



**International
Standard**

ISO 14714

**Essential oils and aromatic
extracts — Determination of
benzene content**

*Huiles essentielles et extraits aromatiques — Détermination de la
teneur en benzène*

**Second edition
2024-10**

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Foreword

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 14714:1998), which has been technically revised.

The main changes are as follows:

- in the title and scope, the word “residual” has been removed;
- the structure of the document has been changed;
- in the scope, “around 10 ppm” has been replaced by “from 1 to 10 mg/kg”;
- in [6.2](#), the type of the recommended column has been changed;
- in [6.3](#), the title of the subclause has been changed and additional information of the mass spectrometer has been added;
- in [9.1.3](#), precisions have been added for building the calibration curves with Flame ionization detector (FID) or by mass spectrometer detection;
- in [9.2.3](#), precisions have been added for determining benzene content by mass spectrometer detection.

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.

Essential oils and aromatic extracts — Determination of benzene content

1 Scope

This document describes a method for determining the traces of benzene in essential oils and aromatic extracts, using static head space gas chromatography.

It applies to contents from 1 mg/kg to 10 mg/kg in the analysed product.

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 356, *Essential oils — Preparation of test samples*

ISO 7609, *Essential oils — Analysis by gas chromatography on capillary columns — General method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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/>

3.1

m/z

mass-to-charge ratio

dimensionless value formed by dividing the mass of an ion by its charge number in mass spectrometry

4 Principle

The sample is analysed by static headspace gas chromatography on a capillary column, either using a flame ionization detector or detection by means of mass spectrometry.

The benzene content is determined using an external standard calibration method.

5 Reagents and products

5.1 Reference substance: benzene, minimum purity 99 %, determined by gas chromatography.

5.2 Diethyl phthalate, which shall be free from any traces of benzene, as verified under test conditions.

6 Apparatus

The usual laboratory apparatus and, in particular, the following shall be used.

6.1 Chromatograph, recorder, integrator, in accordance with ISO 7609.

6.2 Column.

It is recommended to use a capillary column with the following characteristics:

- stationary phase: 6 % cyanopropyl/phenyl, 94 % polydimethylsiloxane;
- length: 30 m;
- internal diameter: 0,25 mm;
- film thickness: 1,4 μm .

It is also possible to use other capillary columns with the following characteristics:

- stationary phase: 100 % dimethylpolysiloxane;
- length: 30 m to 60 m;
- internal diameter: 0,25 mm to 0,5 mm.

6.3 Detector, i.e. flame ionization detector or mass spectrometric detector (single quadrupole mass spectrometer in the electron impact mode with conventional 70 eV ionization).

6.4 Headspace sampler, which allows the injection of headspace vapours, in static mode, to the gas chromatograph either with a gas syringe system with leaktightness locks or by an automatic equipment consisting of a loop and valves.

7 Preparation of test sample

The test sample shall be prepared in accordance with ISO 356.

8 Operating conditions

8.1 Chromatographic operating conditions

8.1.1 Injector temperature

The temperature of the injector shall be 150 °C.

8.1.2 Oven temperature

The oven shall have an isothermal value between 40 °C and 60 °C maintained for 15 min, followed by rapid temperature programming to elute any less volatile product.

8.1.3 Temperature of flame ionization detector

The temperature of the flame ionization detector shall be from 200 °C to 250 °C.

8.1.4 Flow rate of carrier gas and auxiliary gases

The flow rate of carrier gas and auxiliary gases shall be in accordance with ISO 7609.