

p-Menthan-7-ol

A magnolia herbal fragrance ingredient

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p-Menthan-7-ol (**F-1**) is a clear liquid material. It was possibly found in nature in *Perilla frutescens* and *Artemisia asiatica*.¹

It has a fresh, soft and clean floral odor that recalls the fragrance associated with the white petals and blossoms of many flowers such as magnolia, tuberose and muguet. p-Menthan-7-ol is applied in herbal flavorings such as tea and harmonizes wonderfully with muguet, lilac, tuberose and jasmine floral as well as citrus notes, particularly bergamot. It combines well with muguet ingredients, often lifting and smoothing the fragrance. Combined with woody materials and methylionone (CAS# 127-51-5), it diffuses the woody character to the top of the perfume. Small percentages of the material result in floral freshness and large amounts can produce original effects. p-Menthan-7-ol is recommended for use in fine fragrance, personal care and fabric care up to 20%^a.

The commercial material is a mixture of *cis*-p-menthan-7-ol and *trans*-p-menthan-7-ol (**F-2**).

The *cis* isomer is predominant at 60–80%, while the *trans* isomer is 20–40%.

In a multidimensional scaling map of muguet perfumery ingredients (**F-3**), Lyrall and hydroxycitronellal (CAS# 107-75-5) are the sweetest materials and Mayol is the most herbal, minty and pine^b. Due to this fact, it is also used to create the green-floral smell of muguet.

p-Menthan-7-ol is a fragrance ingredient used in decorative cosmetics, fine fragrances, shampoos, toilet soaps and other toiletries as well as in non-cosmetic products such as household

Physical Data for p-Menthan-7-ol

Appearance: Clear colorless liquid

M.W.: 156.3

Boiling point: 215–217°C

Specific gravity: 0.912–0.920 (25°C)

Refractive index: 1.4670–1.4710 (20°C)

Flash point: 201°F TCC

logP (o/w): 3.24 (estd.)

Solubility in ethanol 95°C: Soluble in all proportions

cleaners and detergents. Its use worldwide is in the region of 10–100 metric tons per annum.

According to the International Fragrance Association (IFRA), the maximum skin level in formulae used in fine fragrances is 1.15% (IFRA, Use Level Survey, September 2004), assuming use of the fragrance oil at levels up to 20% in the final product. The 97.5 percentile use level in formulae for use in cosmetics in general has been reported to be 2.2% (IFRA, Use Level Survey, September 2004), which would result in a maximum daily exposure on the skin of 0.056 mg/kg for high-end users of these products.³

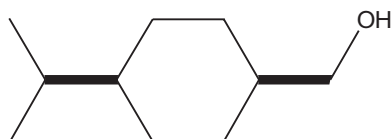
p-Menthan-7-ol can be prepared by hydrogenation of cuminaldehyde (CAS# 122-03-2) and from β -pinene (CAS# 19902-08-0) as a starting material.^{4,5}

The cuminaldehyde route is shown in **F-4**.

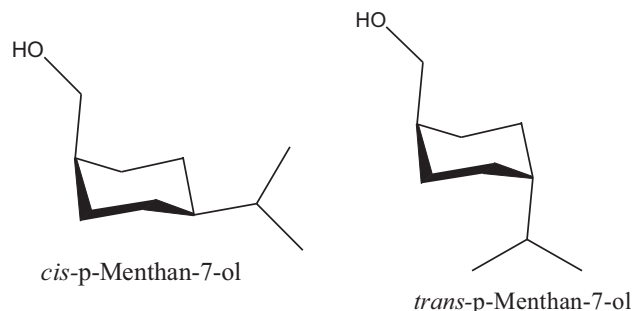
^a Some of the information on occurrence and uses are taken from Firmenich, IFF and Bedoukian specifications, and from FRM 2001 and PMP 96 Databases of Perfumery Materials & Performance, Boelens Aroma Chemicals Information Services, The Netherlands.

^b Lyrall is a trade name of IFF; Mayol is a trade name of Firmenich.

F-1. p-Menthan-7-ol (*cis*-4-isopropylcyclohexanemethanol; trade names: Mayol [Firmenich], Meijiff [IFF], Lilytol [Bedoukian]; C₁₀H₂₀O; CAS# 5502-75-0; FEMA# 4507)



F-2. *cis*-p-Menthan-7-ol and *trans*-p-menthan-7-ol



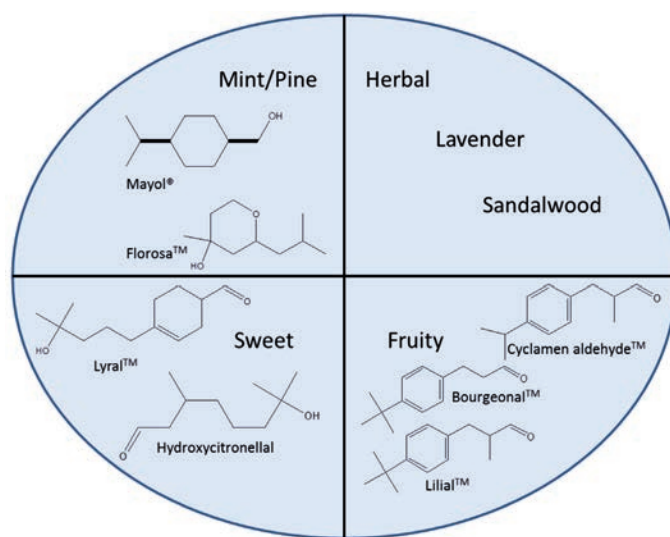
T-1. Firmenich flowery composition

Ingredient	Parts (w/w)
Phenethyl alcohol	350
Amylcinnamic aldehyde	300
Dimethylbenzyl carbinol	200
Cyclamen aldehyde	50
Linalool	40
Terpineol	30
4-Methylphenyl acetaldehyde 50% DEP	20
Undecylenic aldehyde 10% DEP	10

T-2. Muguet fragrance formulation

Ingredient	Parts (w/w)
Bergamot oil	20
Cardamom oil 10%	10
Methyl dihydrojasmonate	120
Damascenone 10%	20
<i>cis</i> -p-Menthan-7-ol >93%	66
<i>cis</i> -3-hexenol 10%	2
<i>cis</i> -Jasmone 10%	65
Linalool	26
DPG	1

F-3. Multidimensional scaling map of muguet perfumery ingredients²



Pure *cis*-p-Menthan-7-ol can be prepared by biotechnological methods. For example, in a study of biotransformation of menthol by sporulated surface cultures of *Aspergillus niger*, the *cis* isomer of p-menthan-7-ol was the main bioconversion product obtained (F-5).⁶

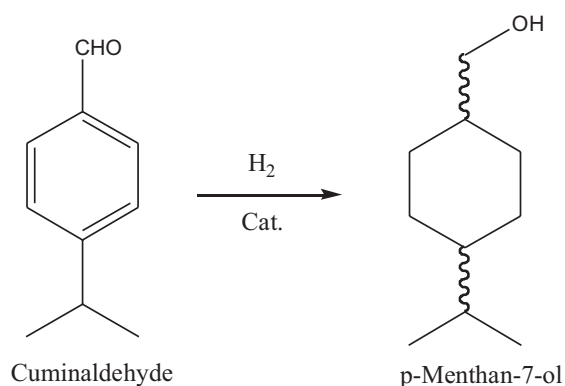
T-1 displays a flowery composition from Firmenich.⁴ The addition of *cis*-p-menthan-7-ol (99%; 2:8) in the composition, which originally lacked it, resulted in a new composition possessing a well-defined flowery odor reminiscent of cyclamen or lily of the valley. When *cis*-p-menthan-7-ol was replaced in the flowery composition by a 3:2 or a 7:3 mixture of *cis*- and *trans*-p-menthan-7-ol, the effect achieved was similar and the obtained flowery note possessed a more or less diffused character.

A muguet accord that contains Lillal (CAS# 80-54-6) and Majantol (CAS# 103694-68-4) in a ratio of ca. 3:2 has been used in *Good Life* (Davidoff, 1998) and *Good Life* woman (Davidoff, 1999)^c. In *Dolce Vita* (Dior, 1995), an overdose of ca. 15% of Majantol and 6% Mayol have been combined to harmonize the different floral parts and to convey smoothness to the fragrance.⁷

Perfumers also prepared another formulation of muguet fragrance in a perfume containing 20% p-menthan-7-ol with a 70:30 *cis/trans* isomers ratio. They also prepared a corresponding perfume formulation of the same ingredients, except that p-menthan-7-ol with a 70:30 *cis/trans* ratio was used in place of p-menthan-7-ol >93% *cis* (T-2). The perfume with the p-menthan-7-ol >93% *cis* had a clean, fresh citrus note while the 70:30 *cis/trans* ratio p-menthan-7-ol containing perfume had a slightly dirty note.⁸

^cLillal is a trademark of Givaudan; Majantol is a trademark of Symrise (previously Haarmann & Reimer).

F-4. Cuminaldehyde route



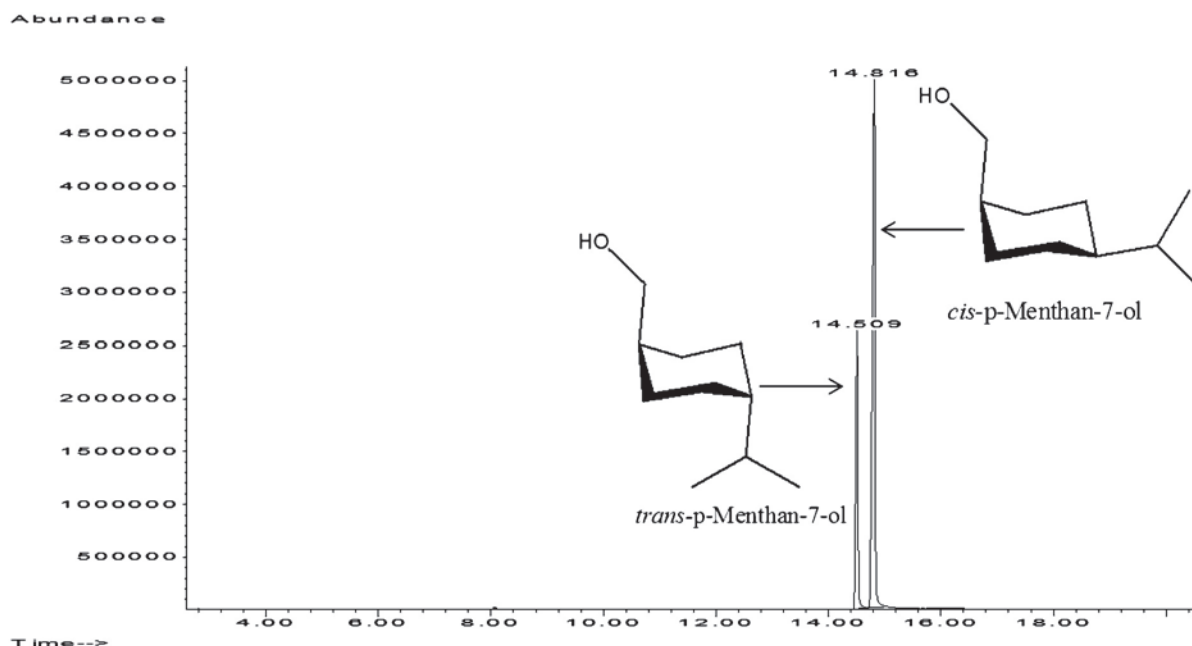
An independent consultant with more than 46 years of experience in the perfume industry commented as follows: "With an increasing concentration of the *cis* isomer, the odor is changing from a soft white floral muguet note to a more powerful green, natural lily of the valley odor that is strong and tenacious. The cut-off line, in my opinion, is at 93% *cis*. The fresh, natural muguet character is best at 98% *cis*. The odor improvement at 93% *cis* is quite remarkable."⁸

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F-5. GCMS of products of menthol biotransformation



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