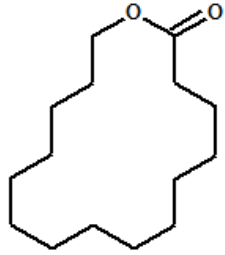


Cyclopentadecanolide

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|-------------------|--|---------------------------|--|
| CAS-No.: | 106-02-5 The scope of this Standard includes, but is not limited to the CAS number(s) indicated above; any other CAS number(s) used to identify this fragrance ingredient should be considered in scope as well. | Molecular formula: | C ₁₅ H ₂₈ O ₂ |
| Structure: |  | | |
| Synonyms: | Angelica lactone Cyclopentadecanolide 15-Hydroxypentadecanoic acid, ω-lactone Oxacyclohexadecan-2-one Pentadecalactone ω-Pentadecalactone Pentadecanolide Cyclopentadecanolid Supra (commercial name) Exaltex (commercial name) Exaltolide (commercial name) Macrolide (commercial name) Muskalactone (commercial name) Pentalide (commercial name) Thibetolide (commercial name) | | |

| | | | | |
|-----------------|-------------------|---------------------|------------------------|------|
| History: | Publication date: | 2020 (Amendment 49) | Previous Publications: | 2013 |
|-----------------|-------------------|---------------------|------------------------|------|

| | | |
|------------------------------|---|-------------------|
| Implementation dates: | For new submissions*: | February 10, 2021 |
| | For existing fragrance compounds*: | February 10, 2022 |
| | *These dates apply to the supply of fragrance mixtures (formulas) only, not to the finished consumer products in the marketplace. | |

| | |
|------------------------|--------------------|
| RECOMMENDATION: | RESTRICTION |
|------------------------|--------------------|

| RESTRICTION LIMITS IN THE FINISHED PRODUCT (%): | | | |
|---|--------|-------------|-------|
| Category 1 | 0.42 % | Category 7A | 4.8 % |

Cyclopentadecanolide

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|-------------|--------|--------------|----------------|
| Category 2 | 0.13 % | Category 7B | 4.8 % |
| Category 3 | 2.5 % | Category 8 | 0.20 % |
| Category 4 | 2.4 % | Category 9 | 4.6 % |
| Category 5A | 0.60 % | Category 10A | 4.6 % |
| Category 5B | 0.60 % | Category 10B | 17 % |
| Category 5C | 0.60 % | Category 11A | 0.20 % |
| Category 5D | 0.20 % | Category 11B | 0.20 % |
| Category 6 | 1.4 % | Category 12 | No Restriction |

FLAVOR REQUIREMENTS:

Due to the possible ingestion of small amounts of fragrance ingredients from their use in products in Categories 1 and 6, materials must not only comply with IFRA Standards but must also be recognized as safe as a flavoring ingredient as defined by the IOFI Code of Practice (www.iofi.org). For more details see chapter 1 of the Guidance for the use of IFRA Standards.

CONTRIBUTIONS FROM OTHER SOURCES:

SEE ANNEX I

ANNEX I

Natural Complex Substances (NCS) containing Cyclopentadecanolide

| Concentration in NCS (%) | CAS number of ingredient | Name of NCS | Botanical name | CAS number of NCS | Essential oil category |
|--------------------------|--------------------------|-------------------|--------------------------|-------------------|------------------------|
| 1.6 | 106-02-5 | Angelica root oil | Angelica archangelica L. | 8015-64-3 | A2.12 |
| 0.29 | 106-02-5 | Angelica seed oil | Angelica archangelica L. | 8015-64-3 | H2.12 |
| 0.01 | 106-02-5 | Galbanum gum | Ferula spp. | 8023-91-4 | K2.15 |
| 0.1 | 106-02-5 | Galbanum oil | Ferula spp. | 8023-91-4 | K2.12 |
| 0.1 | 106-02-5 | Galbanum resin | Ferula spp. | 8023-91-4 | K2.13 |

Cyclopentadecanolide

This is a non-exhaustive indicative list of typical natural presence for Cyclopentadecanolide and is intended to be used in the absence of own analytical data. If analysis has shown that the level of the restricted ingredient in a natural complex substance is different from what is provided in this Annex I, then the analytically determined level should be used in place of the indicative level.

It should further be noted that natural complex substances themselves can be restricted by an IFRA Standard.

For a detailed list of natural contributions, please refer to the Annex I of IFRA Standards, publicly available on the IFRA website (www.ifragrance.org).

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| INTRINSIC PROPERTY DRIVING RISK MANAGEMENT: | DERMAL SENSITIZATION AND SYSTEMIC TOXICITY |
|--|---|

RIFM SUMMARIES:

Recommended concentration levels are based on a comprehensive safety assessment, considering various endpoints. Depending on the outcome of the safety assessment, it might be one or more endpoint(s) that will drive the derivation of the concentration levels. If more than one endpoint is of relevance, the recommended concentration levels for each product category is derived from comparing maximum permitted level per endpoint consideration (dermal sensitization and/or systemic toxicity). Such recommended concentration levels correspond to the lowest level obtained per category.

Additional information is available in the RIFM safety assessment for Cyclopentadecanolide, which can be downloaded from the RIFM Safety Assessment Sheet Database: <http://fragrancematerialsafetyresource.elsevier.com/>.

EXPERT PANEL FOR FRAGRANCE SAFETY RATIONALE / CONCLUSION:

The Expert Panel for Fragrance Safety reviewed all the available data for Cyclopentadecanolide and recommends the limits for the 12 different product categories, which are the acceptable use levels of Cyclopentadecanolide in the various product categories.

REFERENCES:

The IFRA Standard on Cyclopentadecanolide is based on at least one of the following publications:

- The RIFM Safety Assessment on Cyclopentadecanolide if available at the RIFM Safety Assessment Sheet Database: <http://fragrancematerialsafetyresource.elsevier.com>

- Api A.M., Belsito D., Bruze M., Cadby P., Calow P., Dagli M. L., Dekant W., Dent M., Ellis G., Fryer A. D., Fukayama M., Griem P., Hickey C., Kromidas L., Lalko J., Liebler D.C., Miyachi Y., Politano V.T., Renskers K., Ritacco G., Salvito D., Schultz T.W., Sipes I. G., Smith B., Vitale D., Wilcox D.K. (2015). Criteria for the Research Institute for Fragrance Materials, Inc. (RIFM) safety evaluation process for fragrance ingredients. Food Chem Toxicol. 2015 Aug;82 Suppl:S1-S19 (http://fragrancematerialsafetyresource.elsevier.com/sites/default/files/Criteria_Document_Final.pdf).

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- IDEA project (International Dialogue for the Evaluation of Allergens) Final Report on the QRA2: Skin Sensitisation Quantitative Risk Assessment for Fragrance Ingredients, September 30, 2016 (<http://www.ideaproject.info/uploads/Modules/Documents/qra2-dossier-final--september-2016.pdf>).
- Salvito D.T., Senna R. J., Federle T.W. (2002). A framework for prioritizing fragrance materials for aquatic risk assessment. *Environ Toxicol Chem.* 2002;21:1301-1308 (<https://www.ncbi.nlm.nih.gov/pubmed/12069318>).

Additional information on the application of IFRA Standards is available in the Guidance for the use of IFRA Standards, publicly available at www.ifrafragrance.org.