# 2-Ethoxyethyl acetate

| CAS number: | 111-15-9 |
| --- | --- |
| Synonyms: | Cellosolve acetate, EGEEA, ethylene glycol monoethyl ether acetate, ethyl glycol acetate |
| Chemical formula: | C6H12O3 |

Workplace exposure standard (amended)

| TWA: | **2 ppm (10.9 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Sk.** |
| IDLH: | **500 ppm** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A TWA of 2 ppm (10.9 mg/m3) recommended to protect for reproductive and developmental effects in exposed workers.

## Discussion and conclusions

2-Ethoxyethyl acetate is used as a blush retardant in lacquers, as a solvent for nitrocellulose, oils and resins, in wood stains and varnish removers and in products for the treatment of textiles and leathers.

Critical effects include embryo mortality and growth retardation. Limited data are available in humans. In a study on comparable potency, mice displayed equal degrees of testicular atrophy when dosed at 2,000 mg/kg/d of 2-ethoxyethanol and 400 mg/kg of 2-ethoxyethyl acetate. ACGIH (2018) and DFG (2007) recommendations for 2-ethoxyethyl acetate are based on analogy with the 2-ethoxyethanol.

Workers exposed at 88 mg/m3 or less of 2-ethoxyethanol had significantly lower average sperm counts than controls. Exposure of 2-ethoxyethanol in pregnant rabbits or rats caused increase in the incidence of foetal birth defects, growth retardation and embryo mortality in a developmental study (ACGIH, 2018).

Effects on sperm parameters could not be excluded in the group of workers who excreted approximately 100 mg/L of the metabolite 2-ethoxyacetic acid in urine. The DFG (2007) used physiologically based pharmacokinetic (PBPK) modelling to determine that exposure to 2 ppm (2‑ethoxyethanol) over an eight-hour work shift would result in the excretion of 50 mg/L of the metabolite in urine. Noting that reproductive effects could not be excluded at 100 mg/L of the metabolite in a worker study, a TWA of 2 ppm associated with an excretion of 50 mg/L 2-ethoxyacetic acid in urine is expected to provide sufficient protection for reproductive and developmental effects 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.

A skin notation is recommended based on evidence in animals by analogy with 2-ethoxyethanol.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 5 ppm (27 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 5 ppm (27 mg/m3) |
| The TLV-TWA is recommended to minimise the potential for reproductive effects.  Summary of data:  Human data:   * Vapours objectionable at concentrations that cause adverse effects * No further information.   Animal data:   * In a study on comparable potency, mice displayed equal degrees of testicular atrophy when dosed with 2,000 mg/kg of 2-ethoxyethanol, 400 mg/kg of 2-ethoxyethyl acetate, and 500 mg/kg each of 2-methoxyethanol and its ester for 5 d/wk for 5 wk.   The TLV-TWA is based on the reported testicular effects in mice and by analogy with 2‑ethoxyethanol.  Skin notation based analogy with 2-ethoxyethanol.  Insufficient data to recommend a sensitisation or carcinogenicity notation of TLV-STEL. |
| DFG 2007 MAK: 2 ppm (10.8 mg/m3) |
| MAK based on evidence from 2-Ethoxyethanol  Summary of data for 2-Ethoxyethanol:   * Good dermal absorption and accumulation of toxic metabolite ethoxyacetic acid over course of work week; internal exposure is crucial for toxicity; used as starting point for MAK * Effects on sperm parameters could not be excluded in the group of workers who excreted 85 ± 31.3 mg/g (2-ethoxyacetic acid /creatinine); equivalent to approx. 100 mg/L urine * PBPK model shows 2 ppm corresponds to 50 mg/L 2-ethoxyacetic acid in urine; basis for MAK. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2011 TWA: 0.16 ppm (0.8 mg/m3) |
| TWA based on evidence from 2-Ethoxyethanol  Summary of data for 2-Ethoxyethanol:   * Induce testicular atrophy in rats after oral dosing, IP injection, inhalation exposure and dermal application: * NOAEL of 12.5 mg/kg/d in rabbits (affected spermatogenesis, oral dose) * Uses a study in which pregnant rabbits were exposed to EGME (0, 3, 10, 50 ppm) by inhalation as a starting point for benchmark dose (BMD) analyse * BMDL10 is 1.3 ppm (4.1 mg/m3) increase in number of foetuses with delayed ossifications; interspecies factor of 3 and intraspecies factor of 3 to derive MAK. |

### Secondary source reports relied upon

NIL.

### 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 | Skin |
| HCIS | — |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | — |
| ACGIH | Skin |
| DFG | H (skin) |
| SCOEL | NA |
| HCOTN | Skin |
| IARC | NA |
| US NIOSH | SK:SYS |

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: | yes | 3.00 |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | 3 | **consider assigning a skin notation** | |

### IDLH

| Is there a suitable IDLH value available? | Yes |
| --- | --- |

## Additional information

| Molecular weight: | 132.16 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 5.44 mg/m3; 1 mg/m3 = 0.185 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.

European Chemicals Agency (ECHA) (2019) 2-Ethoxyethyl acetate – REACH assessment.

Deutsche Forschungsgemeinschaft (DFG) (2008) Ethylene glycol monoethyl ether acetate – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2011) Ethyleneglycol monomethyl ether (EGME) and ethyleneglycol monomethyl ether acetate (EGMEA). Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2011/10.

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – 2-Ethoxyethyl acetate.

US National Institute for Occupational Safety and Health (NIOSH) (2014) NIOSH Skin Notation Profiles: 2-Ethoxyethyl Acetate.