# Dichloroethyl ether

| CAS number: | 111-44-4 |
| --- | --- |
| Synonyms: | Bis-(2-Chloroethyl)-ether |
| Chemical formula: | C4H8Cl2O |

Workplace exposure standard (amended)

| TWA: | **5 ppm (29 mg/m3)** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | **Carc. 2, Sk.** |
| IDLH: | **100 ppm** |
| **Sampling and analysis**: The recommended value is likely to be below the current limit of detection for standard sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A TWA of 5 ppm (29 mg/m3) is recommended to protect for eye and respiratory tract irritation in exposed workers.

## Discussion and conclusions

Dichloroethyl ether is used as a chemical intermediate, wetting agent, penetrant, fumigant, solvent, dewaxing agent and in lacquers, resins and oils.

The critical effects are reported to be irritation of the eyes and respiratory tract. There are limited toxicological data and ACGIH (2018) is the only primary source available. Tumours are reported in two carcinogenicity studies in mice. The data are insufficient to support carcinogenicity in humans (ACGIH, 2018; NICNAS, 2015). A NOAEC of 35 ppm for irritation in humans reported in ACGIH (2018) with this concentration noticeable by its nauseous odour. Short-term exposure of guinea pigs at 100 ppm resulted in lung injury and secondary effects including moderate congestion of the brain, liver and kidneys (NICNAS, 2015)

A TWA of 5 ppm is recommended as assigned by ACGIH (2018). This TWA is cited to be protective of irritation effects. Its derivation is not reported in the source. The available evidence does not support acute effects associated with short-term exposures. Therefore, a STEL is not recommended.

## Recommendation for notations

Classified as a category 2 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 suggesting potential dermal absorption and adverse systemic effects in animals.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 5 ppm (29 mg/m3); STEL: 10 ppm (58 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 5 ppm (29 mg/m3); TLV-STEL: 10 ppm (58 mg/m3) |
| TLV-TWA and TLV-STEL recommended to minimise the potential for eye and respiratory tract irritation, coughing, nausea and retching.  Summary of data:  Human data:   * Volunteers exposed to 35, 100, 260, 500 ppm experienced the following symptoms: * 500 ppm: eye and respiratory tract irritation, coughing, nausea and retching * 100 and 260 ppm: irritation * NOAEL: 35 ppm, no irritation but nauseous odour detectable.   Animal data:   * Exposure to 35, 105, 500 ppm (guinea pigs, inhalation) produced the following symptoms: * 500 ppm: immediate eye and nose irritation, respiratory disturbance >1.5–3 h, death >5–8 h * 105 ppm: eye and nose irritation >1 h, death >10 h * 35 ppm: eye and nose irritation, no other adverse effects * LD50: 300 mg/kg (guinea pigs, 24 h, dermal) * Inhalation exposure to 69 ppm (rats and guinea pigs, 7 h/d, 5 d/wk) for 130 d resulted in mild physiologic stress responses, and weight loss * no cellular lesions were observed in microscopic examination * Administration of 300 mg/kg/d (mice, 80 wk, oral) resulted in hepatomas in both sexes; no further information * Subcutaneous injection in mice produced low incidents of sarcomas at the injection site.   Assigned an A4, not classified as human carcinogen.  Insufficient data to assign a sensitiser notation. |
| DFG NA NA |
| No report. |
| 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 |
| --- | --- | --- | --- |
| NICNAS |  | 2015 | * LD50: 75 and 215 mg/kg (rats and mice, oral) * LD50: 870 mg/kg (rabbits, dermal) * 4 h LC50: 250 ppm rats * Short-term exposure of guinea pigs to 100 ppm resulted in lung injury, and secondary effects, including moderate congestion of the brain, liver and kidneys * Limited evidence of carcinogenic effect * Equivocal genotoxicity results in *S. typhimurium*, *E. coli* and*B. subtilis*. |
| US EPA |  | 1991 | * Direct-acting mutagen producing base pair exchange mutations in *E. coli, S. typhimurium, and B. subtilis* * Weak positive response to vapor-phase exposure of *Salmonella* frameshift mutant strains TA1538 and TA98 * Mutagenic in *S. cerevisiae* but did not induce heritable translocations in mice * OSF: 1.1 x 10+0 per (mg/kg/d) * IUR: 3.3 x 10-4 per (µg/m3). |
| ECHA |  | 2017 | * LD50: 9 mg/kg (rabbits, dermal) * Study performed as per OECD Test Guideline No. 429 and EC No 440/2008 Guideline B.42, no sensitisation potential * Should not be classified for germ cells mutagenicity according to the classification criteria of EC regulation 1272/2008. |

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | Yes |
| --- | --- |
| 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 | Carc. 2, Skin |
| HCIS | Carcinogenicity – category 2 |
| NICNAS | — |
| EU Annex | Carcinogenicity – category 2 |
| ECHA | NA |
| ACGIH | Carcinogenicity – A4; Skin |
| DFG | — |
| SCOEL | NA |
| HCOTN | NA |
| IARC | Carcinogenicity – Group 3 |
| 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 LD50 ≤1000 mg/kg: | yes | 3.00 |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: | yes | 3.00 |  | | *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: | 143.01 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 5.85 mg/m3; 1 mg/m3 = 0.171 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) (2017) Bis(2-chloroethyl) ether – REACH assessment.

International Agency for Research on Cancer (IARC) (1999) Dichloroethyl ether. IARC Monographs on the evaluation of the carcinogenic risk to humans. 9, Sup 7, 71.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2015) Ethane, 1,1'-oxybis[2-chloro]-: Human health tier II assessment – IMAP report.

US Environmental Protection Agency (US EPA) (1991) Integrated Risk Information System (IRIS) Chemical Assessment Summary - Bis(chloroethyl)ether (BCEE).

Tenth Adaptation to Technical Progress Commission Regulation (EU) No 2017/776 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (the CLP Regulation).

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – Dichloroethyl ether.