HEXYLENE GLYCOL

CAS number: 107-41-5

Synonyms: 2-Methyl-2,4-pentanediol, 2-methylpentane-2,4-diol, 2-butyne-2,4-diol, 2,4-dihydroxy-2-methylpentane, diolane, isol

Chemical formula: $C_6H_{14}O_2$

Workplace exposure standard (interim)

TWA: —

STEL: —

Peak limitation: **25 ppm (121 mg/m^3)**

Notations: —

IDLH: —

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

Recommendation and basis for workplace exposure standard

A peak limitation of 25 ppm (121mg/m^3) is recommended to protect for acute pulmonary and respiratory irritation and eye irritation in exposed workers.

Given the limited data available from the primary sources, it is recommended that a review of additional sources be conducted at the next scheduled review.

Discussion and conclusions

Hexylene glycol is used in oil and water-based paints, lacquers and varnishes and as a solvent plasticiser.

The critical effects of exposure are pulmonary irritation and irritation of the eyes and upper respiratory tract. Volunteers exposed at 50 ppm for 15 min reported slight eye irritation. At higher unspecified concentrations, volunteers reported nose and throat irritation. Volunteers exposed at 100 ppm for five minutes reported slight nasal irritation with one volunteer reporting slight pulmonary discomfort. A 90 day oral gavage study in rats identified a LOAEL of 150 mg/kg/day based on local effects on the stomach. This LOAEL was used to justify the TWA recommended by ACGIH but no specific derivation was provided. Further, ACGIH recommend a STEL for inhalable particulate matter based on the incremental increase in air concentration that corresponds to the observation of increased irritation above the saturated vapor concentration of 66 ppm (ACGIH, 2018).

Due to a lack of sufficient long-term data and evidence of short-term immediate and severe effects, a peak limitation of 25 ppm (121 mg/m^3) is recommended to be retained and is considered protective of acute pulmonary irritation effects from short-term exposure peaks.

Given the uncertainties and decisions regarding long-term effects, it is recommended that an investigation of additional data sources is undertaken at the next scheduled review.

Recommendation for notations

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

Not classified as a skin sensitiser or respiratory sensitiser according to the GHS.

A skin notation is not recommended based on the available data.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1991***	***Peak limitation: 25 ppm (121 mg/m^3)***
ACGIH	***2017***	***TLV-TWA: 25 ppm (vapour fraction); TLV-STEL: 50 ppm (vapour fraction); TLV-STEL: 10 mg/m^3 (inhalable particulate matter, aerosol only)***

TLV-TWA and TLV-STEL recommended to minimise the potential for respiratory and eye irritation in exposed workers.

Additional STEL recommended for inhalable particulate matter (aerosol only) to prevent irritation from particulate concentrations known to be irritating in the presence of vapours.

Summary of data:

Human data:

- 15 min exposure at 50 ppm produced slight eye irritation in some volunteer subjects;
  - unspecified higher concentrations produced nose and throat irritation
- Volunteers subjected to 100 ppm for 5 min reported slight nasal irritation;
  - 1 volunteer reported slight pulmonary discomfort
- Ethylene glycol, a similar compound, produced irritation of the upper respiratory tract at 55 ppm.

Animal data:

- LD_{50}: >2,000 mg/kg (dermal, rabbits)
- Undiluted material slightly irritating to eye of rabbit; as such; assumes mist is expected to be irritating to mucous membranes at the site of deposition where the concentration in the local microenvironment is high
- 90 d oral gavage study in rats (7 d/wk), hepatocellular hypertrophy, species and gender-specific renal changes and inflammation-induced hyperplastic changes in the forestomach and stomach were observed:
  - NOAEL 50 mg/kg local irritant effects on the forestomach and stomach; LOAEL of 150 mg/kg/d
  - NOAEL 450 mg/kg for systemic effects
- 10 rats and 1 rabbit exposed 7 h/d for 9 d to 0.7 mg/L (700 mg/m^3) of an aerosol of hexylene glycol demonstrated microscopic evidence of mild respiratory irritation (e.g. congestion, hyperplasia) in the tracheas; some vapour likely to be present; no control animals

TWA of 25 ppm is justified by stating that, based on the reported LOAEL in rats, the equivalent human dose is 17-fold higher than the recommended TLV-TWA; no derivation provided.

STEL-TLV of 50 ppm for vapour is based on the reported acute data in humans; no derivation.

STEL-TLV of 10 mg/m^3 for inhalable particulate/aerosol based on the incremental increase in air concentration that corresponds to the observation of increased irritation above the saturated vapor concentration of 66 ppm.

Insufficient data to recommend a sensitiser, skin or carcinogenicity notation.

Source	Year set	Standard
DFG	***2001***	***MAK: 10 ppm (49 mg/m^3)***
MAK recommended to protect for irritation of the eye in exposed workers. Summary of addition data: • MAK considered provisional because of lack of adequate data for the irritant potential; requires confirmation in further studies • No further additional information.		
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
ECHA	✓	2011	• No additional information.

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	NA
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	NA
DFG	NA
SCOEL	NA
HCOTN	NA
IARC	NA

Source	Notations
US NIOSH	NA

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:	no
Dermal LD_{50} ≤1000 mg/kg:	no
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%:	
	a skin notation is not warranted

IDLH

Is there a suitable IDLH value available?	No

Additional information

Molecular weight:	118.18
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m^3; 1 mg/m^3 = 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) Hexylene glycol – MAK value documentation.

European Chemicals Agency (ECHA) (2002) 2-methylpentane-2,4-diol (Hexylene glycol) – REACH assessment.