are indispensable for the application 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.

3 Terms and definitions

This document does not contain any terms or definitions that need to be defined.

4 Principle

Leather or fur specimens are extracted under specified conditions. The extract is mixed with 2,4-dinitrophenyl ether. Different types of aldehydes and ketones react with the extract to form their respective hydrazones. After separation, the samples are determined by high-performance liquid chromatography (HPLC) with a UV detector or a diode array detector (DAD).

from leather and fur under standard conditions.

5 Reagents and materials

5.1 Unless otherwise specified, all reagents used are analytically pure. The water used in the tests shall meet the requirements for Grade III water in GB/T 6682, and all solutions used shall be aqueous solutions.

5.2 Formaldehyde solution: the mass fraction is approximately 37%.

available. If using commercially available solutions, procedure 8.1 is unnecessary.

5.3 Iodine solution: 0.05 mol/L, which means it contains 12.68 g of iodine per liter.

5.4 Sodium hydroxide (NaOH) solution: 2.0 mol/L.

5.5 Sulfuric acid (H₂SO₄) solution: 2.0 mol/L.

5.6 Sodium thiosulfate (Na₂S₂O₃) solution: 0.1 mol/L.

5.7 Starch solution: 1% by mass, that is, 1 g of starch are dissolved in 100 mL of water.