HYDROXYPROPYL ACRYLATE (ALL ISOMERS)

CAS number:	25584-83-2 999-61-1
Synonyms:	Hydroxypropyl acrylate: Propanediol, hydroxypropylacrylat, HPA 2-hydroxypropyl acrylate: Acrylic acid, 2-hydroxypropyl ester, 1,2-propanediol, 1-acrylate, propylene glycol monoacrylate
Chemical formula:	$C_6H_{10}O_3$
Structural formula:	—

Workplace exposure standard (retained)

TWA:	**0.5 ppm (2.8 mg/m^3)**
STEL:	—
Peak limitation:	—
Notations:	**Sk., DSEN**
IDLH:	—

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

Recommendation and basis for workplace exposure standard

A TWA of 0.5 ppm (2.8 mg/m^3) is recommended to protect for eye, nasal and respiratory tract irritation in exposed workers.

Discussion and conclusions

Hydroxypropyl acrylate and its isomers are used in the manufacture of thermosetting resin for surface coatings.

Critical effects of exposure are eye, nasal and respiratory tract irritation.

Limited toxicological data in humans are available. Symptoms of eye, nasal and respiratory tract irritation were observed at 5 ppm in a dog sub-chronic inhalation study. Non-specific histologic testicular changes were also noted at this concentration (ACGIH, 2018; DFG, 1998; HCOTN, 2005). Using this same sub-chronic study, primary agencies have assigned different occupational limits.

ACGIH derived a TLV-TWA of 0.5 ppm by seemingly dividing the concentration of 5 ppm by an uncertainty factor of ten. This concentration is considered sufficiently low and a TWA of 0.5 ppm is retained to protect for eye, nasal and respiratory tract irritation effects and to protect for the potential for developmental effects.

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 but not a respiratory sensitiser according to the GHS.

A skin notation is recommended based on evidence suggesting potential dermal absorption and adverse systemic effects in animals.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1991***	***TWA: 0.5 ppm (2.8 mg/m^3)***
TWA for 2-hydroxypropyl acrylate CAS 999-61-1		
ACGIH	***2014***	***TLV-TWA: 0.5 ppm (2.8 mg/m^3)***
TLV-TWA recommended to minimise the risk of eye, nasal and respiratory tract irritation in exposed workers (no explanation on the derivation of TLV-TWA). TLV-TWA for CAS number: 999-61-1 and 25584-83-2 (1-acrylate) Summary of data: Human data: • Contact allergy in workers reported in related methyl acrylates which are generally less potent sensitisers than acrylates. Animal data: • LD_{50}: 170–250 mg/kg (rabbits, dermal) • NOEL: ≤5 ppm (dogs, rabbits, rats, 6 h/d, 5 d/wk, 20–21 d, inhalation) symptoms included eye, nasal, respiratory tract irritation and histologic testicular changes. No effect was observed on body weight, hematologic, clinical chemistry and urinalysis parameters • Based on a reportedly weak skin sensitisation potential in animals, classified as a skin sensitiser. Insufficient data to recommend a carcinogen notation.		
DFG	***1998***	***MAK: 5 ppm***
No scientifically justifiable MAK for hydroxypropyl acrylate (all isomers) able to be derived due to the lack of robust toxicological data. Summary of information: • Skin sensitisation is the only known adverse effect identified in humans; case reports of contact dermatitis after occupational exposure; positive in patch tests. Animal data: • Sub-chronic inhalation study with dogs, rabbits, rats and mice; slight irritation at 5 ppm; lowest concentration tested; same as ACGIH (2018).		
SCOEL	***NA***	***NA***
No report.		
OARS/AIHA	***NA***	***NA***
No report.		

Source	Year set	Standard
HCOTN	***2005***	***TWA: 3 mg/m^3 (0.2 ppm)***

Current administrative TWA recommended to protect for conjunctivitis and upper and lower respiratory tract effects.

The committee recommends a TWA of 1 mg/m^3 (0.2 ppm) as a health-based OEL for hydroxypropyl acrylate (all isomers).

Summary of additional data:

Human data:

- In humans: patch-test reports indicating hydroxypropyl acrylate and isomers are sensitising to the skin.

Animal data:

- In a developmental toxicity study exposure to 1, 5 and 10 ppm (rats, gestation day 6–20, inhalation) produced a maternal toxicity NOAEL of 1 ppm (5.3 mg/m^3) and a developmental toxicity NOAEL of 10 ppm (53 mg/m^3), study involved a vaporised mixture of unknown hydroxypropyl acrylate isomers
- LOAEL of 5 ppm (27 mg/m^3); sub-chronic inhalation study with dogs, rabbits, rats and mice; same as ACGIH (2018)

Secondary source reports relied upon

NIL.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?	Insufficient data
Is the chemical carcinogenic with a mutagenic mechanism of action?	Insufficient data

Insufficient data are available to determine if the chemical is a non-threshold based genotoxic carcinogen.

Notations

Source	Notations
SWA	Skin, Sen (*2-hydroxypropyl acrylate*)
HCIS	Skin sensitisation – category 1
NICNAS	NA
EU Annex	NA
ECHA	Skin Sens. 1
ACGIH	Sk, DSEN
DFG	Sh (dermal sensitiser)
SCOEL	NA
HCOTN	NA
IARC	NA

Source	Notations
US NIOSH	SK:SYS, SK:SEN (*2-hydroxypropyl acrylate*)

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:	yes
Dermal LD_{50} ≤1000 mg/kg:	yes
Dermal repeat-dose NOAEL ≤200 mg/kg:	
Dermal LD_{50}/Inhalation LD_{50} <10:	
In vivo dermal absorption rate >10%:	
Estimated dermal exposure at WES >10%:	
	consider assigning a skin notation

IDLH

Is there a suitable IDLH value available?	No

Additional information

Molecular weight:	130.14
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m³; 1 mg/m³ = Number ppm
This chemical is used as a pesticide:	☐
This chemical is a biological product:	☐
This chemical is a by-product of a process:	☐
A biological exposure index has been recommended by these agencies:	☐ ACGIH ☐ DFG ☐ SCOEL

Workplace exposure standard history

Year	Standard
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.

Deutsche Forschungsgemeinschaft (DFG) (2001) Hydroxypropyl acrylate (all isomers) – MAK value documentation.

European Chemicals Agency (ECHA) (2019) Hydroxypropyl acrylate – REACH assessment.

Health Council of the Netherlands (HCOTN) (2005) Hydroxypropyl acrylate (all isomers). Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/151.

US National Institute for Occupational Safety and Health (NIOSH) (2017) NIOSH Skin Notation Profiles: 2-Hydroxypropyl acrylate (HPA).