# Propane-1,2-diol (total; vapour & particulates)

| CAS number: | 57-55-6 |
| --- | --- |
| Synonyms: | Propylene glycol, 1,2-Dihydroxypropane,  1,2-Propane-diol, 2-Propanediol, |
| Chemical formula: | C3H8O2 |

Workplace exposure standard (amended)

| TWA: | **50 mg/m3** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | — |
| 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 50 mg/m3 (vapour and particulates) is recommended to protect for eye and nose irritation in exposed workers.

## Discussion and conclusions

Propane-1,2-diol is used in products such as coolants, brake fluids, solvents and as artificial mist in the entertainment industry and those attending emergency training.

The critical effects of exposure are eye and nose irritation. Limited toxicological data are available. An increase in the incidence of eye and nasal irritation and cough with a decrease in the FEV1/FVC ratio reported in volunteers exposed at 850 mg/m3 for one minute. No increase in the incidence of eye and respiratory tract irritation is reported in exposed performers when used in theatrical productions as an artificial mist (no further details provided; OARS, 2004). A NOAEC of 160 mg/m3 for goblet cell changes and eye irritation reported in a 90-day inhalation study in rats (HCOTN, 2007; OARS, 2004). No ocular or nasal discharge reported in rats or monkeys at concentrations greater than 330 mg/m3 for 12 to 18 months (OARS, 2004). It may exist as a vapour and as aerosol particles in ambient air at room temperature and atmospheric pressure. However, vapour concentrations are expected to be low due to the low vapour pressure. Human data indicate that acute exposure may result in minimal irritant and respiratory effects in some individuals. The key evidence for the recommendation of a TWA is the eye irritation threshold in animals of 160 mg/m3 (HCOTN, 2007).

Based on this, a TWA of 50 mg/m3 (vapour and particulates) is recommended as derived by HCOTN (2007). This TWA is expected to be protective of eye and nose irritation in exposed workers.

## 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.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 150 ppm (474 mg/m3) (vapour & particulates); TWA: 10 mg/m3 (particulates only) | |
| This exposure standard was established/revised as part of the second batch of Source A updates declared by NOHSC in April 2002. The NES is sourced from the HSE. |
| ACGIH NA NA |
| No report. |
| DFG NA NA |
| No report. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA 2004 TWA: 10 mg/m3 |
| TWA is recommended to minimise the risk of nose and eye irritation following exposure to the aerosol or vapour.  Summary of data:   * No suitable human data to derive TWA value * TWA based on evidence that 160 mg/m3 is considered a threshold for eye irritation as seen in a study in rats, supported by observations of no ocular or nasal discharge in rats or monkeys at >330–414 mg/m3 for 12–18 mo.   Human data:   * In 1,226 patients, 5% in Vaseline or water produced dermal irritation in 195 subjects and sensitisation in 13 subjects; no further information * No increase in the incidence of eye and respiratory tract irritation in exposed performers when used as in theatrical productions as a mist, smoke or fog; no further information * Increase in the incidence of eye and nasal irritation and cough and a decrease in the FEV1/FVC ratio in 27 healthy volunteers exposed at 850 mg/m3 for 1 min * No abnormal irritant response in a repeat insult patch test in 100 volunteers; 1 subject responded with irritant hypersensitive reaction.   Animal data:   * Undiluted minimally irritating to the rabbit eye; minimal signs of dermal irritation in 4h studies * LD50: 21,000 mg/kg (rabbit, dermal) * Not sensitising to mouse ear * Reported NOAEC of 160 mg/m3 for nasal irritation in the rat (6-h nose only exposure): * considered threshold; no further information * No ocular or nasal discharge in rats or monkeys at >330–414 mg/m3 for 12–18 mo; concluded little potential to cause mucosal irritation. |
| HCOTN 2007 TWA: 50 mg/m3 |
| Summary of additional data:   * No studies of chronic inhalation exposure in humans identified * It may exist in air as a vapour, although it must be heated or briskly shaken to produce a vapour and as an aerosol * Inhalation of vapours at room temperature is minimal due to its low vapour pressure * Acute inhalation exposure resulted in acute irritative effects on the upper respiratory tract in humans * Nasal haemorrhaging, thickening of the respiratory epithelium and increase in the number of goblet cells in both male and female rats found in nose-only inhalation study; 160, 1,000 and 2,200 mg/m3 6 h/d, 5 d/wk for 90 d (cited by OARS/AIHA, 2004) * Nose bleed effect not considered in derivation as this effect is only found in nose-only study, rats are obligatory nose breathers and no robust dose response * Number of goblet cells increased at the dose level of 1,000 mg/m3 not at 160 mg/m3 * NOAEC of 160 mg/m3 for goblet cell changes as the starting point for the derivation of the OEL; UF of 3 applied for intraspecies and interspecies variation and the difference between the experimental conditions and the exposure pattern of the worker * Concludes exposure to an aerosol can have effects comparable to exposure to inhalable and respirable dust; OEL to be applied to the sum of the concentrations existing as a vapour and as an aerosol. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| HSE |  | 2002 | * Recommends TWA: 150 ppm (474 mg/m3) (vapour & particulates) and TWA: 10 mg/m3 (particulates only) * Based on NOEC of 320 ppm for nasal and eye irritation; no further information * Vapour limit set below the saturated vapour concentration (170 ppm at 25 degrees). |

### 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 | — |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | NA |
| DFG | — |
| SCOEL | NA |
| HCOTN | — |
| IARC | NA |
| 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 |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 76.09 |
| --- | --- |
| 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*](http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (1998) Propylene glycol – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2007) Propylene glycol (1,2-Propanediol). Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2007/02OSH.

Occupational Alliance for Risk Science (OARS) (2004) Workplace environmental exposure level – Propylene Glycol.

UK Health and Safety Executive (HSE) (2002) propylene glycol – EH64: Summary criteria for occupational exposure limits.