

C I T R A L

CAS N°: 5392-40-5
141-27-5
106-26-3

Empirical formula: C₁₀H₁₆O
(CH₃)₂C=CH(CH₂)₂C(CH₃)=CH-CHO

Synonyms: 3,7-Dimethyl-2,6-octadienal
Geranial (trans-citral)
Neral
Lemarome
Neral and geranial

History: Initial reviews: October 1975, February 1980

Current revision date: 2006

Implementation date: for new submissions*: June 11, 2007
for existing fragrance compounds*: June 11, 2008

Next review date: 2011

* This date applies to the supply of fragrance compounds (formulas) only, not to the finished products in the marketplace.

STANDARD: RESTRICTED
RESTRICTIONS:

Limits in the finished product:

For a description of the categories, refer to the QRA Informational Booklet.

Category 1	0.04 %	Category 7	0.1 %
Category 2	0.05 %	Category 8	1.4 %
Category 3	0.2 %	Category 9	5.0 %
Category 4	0.6 %	Category 10	2.5 %
Category 5	0.3 %	Category 11	See Note box
Category 6	1 %		

Note box: Category 11 includes all non-skin contact or incidental skin contact products. Due to negligible skin contact, the concentration of a fragrance ingredient should not exceed the usual concentration of the fragrance compound in the finished product.

For example, hypothetically if the usual concentration of a fragrance compound in the final product, for example a candle, is at 5%, then any individual fragrance ingredient (in this case citral) must not exceed 5% in the candle.

This Standard cancels and replaces the existing one on citral, which was based on the no longer supported 'quenching' phenomenon.

C I T R A L

Fragrance material specification: Not applicable

Contribution from other sources: See Annex 1

Critical effect: Sensitization

RIFM summaries:

Citral - Sensitization Potency Estimation Based on Weight of Evidence

LLNA weighted mean EC3 values (µg/cm ²) [no. studies]	Human Data			Potency Classification ²	WOE NESIL ³ (µg/cm ²)
	NOEL – HRIPT (induction) (µg/cm ²)	NOEL – MAX (induction) (µg/cm ²)	LOEL ¹ (induction) (µg/cm ²)		
1414 [11]	1400	NA	3876	Weak	1400 µg/cm ²

NOEL = No observed effect level; HRIPT = Human Repeat Insult Patch Test; MAX = Human Maximization Test; LOEL = lowest observed effect level; NA = Not Available

¹Data derived from HRIPT or Human Max tests

²Gerberick *et al.*, 2001

³WoE NESIL limited to two significant figures

Rexpan Rationale / Conclusion:

The RIFM Expert Panel reviewed the critical effect data for citral and based on the weight of evidence established the No Expected Sensitization Induction Level (NESIL) as 1400 µg/cm². They recommend the limits for the 11 different product categories, which are the acceptable use levels of citral in the various product categories. These were derived from the application of the exposure-based quantitative risk assessment approach for fragrance ingredients, which is detailed in the QRA Expert Group* Technical Dossier of March 15, 2006.

References:

Basketter, D. A., Wright, Z., Gilmour, N. J., Ryan, C. A., Gerberick, G. F., Robinson, M. K., Dearman, R. J., Kimber, I., 2002a. Prediction of human sensitization potency using local lymph node assay EC3 values. *The Toxicologist*, 66(1-S), 240.

QRA Expert Group* (AM Api, DA Basketter, PA Cadby, M-F Cano, G Ellis, GF Gerberick, P Griem, PM McNamee, CA Ryan and R Safford), Dermal Sensitization Quantitative Risk Assessment (QRA) for Fragrance Ingredients, Technical Dossier, March 15, 2006, <http://www.rifm.org/pub/publications.asp>.

Research Institute for Fragrance Materials, Inc (1964). Repeated insult patch test of citral in human subjects. Unpublished report from International Flavors and Fragrances Inc., Report number 14576 (RIFM, Woodcliff Lake, NJ USA).

C I T R A L

Research Institute for Fragrance Materials, Inc (2004). Repeated insult patch test in human subjects with citral. RIFM report number 47157 (RIFM, Woodcliff Lake, NJ USA).

Research Institute for Fragrance Materials, Inc (2004). Local Lymph Node Assay on Citral. RIFM report number 45126 (RIFM, Woodcliff Lake, NJ USA).
