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

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

(English Translation)

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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;
- Part 2.Colorimetric method;
- Part 3.Formaldehyde emissions.

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.

- The preparation method for DNPH solution has been changed (see 5.10 of this

Edition; 4.3 of Edition 2019);

- The following has been added. "A water bath or oven, with temperature controllable at $(50 \pm 2)^{\circ}\text{C}$ " (see 6.5 of this Edition);
- The guidelines now include provisions for removing residual glue from samples (see 7.1 of this Edition);
- The test for fur specimens with fur has been added (see Chapter 7 of this Edition);
- The deviation requirements for extraction temperature have been changed (see

8.2.1 of this Edition; 6.2 of Edition 2019);

- The conditions (such as temperature and time) for the reaction of formaldehyde with DNPH have been changed (see 8.2.2 of this Edition; 6.3 of Edition 2019);
- The method for creating the standard working curve has been changed (see 8.2.4 of this Edition; 6.5 of Edition 2019);
- The preparation method of formaldehyde standard solution when using 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);
- The requirement regarding the solution standing time when preparing a standard working curve using DNPH-formaldehyde solution has been deleted (see 6.5.2 of Edition 2019);

Leather and fur -- Determination of formaldehyde content --

Part 1.High-performance liquid chromatography method

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.

NOTE: The method specified in this document is selective and less affected by colored extracts, 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.

GB/T 6682, Water for analytical laboratory use -- Specification and test methods (GB/T 6682-2008, ISO 3696:1987, MOD)

GB/T 39364, Leather - Chemical, physical, mechanical and fastness tests -- Sampling location (GB/T 3936-2020, ISO 2418:2017, MOD)

QB/T 1267, Fur. Chemical, physical and mechanical and fastness tests. Sampling location

QB/T 1272, Fur. Preparation of chemical test samples

QB/T 1273, Fur. Chemical tests. Determination of volatile matter

QB/T 2716, Leather -- Preparation of chemical test samples

QB/T 2717, Leather -- Chemical tests -- Determination of volatile

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).

NOTE: This document measures the total amount of free and hydrolyzed formaldehyde extracted from leather and fur under standard conditions.

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%.

NOTE: Formaldehyde and formaldehyde-2,4-dinitrophenyl ether solutions are commercially available. If using commercially available solutions, procedure 8.1 is unnecessary.

5.9 Extraction solution. 0.1% by mass, i.e., 1 g of sodium dodecyl sulfonate or sodium

dodecyl sulfate are dissolved in 1000 mL of water.

5.10 2,4-Dinitrophenylhydrazine (DNPH) solution. dissolve 0.3 g of DNPH (2,4-dinitrophenylhydrazine) in 100 mL of acetonitrile (5.8).

6.4 Water bath. temperature controllable up to $(40 \pm 2)^{\circ}\text{C}$, equipped with an oscillation

device with an oscillation frequency of (50 ± 10) r/min.

6.6 High performance liquid chromatograph. equipped with a UV detector or diode

array detector.

7.1 Sampling

The leather is manufactured in accordance with GB/T 39364.

The sampling of fur shall be conducted in accordance with the provisions of QB/T 1267.

During the sampling process, care shall be taken to avoid damage to the fur and to keep the fur intact.

If sampling cannot be taken from a standard location (such as directly from shoes or clothing), specimens shall be taken from any location within the available area. The samples shall be representative, and this shall be noted in the test report.

Residual glue on the sample shall be removed by physical methods.

7.2 Specimen preparation

The leather shall be manufactured in accordance with the provisions of QB/T 2716.

The fur shall be tested in accordance with the provisions of QB/T 1272. The test