19 Specific References

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20 General References

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21 Author

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22 Date of Revision

4 May 2017.

Menthol

1 Nonproprietary Names

BP: Racementhol

JP: *dl*-Menthol

PhEur: Menthol, Racemic

USP–NF: Menthol

2 Synonyms

Hexahydrothymol; 2-isopropyl-5-methylcyclohexanol; 4-isopropyl-1-methylcyclohexan-3-ol; 3-*p*-menthanol; *p*-menthan-3-ol; *dl*-menthol; mentholum racemicum; menthomenthol; mentoli; mentolis; peppermint camphor; racemic menthol.

3 Chemical Name and CAS Registry Number

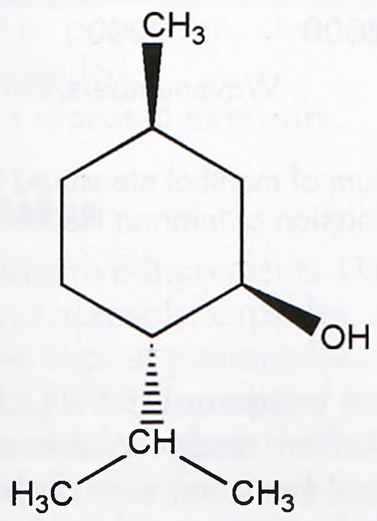
(1*RS*,2*RS*,5*RS*)-(±)-5-Methyl-2-(1-methylethyl)cyclohexanol [15356-70-4]

Note that the following CAS numbers have also been used: [1490-04-6] and [89-78-1].

4 Empirical Formula and Molecular Weight

$C_{10}H_{20}O$ 156.27

5 Structural Formula



6 Functional Category

Flavoring agent.

7 Applications in Pharmaceutical Formulation or Technology

Menthol is widely used in pharmaceuticals, confectionery, and toiletry products as a flavoring agent or odor enhancer. In addition to its characteristic peppermint flavor, *l*-menthol, which occurs naturally, also exerts a cooling or refreshing sensation that is exploited in many topical preparations; *see* Section 18. Unlike mannitol, which exerts a similar effect due to a negative heat of solution, *l*-menthol interacts directly with the body's coldness receptors. *d*-Menthol has no cooling effect, while racemic menthol exerts an effect approximately half that of *l*-menthol. The propensity of menthol to sublime has been exploited to prepare formulated granules with increased porosity, which can increase dissolution and disintegration rate.[1]

When used to flavor tablets, menthol is generally dissolved in ethanol (95%) and sprayed onto tablet granules and not used as a solid excipient.

Menthol has been investigated as a skin-penetration enhancer and is also used in perfumery, tobacco products and chewing gum.

See Table I.

Table I: Uses of menthol.

Use	Concentration (%)
Pharmaceutical products	
Inhalation	0.02–0.05
Oral liquids	0.001–0.05
Tablets	0.2–0.4
Topical formulations	0.05–10.0
Cosmetic products	
Toothpaste	0.4
Mouthwash	0.1–2.0
Oral spray	0.3

8 Description

Racemic menthol is a mixture of equal parts of the (1*R*,2*S*,5*R*)- and (1*S*,2*R*,5*S*)-isomers of menthol. It is a free-flowing or agglomerated crystalline powder, or colorless, prismatic, or acicular shiny crystals, or hexagonal or fused masses with a strong characteristic odor and taste. The crystalline form may change with time owing to sublimation within a closed vessel. The USP 40–NF 35 S1 specifies that menthol may be either naturally occurring *l*-menthol or