Molecule of the Month: Menthyl Lactate

Organoleptic characteristics, physical data and applications

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Menthyl lactate has a mild, cooling, fresh, minty, somewhat burnt sugarlike and sweet menthol taste profile (**see F-1**). It is used in minty compounds for various purposes such as toothpaste, chewing gum and tobacco; it is also used in confections, beverages, and as a peppermint booster in oral care products.

Menthyl lactate is produced in two forms—a white crystalline powder and fused material; both forms are used in various applications. Menthyl lactate (l-menthyl-l-lactate) was, for several years, considered as an artificial cooling agent, despite its viable preparation from natural starting materials like l-menthol and l-lactic acid (**see F-2**). In 2006, menthyl lactate was identified in dementholized cornmint oil from India, and this enabled manufacturers to claim it as a natural or nature identical product, depending on its preparation process.[1]

Menthyl lactate is a high performance cooling agent (**see F-3**). The molecule provides a pleasant, long-lasting freshness and a cooling effect on the skin—all without the use of alcohol or menthol. It can also be used as a signal or marker to reinforce product benefits to consumers. For instance, menthyl lactate's global usage as an active cosmetic ingredient can be used to highlight time related benefits of a final product. Additionally, it can be used as a cryogenic agent for sport injuries, together with menthol.

Although menthyl lactate has a faint inherent odor, this can easily be masked by fragrances; adding fragrant profiles to products using menthyl lactate is therefore clearly possible. In addition, the material can be cold-processed and possesses stability in pH-value range of 4-8.* It also easily blends with oils, fragrances and glycols, and thus can be used in varied applications.

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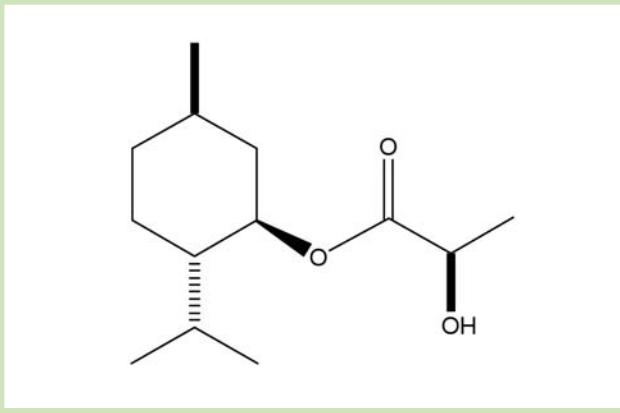
References:

1. K Gassenmeier, Identification and quantification of l-menthyl lactate in essential oils from *Mentha arvensis* L. from India and model studies on the formation of l-menthyl lactate during essential oil production, *Flav Fragr J*, John Wiley & Sons Ltd., 21 (4), 725–730 (2006)

* Information taken from Symrise and Frutarom Ltd. publications.

Molecular structure of menthyl lactate **F-1**



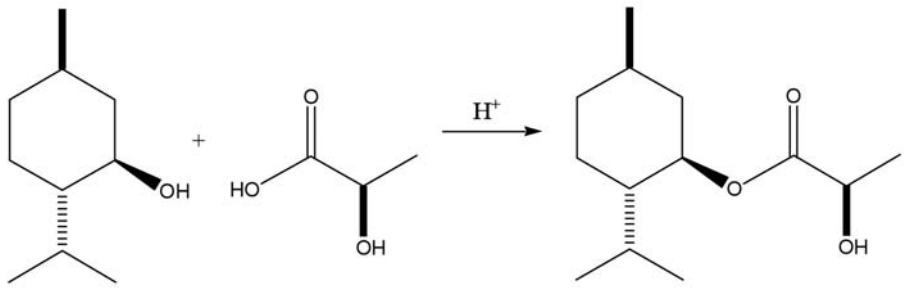
CAS#:	59259-38-0
FEMA#:	3748
Synonyms:	l-Menthyl 2-hydroxypropanoate; Frescolate ML[a]; Arctice ML[b]

Physical Data (Crystalline form)

Appearance:	White, crystalline substance
Molecular Formula:	$C_{13}H_{24}O_3$
Molecular Weight:	228.4
Specific Rotation (20°C):	-78°
Congealing Point:	42°C
Solubility:	Soluble in ethyl alcohol (50 vol. %), propylene glycol and other glycols

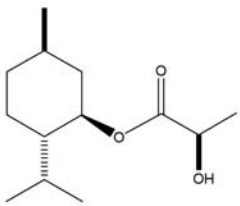
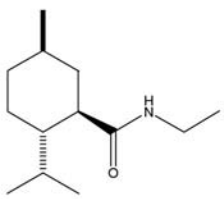
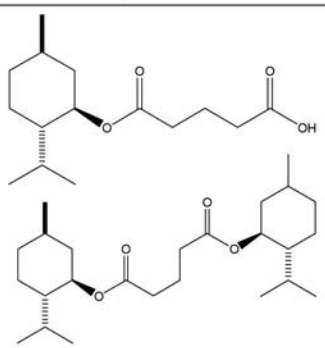
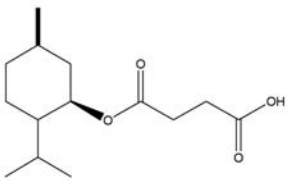
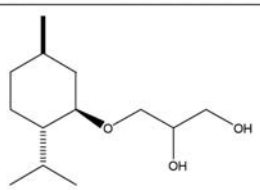
[a] Frescolate is a trademark of Symrise.
[b] Arctice is a trademark of O'Laughlin Industries.

Preparation of menthyl lactate with l-menthol and l-lactic acid as the starting materials F-2



L-Menthol L-Lactic acid L-Menthyl lactate

Some members of menthol derived cooling agents family** F-3

Menthyl lactate l-Menthyl 2-hydroxypropanoate		Mild cooling, sweet menthol taste, fresh, minty, somewhat burnt sugar. Used in minty compounds for all purposes such as toothpaste, chewing gum, tobacco; oral care products, peppermint booster, confections and beverages.
Menthol carboxamide 2-Isopropyl-5-methylcyclohexane-carboxylic acid ethylamide		Extremely cooling, fresh menthol taste. Used in flavor compounds for all purposes such as toothpaste, chewing gum, candies, ice cream, tobacco for cigarettes and filter tips; oral care products; in cosmetic lotions, creams and cooling shaving products.
Menthyl glutarate Pentandioic acid, menthyl ester and Pentanedioic acid, dimenthyl ester		Uses in minty compounds for all purposes such as toothpaste, chewing gum, tobacco; oral care products, anti-dandruff compositions, spreadable foods, confections and beverages.
Monomenthyl succinate Butanedioic acid, monomenthyl ester		Pleasant, long-lasting cooling effect. Used in fruit flavors, tobacco flavors, oral care products, nasal care products, toilet articles, chewing gum and alcoholic beverages.
Menthoxypropane-1, 2-diol 3-l-(p-Menthane-3-yloxy)-1,2-propane diol		Faint, minty odor. Used as cool-feeling additive in cosmetics, Soaps, dentrifices, mouthwashes, chewing gum, tobacco and medical plasters.

** Information is taken from Symrise, Takasago, Shanghai Apple F&F and O'Laughlin Ind. publications.