# Diglycidyl ether (DGE)

| CAS number: | 2238-07-5 |
| --- | --- |
| Synonyms: | DGE, bis(2,3-Epoxy propyl) ether,  di(2,3-epoxypropyl)ether |
| Chemical formula: | C6H10C3 |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **0.01 ppm (0.05 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **10 ppm** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

An interim TWA of 0.01 ppm (0.05 mg/m3) is recommended to protect for eye, skin and respiratory tract irritation including burns, and for haematopoietic (blood cell) and reproductive effects 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

Diglycidyl ether (DGE) is commonly used as a textile-treating agent, and as a chlorinated organic compound stabiliser.

The critical effects of exposure include eye, skin and respiratory tract irritation and effects on haematopoietic system (white blood cells and bone marrow changes) and reproductive organs. Limited data from animal studies indicate that DGE has a high acute inhalation toxicity and moderate dermal toxicity. A sub-chronic inhalation study in rats reported a LOAEC of 0.3 ppm (1.6 mg/m3) for haematopoietic system or organ changes (ACGIH, 2018). This study was used to derive the TLV‑TWA recommended by ACGIH.

Given the lack of human and animal data, the recommended TWA is adopted from the current TLV‑TWA of 0.01 ppm (0.05 mg/m3) by ACGIH (2018). However, due to the lack of any NOAEL or studies with exposure below 0.3 ppm (1.6 mg/m3) it is recommended that a priority review be undertaken at the next scheduled review of the WES.

## 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 evidence.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 0.1 ppm (0.53 mg/m3) | |
|  |
| ACGIH 2007 TLV-TWA: 0.01 ppm (0.05 mg/m3) |
| TLV-TWA recommended to minimise the risk of eye, skin, and respiratory tract irritation and haematopoietic and reproductive organ effects in exposed workers.  Summary of data:  Human data:   * Symptoms observed in workers include burns, irritation of the skin, eyes, and respiratory tract * Recognisable odour >5 ppm.   Animal data:   * LC50: 30 ppm (mice, 4 h) * LC50: 68 ppm (rats, 8 h) * LD50: 170 mg/kg (mice, oral) * Dermal exposure ( at 0.5 mL undiluted, rabbit) resulted in erythema, oedema, and eschar formation * Exposure at 1.3–2.5 ppm (rats, 4 h, inhalation) for 19 exposures over 29 d resulted in reduced body weight gain, leukocyte count, polymorphonuclear cells, nucleated cells in the femoral marrow and weight of the thymus, spleen, and testes * LOAEL: 0.3 ppm (rats, 4 h, 60 exposures, inhalation) for haematopoietic system and organ changes * Exposure at 33 and 100 ppm produced epithelioma in mice following repeated skin application * Exposure at 3 ppm (4 h/d, 5 d/wk,19 exposures, inhalation) resulted in eosinophilia * Positive mutagenic effect in bacteriophage T2 and *Neurospora* * Induce chromosomal aberrations in plant cells * Positive mutagenic action in *S. typhimurium* * Exposure at 0.3 ppm (rats, inhalation 4 h/d, 5 d/wk, 60 exposures for 90 d) produced focal degeneration of the germinal epithelium (ovary).   Assigned an A4, not classified as human carcinogen.  Insufficient data to recommend a skin or sensitiser notation. |
| DFG 2004 Not assigned |
| No MAK recommended.  Summary of additional data:   * Previous MAK of 0.1 ppm * Exposure at 30 and 125 mg/kg (rats, dermal) resulted in haematopoietic system effects, toxic effects on cornea, testes, kidneys and adrenals * LD50: 1,000–1,500 mg/kg (rats, dermal), symptoms included reduction in the white blood cells, reduced bw, inflammation of the skin and pneumonia * *S. typhimurium* TA100 and TA1535, mutations were observed with and without metabolic activation system * *Neurospora* W. 40, induced reverse mutations from adenine dependence to adenine independence * Dermal application produced tumour in several studies on mice. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### Secondary source reports relied upon

NIL.

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | Insufficient data |
| --- | --- |
| 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 | — |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | Carcinogenicity – A4 |
| DFG | Carcinogenicity – 3B, H (skin) |
| SCOEL | NA |
| 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 |
| --- |
| |  |  |  |  | | --- | --- | --- | --- | | 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: | no | -3.00 |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | 0 | **a skin notation is not warranted** | |

### IDLH

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

## Additional information

| Molecular weight: | 130.14 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 5.32 mg/m3; 1 mg/m3 = 0.188 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) (2004) Diglycidylether – MAK value documentation.

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