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**symrise** 

# Symcool<sup>®</sup> Cooling Agents

Infinite Sensations

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We are committed to the creation of new and differentiated sensory products and the discovery of new applications for existing products.



# Symcool® Cooling Agents

## Infinite Sensations

We are committed to the creation of new products and the discovery of new applications for existing products.

Physiological coolants have been around for decades, the most well-known being menthol. The Symcool® line offers unique odorless and flavorless cooling sensations which can be used alone or as a complement to menthol to help extend the cool fresh feeling in the final application, or in fruit flavors to enhance juiciness perception. The low volatility of these compounds allows for skin contact without a burning sensation in the eyes. In order to satisfy today's customers who demand specific sensory experiences, the need exists for physiological coolants to provide intense and memorable sensations.

## Symcool® Series: Exceptional Performance

Symrise's Fragrance and Sensory Ingredients Business Unit has been a major supplier of the cooling compounds including WS-3, WS-5, WS-12, WS-23 and Menthyl Lactate. These products allow our customers to use coolants in a broader array of market segments and applications.

Our sensory research demonstrates individual coolants are perceived in specific areas of the mouth with different cooling profiles. Each coolant provides unique characteristics in terms of cooling intensity and longevity, combined with negligible odor and low volatility.

Our Symcool® materials have achieved the requirements of the Food Safety System Certification 22000.

## Symcool® Extra Series: Enhanced Cooling – Easy-to-use Liquids

Symcool® Extra WSE-500 combines sensations found in our popular WS-3, WS-23 and Menthyl Lactate with a little something extra.

The Symcool® Extra cooling system delivers more. This product provides a balanced and well-rounded cooling sensation with the right intensity for both oral and cosmetic applications.

Symcool® Extra cooling system is an easy to incorporate liquid. The proprietary cooling system was created without adding solvents or diluting the system. The system is easier to handle than powder, crystals or flakes. These clear liquids allow manufacturers to avoid issues resulting from insufficient mixing of powder.

## What are Symcool® compounds?

### ■ Symcool® WS-3

#### **Cyclohexanecarboxamide, N-Ethyl-5-Methyl-2-(1-Methylethyl)-**

WS-3 is a menthol derivative. But unlike menthol, WS-3 is virtually nonvolatile, odorless and tasteless. WS-3 is one of the most used cooling agents in the market and it's known for its clean immediate cooling impact and has been found to cool primarily at the roof of the mouth, the back of the mouth and the back of the tongue.

### ■ Symcool® WS-5

#### **N-(Ethoxycarbonylmethyl)-3-p-menthanecarboxamide**

WS-5 is a menthol derivative that was developed in the 1970s by Wilkinson Sword, but was not commercialized due to a bitter aftertaste associated with the product. However, we have developed a patented process to offer substantially pure WS-5 that does not possess the bitter aftertaste present in previous forms of the product. WS-5 has been found to have approximately two and one-half times the cooling intensity of WS-3, it is one of the strongest commercially available coolants, yet exhibits a smooth and round flavor profile. WS-5 has been found to cool primarily at the roof of the mouth and the back of the tongue.

### ■ Symcool® WS-12

#### **(1R,2S,5R)-N-(4-Methoxyphenyl)-5-methyl-2-(1-methylethyl)cyclohexanecarboxamide**

WS-12 is a menthol derivative. But unlike menthol, WS-12 is virtually nonvolatile, odorless and tasteless. WS-12 is

offers one of the strongest initial cooling impacts and a significantly longer lasting effect comparing with such conventional coolants such as WS-3, WS-5, and WS-23. It has potential for use in mint flavors in oral care applications as well as confectionary and chewing gum depending on dosage levels. In addition it can be used at low levels to impart freshness into berry, citrus and other fruit flavors in a variety of applications. WS-12 has been found to cool primarily at the front of the tongue.

## ■ Symcool® WS-23

### Butanamide, N,2,3-trimethyl-2-(1-methylethyl)-

WS-23 is not derived from menthol. But like WS-3, it exhibits little or no odor or taste and has a low volatility. Sensory evaluations of WS-23 indicate that the product cools more

in the front of the tongue and mouth. While the product has somewhat less cooling impact than that of WS-3, the cooling profile is more round and smooth in character.

## ■ Symcool® Extra WSE-500

WSE-500 is a proprietary, liquid blend of cooling agents. This easy to incorporate material allows for manufacturers to avoid issues that result from insufficient mixing of solids.

#### LIST OF REFERENCES

	WS-3	WS-5	WS-12	WS-23	WSE-500	ML
FEMA	3455	4309	4681	3804	3455 / 3804 / 3748	3748
FL	16.013	16.111	16.123	16.053	16.013 / 16.053 / 09.551	09.551
CAS	39711-79-0	68489-14-5	68489-09-8	51115-67-4	51115-67-4 / 59259-38-0 / 39711-79-0	59259-38-0
EINECS	254-599-0	Na/A	N/A	256-974-4	256-974-4 / 261-678-3 / 254-599-0	261-678-3

#### RECOMMENDED USAGE LEVEL (ppm)

	WS-3	WS-5	WS-12	WS-23	WSE-500	ML
Beverage <small>(Alcoholic &amp; Non-alcoholic)</small>	1-10	1-10	0.1-1	1-8	1-20	1-20
Toothpaste	100-1000	50-400	50-400	100-1000	100-1000	100-1000
Mouthwash	5-200	5-100	5-100	5-200	10-200	10-200
Hard Candy	15-150	10-300	1-20	10-50	15-160	15-500
Chewing Gum	500-2000	100-1500	15-300	500-3000	500-3000	500-2000
Creams & Lotions	500-5000	500-5000	500-5000	500-5000	500-5000	500-5000

#### PHYSICAL PROPERTIES

	WS-3	WS-5	WS-12	WS-23	WSE-500	ML
Physical Form	White crystals	Solid white	White crystalline powder	White crystals powder	Clear liquid,	Liquid or white colorless fused solid
Melting Point	206.96°F / 97.2°C	177.8°F / 81°C	352.76°F / 178.2°C	145.4°F / 63°C	N/A	N/A
Flashpoint	>212°F / >100°C	>212°F / >100°C	>413.6°F / >212°C	>212°F / >100°C	>212°F / >100°C	>219°F / >104°C
Purity	99%	+ Isomer 99% min	99.8% min	99.50% min	N/A	98%

## Menthyl Lactate

### Propanoic acid, 2-Hydroxy-, 5-methyl-2-(1-methylethyl) cyclohexyl ester

Menthyl Lactate is also a menthol derivative. The product has a mild mint-like character, with a fresh and invigorating profile. In addition to use in flavor applications, the product is also widely used in cosmetics and personal care applications. Our product is offered in fused form.

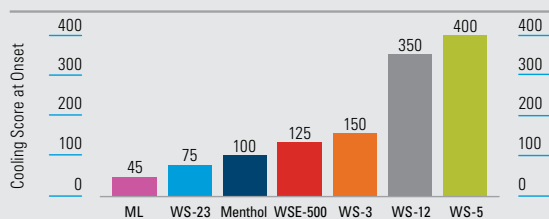
## Cooling Intensity

We have evaluated two basic attributes of cooling agents: cooling at onset and cooling longevity. Sensory attributes of coolants were evaluated at 20 ppm in ethanol. Menthol was used as a reference in measuring the overall cooling intensity. WS-5 has been found to have approximately four times the cooling intensity of menthol. The desired intensity of sensory perception and duration will depend on factors such as coolant concentration, flavor interactions and other formula attributes.

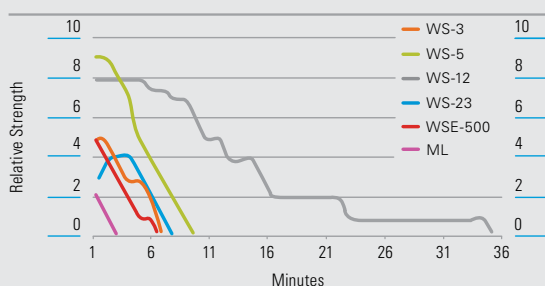
## Solubility

Symcool® cooling agents are sparingly soluble in water. They are soluble in ethanol, propylene glycol, flavor systems and fragrance oils.

RELATIVE COOLING STRENGTH AT FIRST ONSET



COOLING LONGEVITY



## SOLUBILITY OF INDIVIDUAL COOLANTS

Solvent	Temp. °C	Solubility, g/100 ml
<b>WS-3</b>		
Propylene glycol	20	10.7
96% ethanol	20	186.0
40% ethanol	20	0.2
40% ethanol	40	1.2
60% ethanol	20	14.8
60% ethanol	40	38.6
Triacetin	20	Practically insoluble

<b>WS-5</b>		
Propylene glycol	20	11.5
96% ethanol	20	79.4
40% ethanol	20	1.9
40% ethanol	40	3.5
60% ethanol	20	50
60% ethanol	40	70
Triacetin	20	Practically insoluble

<b>WS-12</b>		
Propylene glycol	20	Practically insoluble
96% ethanol	20	0.1
40% ethanol	20	Practically insoluble
60% ethanol	20	0.015
Triacetin	20	Practically insoluble
L-Carvone	20	5.5
Isopropanol	20	2.5
Ethanol (200 Proof)	20	2.5
Ethyl Acetate	20	1.5

<b>WS-23</b>		
Propylene glycol	20	76.4
96% ethanol	20	260.4
40% ethanol	20	18.8
40% ethanol	40	21.9
60% ethanol	20	101.6
60% ethanol	40	122.2
Triacetin	20	3.6

<b>WSE-500</b>		
40% ethanol	20	5.6
40% ethanol	40	13.3
60% ethanol	20	62.5
60% ethanol	40	131.6
Triacetin	20	Practically insoluble

<b>Menthyl Lactate</b>		
Propylene glycol	–	36.6
96% ethanol	–	287.3
40% ethanol	20	4.4
40% ethanol	40	7.6
60% ethanol	20	77.0
60% ethanol	40	93.4
Triacetin	–	28.2

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