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**Oil of lime expressed, Persian type  
(*Citrus latifolia* Tanaka)**

*Huile essentielle de limette exprimée à froid, type Perse (Citrus latifolia Tanaka)*



Reference number  
ISO 23954:2009(E)

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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 23954 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

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# Oil of lime expressed, Persian type (*Citrus latifolia* Tanaka)

## 1 Scope

This International Standard specifies certain characteristics of the oil of lime expressed, Persian type (*Citrus latifolia* Tanaka) in order to facilitate assessment of its quality.

## 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.

ISO/TR 210, *Essential oils — General rules for packaging, conditioning and storage*

ISO/TR 211, *Essential oils — General rules for labelling and marking of containers*

ISO 212, *Essential oils — Sampling*

ISO 279, *Essential oils — Determination of relative density at 20 °C — Reference method*

ISO 280, *Essential oils — Determination of refractive index*

ISO 592, *Essential oils — Determination of optical rotation*

ISO 875, *Essential oils — Evaluation of miscibility in ethanol*

ISO 4715, *Essential oils — Quantitative evaluation of residue on evaporation*

ISO 4735, *Oils of Citrus — Determination of CD value by ultraviolet spectrometric analysis*

ISO 11024-1, *Essential oils — General guidance on chromatographic profiles — Part 1: Preparation of chromatographic profiles for presentation in standards*

ISO 11024-2, *Essential oils — General guidance on chromatographic profiles — Part 2: Utilization of chromatographic profiles of samples of essential oils*

## 3 Terms and definitions

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

### 3.1

#### **oil of lime expressed, Persian type**

essential oil of lime expressed, Persian type (*Citrus latifolia* Tanaka) of the Rutaceae family, expressed or pressed from the peel of the fruit without heat

NOTE 1 The principal areas of production are the USA, Mexico, and Brazil.

NOTE 2 For information on CAS number, see ISO/TR 21092 [2].

## 4 Requirements

### 4.1 Appearance

Mobile clear liquid.

### 4.2 Colour

Green, yellow-green, or brownish-green.

### 4.3 Odour

Characteristic of the peel of fresh lime.

### 4.4 Relative density at 20 °C, $d_{20}^{20}$

Minimum: 0,861.

Maximum: 0,879.

### 4.5 Refractive index at 20 °C

Minimum: 1,476.

Maximum: 1,486.

### 4.6 Optical rotation at 20 °C

Between +38° and +53°.

### 4.7 Miscibility in 95 % (volume fraction) ethanol at 20 °C

It shall not be necessary to use more than 3 volumes of 95 % (volume fraction) ethanol (with slight haze permitted) to obtain a clear solution with 1 volume of essential oil.

### 4.8 Residue on evaporation

Minimum: 5,0 % (mass fraction).

Maximum: 12,0 % (mass fraction).

### 4.9 CD value

Minimum: 0,24.

### 4.10 Chromatographic profile

Carry out the analysis of the essential oil by gas chromatography. Identify in the chromatogram obtained, the representative and characteristic components listed in Table 1. The proportions of each of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table 1 — Chromatographic profile

Component	Minimum	Maximum
	%	%
$\alpha$ -Pinene	2,0	2,5
$\beta$ -Pinene	10,0	12,0
Myrcene	1,2	2,0
<i>p</i> -Cymene	0	0,5
Limonene	47,0	53,0
$\gamma$ -Terpinene	11,0	14,0
Neral	1,0	2,0
Geranial	2,0	3,0
Neryl acetate	0,6	1,3
Geranyl acetate	0,2	0,4
$\beta$ -Caryophellene	0,4	0,6
$\alpha$ -Bergamotene	0,8	1,3
$\beta$ -Bisabolene	1,5	2,0
NOTE The chromatographic profile is normative, contrary to the typical chromatograms given for information in Annex A.		

#### 4.11 Flashpoint

Information concerning the flashpoint is given in Annex B.

### 5 Sampling

See ISO 212.

Minimum volume of test sample: 30 ml.

NOTE This volume allows each of the tests specified in this International Standard to be carried out at least once.

### 6 Test methods

#### 6.1 Relative density at 20 °C, $d_{20}^{20}$

See ISO 279.

#### 6.2 Refractive index at 20 °C

See ISO 280.

#### 6.3 Optical rotation at 20 °C

See ISO 592.

**6.4 Miscibility in 95 % (volume fraction) ethanol at 20 °C**

See ISO 875.

**6.5 Residue on evaporation**

Test portion: 3 g.

Evaporation time: 6 h.

See ISO 4715.

**6.6 CD value**

Maximum value: 315 nm.

Sample size: 20 mg.

See ISO 4735.

**6.7 Chromatographic profile**

See ISO 11024-1 and ISO 11024-2.

**7 Packaging, labelling, marking, and storage**

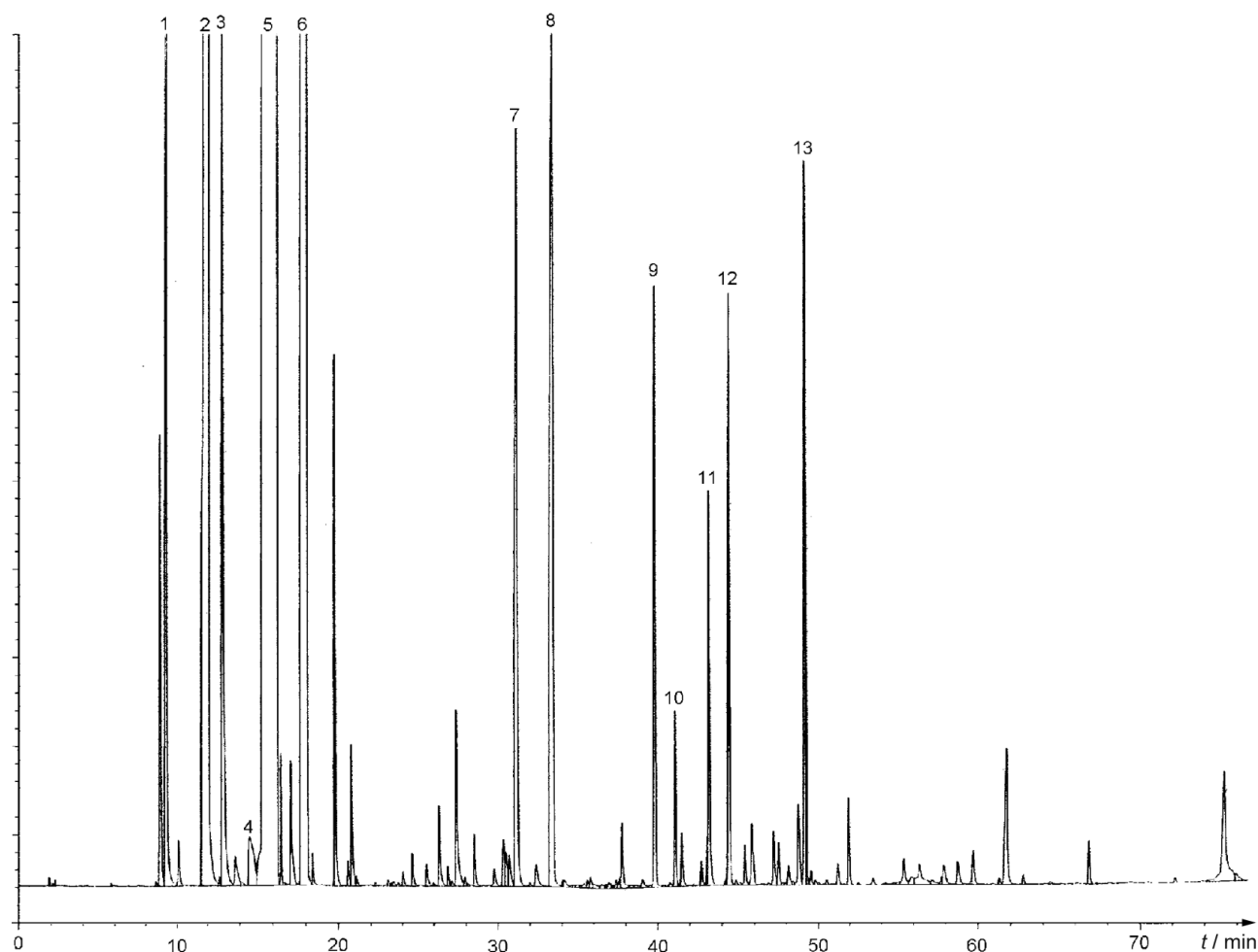
See ISO/TR 210 and ISO/TR 211.

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## Annex A (informative)

### Typical chromatograms of the analysis by gas chromatography of the essential oil of lime expressed, Persian type (*Citrus latifolia* Tanaka)



#### Peak identification

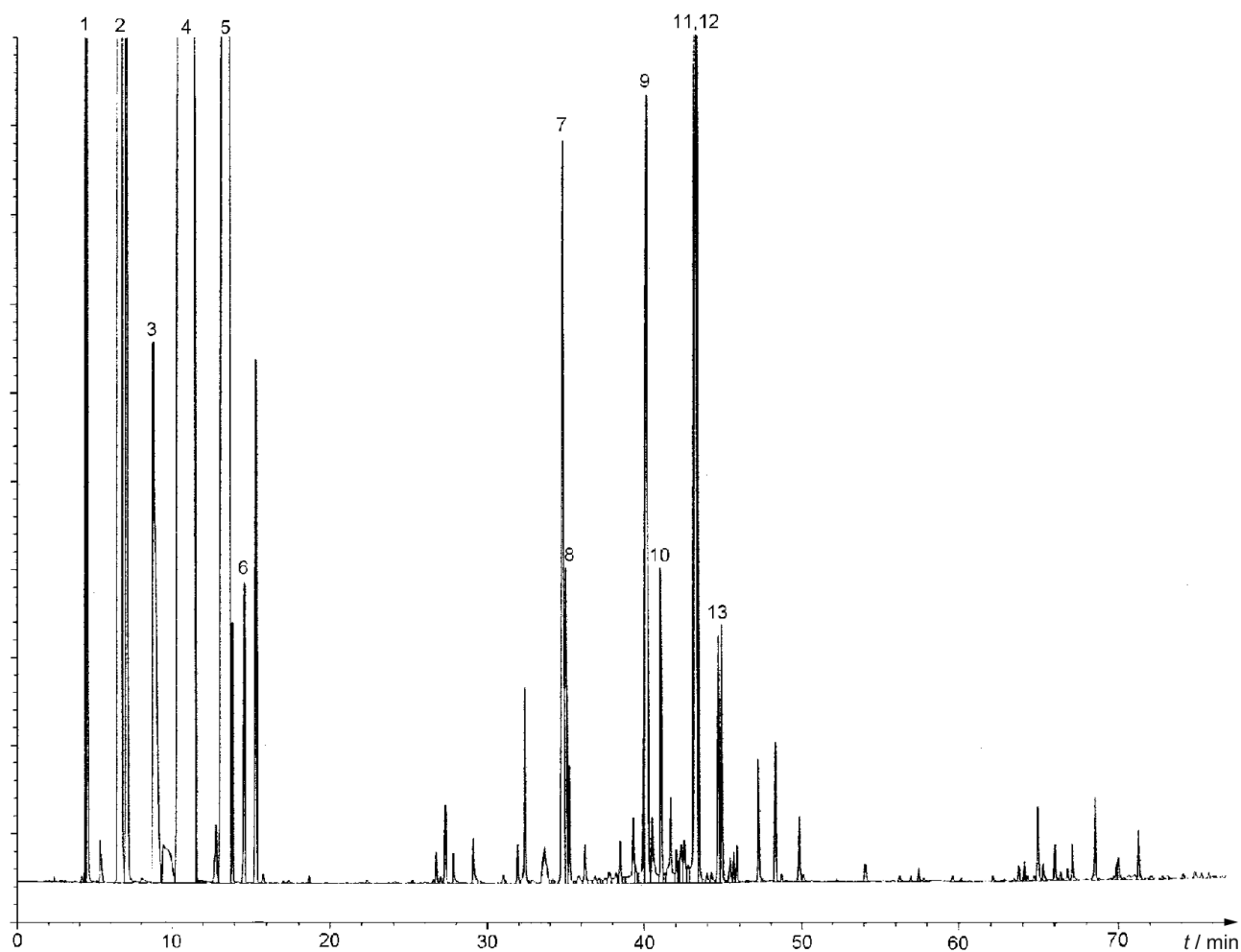
1	$\alpha$ -Pinene	12	$\alpha$ -Bergamotene
2	$\beta$ -Pinene	13	$\beta$ -Bisabolene
3	Myrcene		
4	<i>p</i> -Cymene		
5	Limonene		
6	$\gamma$ -Terpinene		
7	Neral		
8	Geranial		
9	Neryl acetate		
10	Geranyl Acetate		
11	$\beta$ -Caryophellene		

#### Operating conditions

Column: capillary, silica, 30 m length, 0,2 mm internal diameter  
 Stationary phase: poly(5%diphenyl/95%dimethylsiloxane) (SP-5<sup>1</sup>)  
 Film thickness: 0,20  $\mu$ m  
 Oven temperature: isothermal at 60°C for 8 min and then programming temperature from 60 °C to 200 °C at a rate of 2 °C/min  
 Detector temperature: 250 °C  
 Detector: flame ionization type  
 Carrier gas: helium  
 Volume injected: 0,1  $\mu$ l  
 Carrier gas flow rate: 1 ml/min  
 Split ratio: 1:100

Figure A.1 — Typical chromatogram taken on an apolar column

1) Example of a product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.



**Peak identification**

- 1  $\alpha$ -Pinene
- 2  $\beta$ -Pinene
- 3 Myrcene
- 4 Limonene
- 5  $\gamma$ -Terpinene
- 6 *p*-Cymene
- 7  $\alpha$ -Bergamotene
- 8  $\beta$ -Caryophellene
- 9 Neral
- 10 Neryl acetate
- 11  $\beta$ -Bisabolene
- 12 Geranial
- 13 Geranyl acetate

**Operating conditions**

Column: capillary, silica, 30 m length, 0,2 mm internal diameter  
 Stationary phase: polyethylene glycol (Supelcowax-10<sup>1</sup>)  
 Film thickness: 0,20  $\mu$ m  
 Oven temperature: isothermal at 60 °C for 8 min and then programming temperature from 60 °C to 200 °C at a rate of 2 °C /min  
 Injector temperature: 250 °C  
 Detector temperature: 250 °C  
 Detector: flame ionization type  
 Carrier gas: helium  
 Volume injected: 0,1  $\mu$ l  
 Carrier gas flow rate: 1 ml/min  
 Split ratio: 1:100

**Figure A.2 — Typical chromatogram taken on a polar column**

## Annex B (informative)

### Flashpoint

#### B.1 General information

For safety reasons, transport companies, insurance companies, and people in charge of safety services require information on the flashpoints of essential oils, which in most cases are flammable products.

A comparative study on the relevant methods of analysis (see ISO/TR 11018 <sup>[1]</sup>) concluded that it was difficult to recommend a single apparatus for standardization purposes, given that:

- there is a wide variation in the chemical composition of essential oils;
- the volume of the sample needed for certain equipment is incompatible with the high price of essential oils;
- as there are several different types of equipment which can be used for the determination, users cannot be expected to use one specified type only.

Consequently, it was decided to give a mean value for the flashpoint annexed to each International Standard, for information, in order to meet the requirements of the interested parties.

The equipment with which this value was obtained has to be specified.

For further information, see ISO/TR 11018 <sup>[1]</sup>.

#### B.2 Flashpoint of the essential oil of lime expressed, Persian type (*Citrus latifolia* Tanaka)

The mean value is +46 °C.

NOTE Obtained with tag closed cup equipment or equivalent.

## Bibliography

- [1] ISO/TR 11018, *Essential oils — General guidance on the determination of flashpoint*
- [2] ISO/TR 21092, *Essential oils — Characterization*

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