CETYL ALCOHOL

Chemical identity

Primary name and/or INCI name

Cetyl Alcohol (INCI name)

Chemical names

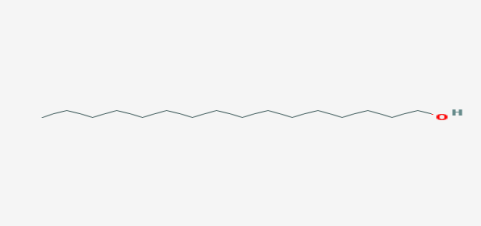
Esadecan-1-olo

CAS / EC number

CAS: 36653-82-4

EC: 253-149-0

Structural formula



Empirical formula

$C_{16}H_{34}O$

Physical form, Molecular weight

Physical form
white, waxy solid

Molecular weight
242.44056

Purity, composition, impurities

Cetyl Alcohol (National Formulary) contains a minimum of 90% Cetyl Alcohol. Cetyl Alcohol is generally believed to be l-hexadecanol, but commercial grades often contain measurable amounts of stearyl alcohol and other long-chain aliphatic alcohols. The Cosmetic, Toiletry and Fragrance Association (CTFA) Specification for Cetyl Alcohol includes the following impurities:

- Hydrocarbons 1.5% maximum
- Ash 0.05% maximum
- Lead (as elemental lead) 20 ppm maximum
- Arsenic (as elemental arsenic) 3 ppm maximum

Il Governo Federale tedesco ha dichiarato che i livelli dei metalli pesanti nei prodotti cosmetici sono da considerarsi evitabili se superiori ai valori elencati di seguito:

- Piombo: 20 ppm
- Arsenico: 5 ppm

(Rif. Bundesgesundheitsblatt (Federal Health Journal, Germany), 28, 1985, Nr. 7, 216.)

Solubility

Solubility: < 1 mg/L
Temp.23 °C - pH 5.5

Partition coefficient (Log Pow)

Log Pow: 6.7 calculated at 25°C

Additional physical and chemical specifications

Melting point: 49.3°C

Boiling point: 334°C

Flash point: ca. 149 °C a 101.3 kPa

Vapour pressure: 3.06×10^{-6}

Density: 0.8886 g/cm³ (16°C)

Viscosity: 3.394 mm²/s (static) a 100 °C

pKa: 15.76

Homogeneity and Stability

Thermal decomposition: > 350 °C

Hazardous reactions: stable under normal conditions

Function and uses

Funzione: umettante / solvente / condizionante cutaneo / additivo reologico
Uso: Cetyl Alcohol is used as an emollient to prevent drying and chapping of the skin because of its water-binding property.

Acute toxicity

Organism	Test Type	Route	Reported Dose (Normalized Dose)	Effect	Source
guinea pig	**LDLo**	**skin**	**10gm/kg (10000mg/kg)**		**"Patty's Industrial Hygiene and Toxicology," 3rd rev. ed., Clayton, G.D., and F.E. Clayton, eds., New York, John Wiley & Sons, Inc., 1978-82. Vol. 3 originally pub. in 1979; pub. as 2n rev. ed. in 1985.Vol. 2C, Pg. 4635, 1982.**
mouse	LD50	intraperitoneal	1600mg/kg (1600mg/kg)		Food and Cosmetics Toxicology. Vol. 16, Pg. 683, 1978.
mouse	LD50	oral	3200mg/kg (3200mg/kg)		Food and Cosmetics Toxicology. Vol. 16, Pg. 683, 1978.
rabbit	**LD50**	**skin**	**> 2600mg/kg (2600mg/kg)**		**American Industrial Hygiene Association Journal. Vol. 34, Pg. 493, 1973. Link to PubMed**
rat	LCLo	inhalation	2220mg/m3/6H (2220mg/m3)		Journal of the American College of Toxicology. Vol. 7(3), Pg. 359, 1988.
rat	LD50	intraperitoneal	1600mg/kg (1600mg/kg)	GASTROINTESTINAL: "HYPERMOTILITY, DIARRHEA" SKIN AND APPENDAGES (SKIN): "DERMATITIS, OTHER: AFTER SYSTEMIC EXPOSURE"	Food and Cosmetics Toxicology. Vol. 16, Pg. 683, 1978.
rat	LD50	oral	5gm/kg (5000mg/kg)	CARDIAC: OTHER CHANGES LUNGS, THORAX, OR RESPIRATION: OTHER CHANGES	Journal of the American College of Toxicology. Vol. 7(3), Pg. 359, 1988.

Irritation and corrosivity

Skin irritation

Classification: not irritating

Following a 4 hour semi-occlusive exposure of Kalcol 6098 to rabbit skin there was no evidence of skin irritation between 24 and 72 hours after patch removal. Kalcol 6098 is not a skin irritant according to EU or GHs criteria.

Reference type: study report
Year: 1996
Report date: 1996-05-12
Type of method: in vivo
Test guideline: according to Guideline OECD Guideline 404 (Acute Dermal Irritation / Corrosion)
GLP compliance: Yes
Species: rabbit (New Zealand White)

Mucous membrane irritation

Classification: not irritating

Kalcol 6098 is not an eye irritant according to EU or GHS criteria.

Reference type: study report
Year: 1996
Report date: 1996-07-22
Type of method: in vivo
Test guideline: according to OECD Guideline 405 (Acute Eye Irritation / Corrosion)
GLP compliance: Yes
Species: rabbit (New Zealand White)

Skin sensitisation

Classification: not sensitising

In a reliable study, conducted according to OECD guideline 406, Kalcohl 6098 was not a skin sensitiser in guinea pigs. The study was performed in compliance with GLP.

Reference type: study report

Year: 1996

Report date: 1996-07-23

Type of method: in vivo

Type of study: Guinea pig maximisation test

Test guideline: according to Guideline OECD Guideline 406 (Skin Sensitisation)

GLP compliance: Yes

Species: rabbit (New Zealand White)

Dermal / percutaneous absorption

Assenza di studio specifico di assorbimento percutaneo

Dati in nostro possesso

- Molecular weight: 242.44056 Da
- Log Pow: 6.7 (lipofilo)
- pKa: 15.76 (a pH fisiologico non è dissociato)

(THE SCCS'S NOTES OF GUIDANCE FOR THE TESTING OF COSMETIC INGREDIENTS AND THEIR SAFETY EVALUATION 8TH REVISION: In case the results are derived from an inadequate in vitro study, 100% dermal absorption is used. However, in case MW > 500 Da and log Pow is smaller than -1 or higher than 4, the value of 10% dermal absorption is considered)

Studi di assorbimento orale

- BAXTER, J.H., STEINBERG, D., MIZE, C.E , and ARIGAN, J. 11967). Absorption and metabolism of uniformly '*C-labeled phytol and phytanic acid by the Intestine of the rat studied with thoracic duct cannulatron. Brochim. Biophys. Acta 137(2), 277-90.
- McIsaac W M, Williams R T- The metabolism of spermaceti. W.A - Journal Biol. Chem. 2(2): 42-44, 1958

Conclusione di entrambi gli studi di assorbimento orale:

Cetyl alcohol was incompletely absorbed with 20% of the dose recovered unchanged from the faeces. Faecal excretion was complete within 48 hours. About 6% of the dose was in the form of glucuronic acid conjugate in the urine.

Considerazioni finali:

visti gli elementi a disposizione è ragionevole considerare il caso peggiore di assorbimento percutaneo del **100%**

Repeated dose toxicity

1.Conclusion: in a reliable study, in which rats were treated with Alfol 16 via the diet for 13 weeks, an **NOAEL of >4400 mg/kg** bw/day (highest dose tested) was determined. Reduced weight gain, food consumption and organ weight changes were deemed to be secondary to the high dose administered but not specific to the test substance.

Reference type: study report

Year: 1996

Report date: 1996-01-01

Test type: subchronic

Test guideline: no guideline followed

Principles of method if other than guideline: rats treated via the diet for 90 days with limited evaluation

GLP compliance: No

Species: rat (albino)

Route of administration: oral-feed

Repeated dose toxicity

2.Conclusion: In a reliable study, performed according to a protocol similar to OECD guideline 407, a 28-day oral **NOAEL of 1000 mg/kg bw/day** was determined in the rat. The study was performed in compliance with GLP.

Reference type: study report
Year: 1999
Report date: 1996-01-01
Test type: subacute
Test guideline: equivalent or similar to OECD Guideline 407 (Repeated Dose 28-Day Oral Toxicity in Rodents)
GLP compliance: Yes
Species: rat (Sprague-Dawley)
Route of administration: oral-gavage

Mutagenicity / Genotoxicity

Conclusions: In a reliable study, performed according to OECD guideline 471, the C16 alcohol Kahlcol 6098 did not increase the reverse mutation rate in histidine dependent bacterial strains of Salmonella typhimurium in the presence or absence of metabolic activation at concentrations up to 5000 µg/plate. This concentration was not cytotoxic. The study was performed in compliance with GLP.

Reference type: study report

Year: 1996

Type of genotoxicity: gene mutation

Type of study: bacterial reverse mutation assay (e.g. Ames test)

Test guideline: equivalent or similar to OECD Guideline 471 (Bacterial Reverse Mutation Assay)

GLP compliance: Yes

Species: S. typhimurium TA 1535, TA 1537, TA 98 and TA 100

Metabolic activation: with and without

Carcinogenicity

Carcinogenicity

- Ando K, Kodama K, Kato A, Tamura G, Arima K- Antitumour activity of glyceryl ethers. Cancer Research 32: 125-129, 1972
- Sice J - Tumor-promoting activity of n-alkanes and l-alkanols. Toxicology and Applied Pharmacology 9: 70-74, 1966

Conclusione di entrambi gli studi carcinogenicità: negative

Reproductive toxicity

1. Conclusions: In a reliable screening study, a repeated oral dose **NOAEL of 1822 mg/kg/day** for males and **4567 mg/kg/day** (the highest dose tested) in females was determined for effects on reproductive organs in the rat.

Reference type: study report

Year: 1966

Report date: 1966-01-01

Test type: Repeat dose study with histopathology of reproductive organs.

Test guideline: no guideline followed

Principles of method if other than guideline: Rats treated via the diet for 90 days with limited evaluation, but including reproductive organs

GLP compliance: no

Species: rat (albino)

Reproductive toxicity

2. Conclusions: In a reliable screening study, performed using a protocol similar to OECD guideline 407, the 28-day oral NOAEL for effects on reproductive organs in rats was determined to be **1000 mg/kg bw/day**.

Reference type: study report

Year: 1985

Test type: repeat dose study with histopathology of reproductive organs.

Test guideline: equivalent or similar to OECD Guideline 407 (Repeated Dose 28-Day Oral Toxicity in Rodents)

Principles of method if other than guideline: An in-house protocol based on OECD Guide-line 407, including evaluation of reproductive organs

GLP compliance: no data

Species: rat (Sprague-Dawley)

Developmental toxicity/teratogenicity

Conclusions: In a reliable study conducted to the draft OECD guideline 422, the NOAEL for maternal and developmental toxicity was **2000 mg/kg bw/day,** the highest dose tested. The study was performed in compliance with GLP. The study is a read across from dodecanol (CAS 112-53-8).

Study result type: read-across from supporting substance (structural analogue, dodecanol)

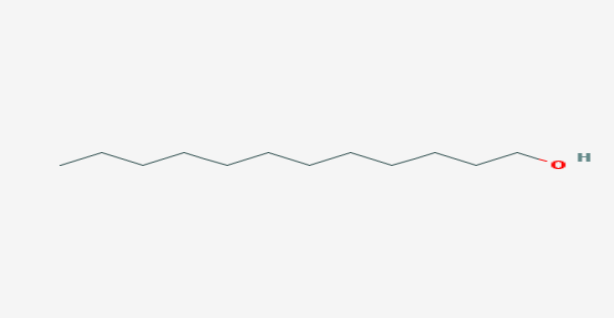
Year: 1992

Principles of method if other than guideline: Draft OECD 422 Combined Repeat dose and Reproductive/Developmental Toxicity Screening Test.

GLP compliance: yes

Species: rat (Wistar)

Dodecanolo ($C_{12}H_{26}O$)



Cetyl Alcohol ($C_{16}H_{34}O$)

Human data

The skin irritation potential of Cetyl Alcohol (**100.0%**) was evaluated in 20 subjects (18-65 years old). One-tenth milliliter of the test substance was applied via an occlusive patch to the volar surface of the forearm of each subject; each patch remained for 24 or 48 h. Skin reactions were scored 2 and 24 h after patch removal according to the scale 0.5 (barely perceptible irritation) to 4.0 (severe irritation). No erythematous reactions were elicited by the test substance.

Da studi fonte CIR: Mary Ann Liebert, Inc., Publishers - Final Report on the Safety Assessment of Cetearyl Alcohol, Cetyl Alcohol, lsostearyl Alcohol, Myristyl Alcohol, and Behenyl Alcohol - JOURNAL OF THE AMERICAN COLLEGE OF TOXICOLOGY -Volume 7, Number 3, 1988

si ha:

Human data

Type of study	*Ingredient*	*Alcohol concentration and vehicle*	*No. of subjects*	*Procedure*	*Results*
Skin irritation	Cetyl Alcohol	100%	20	24–48 h occlusive patch test	No irritation
Skin irritation	Cetyl Alcohol	100%	20	24–48 h occlusive patch test	No irritation
Skin irritation	Cetyl Alcohol	11.5% in cream base	80	10-day cumulative irritation test	Erythema, folliculitis, pustules (1 subject)
Skin irritation	Cetyl Alcohol	6.0% in formulation	20	24–48 h occlusive patch test	No irritation
Skin irritation	Cetyl Alcohol	6.0% in cream	12	21-day cumulative irritation test	Potential for mild cumulative irritation
Skin irritation	Cetyl Alcohol	5.0% in cream	9	21-day cumulative irritation test	No cumulative irritation
Skin irritation	Cetyl Alcohol	4.0% in cream	12	21-day cumulative irritation test	Slight irritation
Skin irritation	Cetyl Alcohol	4.0% in lipstick	52	4-week application period	No irritation
Skin irritation	Cetyl Alcohol	3.25% in hair conditioner	75	30-day home use test	No significant irritation
Skin irritation	Cetyl Alcohol	3.25% in conditioner	15	24-h patch test	Mild irritation
Skin irritation	Cetyl Alcohol	3.25% in conditioner	15	21-day cumulative irritation test	No significant irritation
Skin irritation	Cetyl Alcohol	2.0% in lotion	9	21-day cumulative irritation test	No cumulative irritation
Skin irritation	Cetyl Alcohol	2.0% in cream	11	21-day cumulative irritation test	Slight irritation
Skin irritation	Cetyl Alcohol	2.0% in cream	11	21-day cumulative irritation test	Potential for mild cumulative irritation

Safety evaluation-calculation of the MoS

Hair conditioner al 5% Cetyl Alcohol (caso tipico fonte CIR)

SED = A (mg/kg bw/day) x C (%)/100 x DAp (%)/100

A (mg/kg bw/day) =	Estimated daily exposure to a cosmetic product per kg body weight, based upon the amount applied and the frequency of application = **0,60** (THE SCCS'S NOTES OF GUIDANCE FOR THE TESTING OF COSMETIC INGREDIENTS AND THEIR SAFETY EVALUATION 8TH REVISION)
C (%) =	the Concentration of the ingredient under study in the finished cosmetic product on the application site = **5%**
DAp (%) =	Dermal Absorption expressed as a percentage of the test dose assumed to be applied in real-life conditions = **100%**

SED = 0,6 x 5/100 x 100/100= 0,03

NOAEL (oral, rat, 28-day)= 1000 mg/kg bw/day

NOAEL con fattore di correzione 3 (dovuto allo studio a 28 giorni) = 333,33 mg/kg bw/day

MoS = NOAEL/SED = 333,33/0,03 = 11.111

Safety evaluation-calculation of the MoS

Face Cream al 5% Cetyl Alcohol (caso tipico fonte CIR)

SED = A (mg/kg bw/day) x C (%)/100 x DAp (%)/100

A (mg/kg bw/day) = Estimated daily exposure to a cosmetic product per kg body weight, based upon the amount applied and the frequency of application = **24,14** (THE SCCS'S NOTES OF GUIDANCE FOR THE TESTING OF COSMETIC INGREDIENTS AND THEIR SAFETY EVALUATION 8TH REVISION)

C (%) = the Concentration of the ingredient under study in the finished cosmetic product on the application site = **5%**

DAp (%) = Dermal Absorption expressed as a percentage of the test dose assumed to be applied in real-life conditions = **100%**

SED = 24,14 x 5/100 x 100/100 = 1,207

NOAEL (oral, rat, 28-day)= 1000 mg/kg bw/day

NOAEL con fattore di correzione 3 (dovuto allo studio a 28 giorni) = 333,33 mg/kg bw/day

MoS = NOAEL/SED = 333,33/1,207 = 276,2