# Diethylene glycol monobutyl ether

| CAS number: | 112-34-5 |
| --- | --- |
| Synonyms: | 2-(2-Butoxyethanol)ethanol, butoxy diethylene glycol, butoxydiglycol, butoxyethoxyethanol, butyl carbitol, butyl diglycol, butyl digol, DGME |
| Chemical formula: | C8H18O3 |
| Structural formula: | — |

Workplace exposure standard (new)

| TWA: | **10 ppm (67.5 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 10 ppm (67.5 mg/m3) is recommended to protect for hepatic effects and lung irritation in exposed workers.

## Discussion and conclusions

Diethylene glycol monobutyl ether (DGBE) is used as a solvent for nitrocellulose, oils, dyes, gums, soaps and polymers. It is also used as a coalescing agent in latex paints and in hard surface cleaners.

The critical effects are irritation of the lungs and effects on liver and kidneys weight. Limited human data suggests uptake of DGBE via inhalation and intact skin is low. A NOAEC of 94 mg/m3 (14 ppm) is reported for body weight loss in a ninety-day rat inhalation study. This dose was the highest dose tested and no effects including liver changes were observed (ACGIH, 2018; DFG, 2008).

The recommended TWA of 10 ppm (67.5 mg/m3) is consistent across primary sources and on the weight of evidence presented is expected to be protective of effects in the liver and possible irritation of the lungs. There are insufficient data to warrant the recommendation of a STEL and the recommended TWA is considered adequately protective for acute 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.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA NA NA | |
| No report. |
| ACGIH 2013 TLV-TWA: 10 ppm (67.5 mg/m3) (inhalable fraction and vapor) |
| TLV-TWA recommended for occupational exposure to minimise potential for hepatic effects.  Summary of data:  Human data:   * Measurements from exposed workers suggest uptake via inhalation and intact skin is low * Patch testing with undiluted material caused reddening of the skin in a limited number of volunteers.   Animal data:   * NOAEL: 250 mg/kg/d (rats, 13 wk, drinking water); increased relative liver weight and body weight loss * NOAEL: 94 mg/m3 (14 ppm) (rats, 90 d, inhalation); exposed (whole body) to 0, 13, 40 or 94 mg/m3; no treatment-related effects other than body weight loss * Exposure at 100 mg/m3 (15 ppm) vapour and 350 mg/m3 and 1,000 mg/m3 aerosol caused reduction in spleen weight of male rats (vapour and aerosol) and histopathological changes in lungs of both sexes (aerosol) * Exposure at 117 mg/m3 (17 ppm) for 5 wk caused liver effects in female rats; 3/10 pale liver and increased relative liver weight * Mutagenicity not observed in Ames tests and negative results in *in vitro* and *in vivo* studies * Undiluted DGBE was a slight skin irritant and moderate eye irritant in rabbits and guinea pigs * No systemic or neurotoxic effects observed in rats following dermal application of up to 2,000 mg/kg/d of DGBE for 13 wk.   TLV-TWA based on NOAEL 250 mg/kg/d being equivalent to a human inhalation NOAEC of 1,750 mg/m3 (260 ppm); assuming 70-kg worker inhales 10 m3; supported by rat inhalational study with NOAEL of 94 mg/m3 (14 ppm) (noted above).  No skin notation warranted; insufficient data to recommend TLV-STEL, DSEN, RSEN or carcinogenicity notations. |
| DFG 2008 MAK: 10 ppm (67 mg/m3) |
| Summary of additional data:   * No suitable human data for deriving MAK value * Commission considered 50 mg/kg/d as NOAEL not 250 mg/kg/d (rats, 13 wk, drinking water) as cited by ACGIH (2018), due to marginal, but dose-dependent increased spleen weights and slight changes in blood parameters; corresponds to 350 mg/m3 (52 ppm) * MAK derived from NOAEC of 14 ppm (94 mg/m3) (rats, 90 d, inhalation); no local or systemic effects; highest concentration; rounded to 10 ppm * No data available on mechanism of action of DGBE * LC50: 18 ppm (rats), corresponding to highest concentration that can be generated as a pure vapour; no further information * No new inhalation studies published since 1992 MAK documentation * No data available for carcinogenicity. |
| SCOEL 2002 TWA: 10 ppm (67.5 mg/m3); STEL: 15 ppm (101.2 mg/m3) |
| Summary of additional data:   * Critical effect is local irritation of the lung * To avoid irritation due to aerosols of DGBE, a STEL of 15 ppm (101.2 mg/m3) is recommended. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2003 Not assigned |
| No additional data. |

### Secondary source reports relied upon

| Source | |  | | Year | | Additional information | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NICNAS |  | | 2013 | | * No additional information. | |

### 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 | NA |
| HCIS | NA |
| NICNAS | — |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | — |
| DFG | — |
| SCOEL | — |
| 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: | 162.23 |
| --- | --- |
| 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) (2008) Diethylene glycol monobutyl ether – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (2002) Recommendation from the Scientific Committee on Occupational Exposure Limits for 2-(2-Butoxyethoxy)ethanol. SCOEL/SUM/101.

Health Council of the Netherlands (HCOTN) (2003) Diethyleneglycol (mono)alkylethers. Evaluation of the effects on reproduction, recommendation for classification. The Hague: Health Council of the Netherlands; publication no. 2003/10OSH.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2013) Ethanol, 2-(2-butoxyethoxy): Human health tier II assessment.