# Propylene glycol monomethyl ether

| CAS number: | 107-98-2 |
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| Synonyms: | 1-Methoxy-2-hydroxypropane, 1-methoxy-2-propanol, 1-methoxypropan-2-ol, 2-propanol 1-methoxy, methoxyisopropanol, methyl proxitol, PGME, propylene glycol methyl ether, |
| Chemical formula: | C4H10O2 |

Workplace exposure standard (retained)

| TWA: | **100 ppm (369 mg/m3)** |
| --- | --- |
| STEL: | **150 ppm (553 mg/m3)** |
| 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 100 ppm (369 mg/m3) is recommended to protect for irritation of the eyes and upper respiratory tract in exposed workers.

A STEL of 150 ppm (553 mg/m3) is recommended to protect for acute irritation of the eyes and upper respiratory tract in exposed workers.

## Discussion and conclusions

Propylene glycol monomethyl ether (PGME) is used as a solvent material in paint and coating processes, inks, cosmetics and cleaning agents used in industrial and domestic applications.

Critical effects of exposure are eye and upper respiratory tract irritation and liver and lung effects in high acute exposures.

Human volunteers complained of eye and upper respiratory tract irritation at 50 to 2,000 ppm for exposure durations of one to seven hours. Complaints became more common at 150 ppm and the irritation was intolerable at 750 ppm. In the same study, a LOAEC of 250 ppm is reported for eye and throat irritation with nausea and headaches in workers exposed for 15 to 30 minutes (ACGIH, 2018). A NOAEC of 100 ppm (concentration at which odour detected) for irritant effects was identified in another human double-blind study (ACGIH, 2018) with slight eye irritation reported at 150 ppm. However, SCOEL (1999) expressed concerns with this study due to potential subjective bias through odour detection in a small number of subjects. Central nervous system (CNS) depression is noted at exposures of 1,000 ppm. This concentration is ten times the current SWA TWA and occupational exposure levels by DFG (1984) and SCOEL (1989). However, the irritant effects reported at concentrations are one order of magnitude lower than this value.

The current TWA of 100 ppm derived by DFG (1984) and SCOEL (1989) is recommended to be retained to protect for irritation effects in exposed workers. A STEL of 150 ppm by SCOEL (1989) is also recommended to protect against adverse effects at higher concentrations.

## 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: 100 ppm (369 mg/m3); STEL: 150 ppm (553 mg/m3) | |
|  |
| ACGIH 2013 TLV-TWA: 50 ppm (184 mg/m3); TLV-STEL: 100 ppm (369 mg/m3) |
| TLV-TWA recommended on data from human volunteer studies to protect from eye and upper respiratory tract irritation.  The TLV-STEL is recommended to protect against liver, kidney and lung effects observed in animal inhalation studies.  Human data:   * Volunteers inhaling 50–2,000 ppm for 1–7 h (1970 study) used for determining TLV-TWA based on subjective responses: * odour tolerance identified at 100 ppm * eye irritation reported by 2/6 volunteers after 2 h exposure (unknown concentration) * eye and throat irritation with nausea and headaches reported by 8 persons at 250 ppm (15–30 min) * extreme discomfort, lacrimation and respiratory discomfort at 2,050 ppm * Volunteers exposed to vapours in a double-blind test indicated no significant treatment related effects for any of three concentrations (0, 100 and 150 ppm) with only slight eye effects reported at 150 ppm. * *In vitro* PGME exposures elicited pro-inflammatory cytokines in nasal mucosa cells at 100 ppm * Multiple metabolic studies conducted with inhalation average uptake in male volunteers – 81.3%.   Animal data:   * NOAEC of 1,000 ppm inhaled (female mice, 13 wk) * LD50: 12–15 mL/kg (rabbits, dermal) * CNS depression at 3,000 ppm (inhalation, rats and rabbits, 6 h/d 5 d/w for 13 w) with increase liver weights of 6-8% * liver weight increases in rabbits at 1,500 and 3,000 ppm and slight lungs changes (unspecified) (female 1,500 ppm; male 3,000 ppm) (inhalation, 130 exposures of 7 h/d for 184 d) * No indication of histopathology or haematological effects in kidneys (also supporting NOEL of 1,000 ppm) * Cytotoxic effects on rat liver cells reported (no further details) * Not mutagenic in five *S. typhimurium* strains with and without S9 activation * No *in vitro* increase in frequency of micronuclei transformation in Syrian Hamster Embryo (SHE) cells * No reproductive effects observed (Wistar rats, inhalation) * Slight to moderate irritation observed in scarified rabbit skin after 24 h.   There is insufficient data available to recommend Skin, DSEN or RSEN notations. |
| DFG 1984 MAK: 100 ppm (370 mg/m3) |
| MAK value recommended to adequately protect exposed workers from irritation to eyes and respiratory tract.  Summary of additional data:  Systemic effects from inhalation (CNS depression) not expected <1,000 ppm.  Negative results only identified in reproductive and teratogenicity studies in two animal species (no further information). |
| SCOEL 1999 TWA: 100 ppm (375 mg/m3); STEL: 150 ppm (563 mg/m3) |
| TWA and STEL both recommended to reduce irritant exposures based on results of double-blind human studies (1997).  Skin notation was recommended based on dermal exposures leading to rapid dermal absorption contributing to body burden.  Summary of additional data:  Human data:   * 1997 study of volunteers exposed to vapours in a double-blind test used for determining the NOAEC of 150 ppm over lower results obtained in the 1970 study as subjective symptoms likely biased due to odours detected.   No reproductive, genotoxic effects identified in rats or rabbits until concentrations >10 times the recommended TWA. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| US EPA |  | 1991 | Inhalation RfC only:   * NOAEL: 1,000 ppm (rats and rabbits, inhalation) * LOAEL: 3,000 ppm narcotic effect >2 wk (rats and rabbits, inhalation). |
| ECHA |  | 2020 | DN(M)EL:   * Long term: 100 ppm * Acute / short term: 150 ppm. |
| OECD |  | 2001 | No additional data. |

### 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 | — |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | — |
| ACGIH | Carcinogenicity – A4 |
| DFG | — |
| SCOEL | Skin |
| HCOTN | NA |
| 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? | Yes |
| --- | --- |

## Additional information

| Molecular weight: | 90.10 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 3.69 mg/m3; 1 mg/m3 = 0.27 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) (2008) Propylene glycol 1-methyl ether (1‑methoxypropanol-2) – MAK value documentation.

European Chemicals Agency (ECHA) (2019) Propylene glycol monomethyl ether – REACH assessment.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (1999) Recommendation from the Scientific Committee on Occupational Exposure Limits for 1-Methoxypropan-2-ol. SCOEL/SUM/38.

Organisation for Economic Cooperation and Development (OECD) (2001) SIDS initial assessment profile – 1-Methoxypropan-2-ol (PGME).

US Environmental Protection Authority (US EPA) (1991) Integrated Risk Information System (IRIS) Chemical Assessment Summary – Propylene glycol monomethyl ether.