

ETHYL ACRYLATE

CAS number: 140-88-5

Synonyms: Acrylic acid ethyl ester, 2-propanoic acid ethyl ester

Chemical formula: $C_5H_8O_2$

Structural formula: —

Workplace exposure standard (amended)

TWA: 2 ppm (8.31 mg/m³)

STEL: 5 ppm (20 mg/m³)

Peak limitation: —

Notations: DSEN

IDLH: 300 ppm

Sampling and analysis: The recommended value is quantifiable through available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

The TWA of 2 ppm (8.31 mg/m³) is recommended to protect for irritation of the eyes, nose and upper airways in exposed workers.

The STEL of 5 ppm (20 mg/m³) is recommended to protect for acute irritation of the eyes, nose and upper airways in exposed workers.

Discussion and conclusions

Ethyl acrylate is used to make acrylic resins and as emulsion and solution polymers for surface coating textiles, paper and leather. It is also used in the production of acrylic fibres, adhesives and binders.

Critical effects include strong irritation of the eyes, skin and nose as well as skin sensitisation (ACGIH, 2018). A NOAEC of 2.5 ppm and LOAEC of 5 ppm for eye and nose irritation were reported in a study in volunteers involving five single four-hour exposures, with peaks of 10 ppm. Extended inhalation exposure at 50 to 75 ppm caused drowsiness, headache and nausea in workers. Positive results for skin sensitisation are seen in humans following dermal application (ACGIH, 2018; DFG, 2015). Reported studies note that vapour can be 'very irritating' at concentrations of 4 to 5 ppm (NICNAS, 2015).

Based on the reported NOAEC of 2.5 ppm in volunteers (DFG, 2015), a TWA of 2 ppm is recommended. A STEL of 5 ppm is recommended based on evidence of irritation effects associated with peaks in exposure at 10 ppm.

Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Classified as a skin sensitiser and not a respiratory sensitiser according to the GHS.

A skin notation is not recommended based on information in animals.

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APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA Peak limitation: 5 ppm (20 mg/m³)
ACGIH	2001	TLV-TWA: 5 ppm (21 mg/m³); TLV-STEL: 15 ppm (61 mg/m³)
<p>TLV-TWA recommended to minimise the potential for eye, skin, mucous membrane, respiratory tract and GIT irritation.</p> <p>TLV-STEL recommended to provide an additional measure of protection against irritant effects and possible sensitisation (no further explanation of derivation of TLV-TWA and TLV-STEL).</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> • Strong skin, mucous membrane, eye, GIT and respiratory tract irritant • Extended inhalation exposure to 50–75 ppm produced drowsiness, headache and nausea; no further information • Skin sensitisation reactions in 10 of 24 volunteers after application of 4% in petroleum jelly. <p>Animal data:</p> <ul style="list-style-type: none"> • LC₅₀: 1,000 ppm (rats, 4 h) • LD₅₀: 1,790 mg/kg (rabbits, dermal) • Rats exposed at 300 or 540 ppm died <30 d; demonstrated histopathologic changes consisting of pulmonary congestion, cloudy swelling and congestion of the liver, cloudy swelling of the renal tubules and excessive pigmentation of the spleen • Mice exposed at 75 ppm or 225 ppm for 6 h/d for 30 d displayed depression in body weight gain and degenerative, inflammatory and metaplastic histopathologic changes in the nasal turbinates <ul style="list-style-type: none"> ◦ exposure at 25 ppm did not produce any observed pathologic effects, i.e. a NOAEC = 25 ppm. 		
DFG	2015	MAK: 2 ppm (8.31 mg/m³)
<p>Summary of additional data:</p> <ul style="list-style-type: none"> • Study in volunteers; 5 x single 4 h exposures; constant concentrations of 0; 2.5 or 5 ppm or alternating concentrations with peaks of 10 ppm; chemosensory irritant effect: <ul style="list-style-type: none"> ◦ LOAEC of 5 ppm in humans for eye and nose irritation; ◦ NOAEC of 2.5 ppm • No systemic accumulation detected • MAK based on identified NOAEC of 2.5 ppm in humans and rounded to get 2 ppm. 		
SCOEL	NA	NA
No report.		
OARS/AIHA	NA	NA
No report.		
HCOTN	NA	NA
No report.		

Secondary source reports relied upon

Source	Year	Additional information
NICNAS	✓ 2015	<ul style="list-style-type: none"> The critical health effects include: <ul style="list-style-type: none"> local effects (skin sensitisation; eye, skin and respiratory irritation); and systemic acute effects through oral, dermal and inhalation exposure Workers exposed to the dust reported itching of the skin in the facial creases, ears and nose; no exposure information provided Vapour reported as 'can be very irritating' at moderate concentrations of 4–5 ppm.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?

No

The chemical is not a non-threshold based genotoxic carcinogen.

Notations

Source	Notations
SWA	Sen
HCIS	Skin sensitisation – category 1
NICNAS	Skin sensitisation
EU Annex	NA
ECHA	Skin Sens. 1
ACGIH	Carcinogenicity – A4
DFG	H (skin), Sh (dermal sensitiser)
SCOEL	NA
HCOTN	Carcinogenicity – category 3
IARC	Carcinogenicity – Group 2B
US NIOSH	SK:SYS, SK:SEN

NA = not applicable (a recommendation has not been made by this Agency); — = the Agency has assessed available data for this chemical but has not recommended any notations

Skin notation assessment

Calculation

Adverse effects in human case study:
Dermal LD₅₀ ≤ 1000 mg/kg:
Dermal repeat-dose NOAEL ≤ 200 mg/kg:
Dermal LD₅₀/Inhalation LD₅₀ < 10:
In vivo dermal absorption rate > 10%:
Estimated dermal exposure at WES > 10%:

no

a skin notation is not warranted

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight:	100.12
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 4.09 mg/m ³ ; 1 mg/m ³ = 0.245 ppm
This chemical is used as a pesticide:	<input type="checkbox"/>
This chemical is a biological product:	<input type="checkbox"/>
This chemical is a by-product of a process:	<input type="checkbox"/>
A biological exposure index has been recommended by these agencies:	<input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> SCOEL

Workplace exposure standard history

Year	Standard
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[Click here to enter year](#)

References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7th Edition Documentation, CD-ROM, Single User Version. Copyright 2018. Reprinted with permission. See the [TLVs® and BEIs® Guidelines section](#) on the ACGIH website.

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Health Council of the Netherlands. Ethyl acrylate. Evaluation of the carcinogenicity and genotoxicity. The Hague: Health Council of the Netherlands, 2012; publication no. 2012/19.

International Agency for Research on Cancer (IARC) (In prep.) Ethyl acrylate. IARC Monographs on the evaluation of the carcinogenic risk to humans.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2015) 2-Propenoic acid, ethyl ester: Human health tier II assessment – IMAP report.

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – ethyl acrylate.

US National Institute for Occupational Safety and Health (NIOSH) (2014) NIOSH Skin Notation Profiles: ethyl acrylate.

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