# Diborane

| CAS number: | 19287-45-7 |
| --- | --- |
| Synonyms: | Boroethane, boron hydride, diboron hexahydride |
| Chemical formula: | B2H6 |
| Structural formula: | — |

Workplace exposure standard (amended)

| TWA: | **0.01 ppm (0.01 mg/m3)** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | — |
| IDLH: | **15 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 0.01 ppm (0.01 mg/m3) is recommended to protect for respiratory irritation and pulmonary oedema in exposed workers.

## Discussion and conclusions

Diborane is used as a reducing agent, rubber vulcaniser, polymerization catalyst, flame-speed accelerator, doping agent and in rocket propellant.

Acute effects after high concentration exposure in humans result in breathlessness, coughing, nausea, chest pains and neurotoxic effects. An inhalation study in rats reported that exposure at 0.11 ppm (0.13 mg/m3), six hours per day, five days per week for eight weeks resulted in increased levels of neutrophils and phospholipids in the lung lavage fluid in a concentration-dependent manner. The results suggest a LOAEL for lung effects in rats of 0.11 ppm (HCOTN, 2,000; DFG 2,000).

In line with the HCOTN recommendations, a TWA of 0.01 ppm is derived using the reported LOAEL and applying an uncertainty factor of 10 to account for absence of a NOAEL and an uncertainty factor to account for interspecies differences is not applied as the LOAEL is for localised effects. Based on the available evidence, the recommended TWA is considered to protect for the lung 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 1991 TWA: 0.1 ppm (0.11 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 0.1 ppm (0.1 mg/m3) |
| TLV-TWA recommended to minimise the risk of headache, vertigo, chills, fever, respiratory irritation and pulmonary oedema in exposed workers.  Summary of data:  Human data:   * Acute effects of high-level exposure of workers include breathlessness, coughing, nausea, chest pains and neurotoxic effects * Long-term exposure symptoms include headaches, dizziness, shivering and fever.   Animal data:   * LC50: 40 or 80 ppm (rat, 4 h) age dependant, primary symptoms pulmonary oedema and suspected change in the CNS * Rats, guinea pigs and dogs were exposed to 1–2 and 5 ppm (6 h/d, 6 mo): * 17/18 rats, 2/2 dogs died at 5 ppm exposure * 10/20 rats, 1/2 dogs, 0/10 guinea pigs died at 1–2 ppm.   Insufficient data to recommend a carcinogen, skin or sensitisation notation. |
| DFG 2000 Not assigned |
| Because of the lack of concentration measurements in the studies available with man, no MAK value can be evaluated.  Summary of additional data:   * Exposure to 0.11 and 0.96 ppm (rats, 6 h/d, 5 d/wk, 8 wk, inhalation) increased the levels of neutrophils and phospholipids in the lung lavage fluid in a concentration-dependent manner * Exposure to 0.2 and 0.7 ppm (mice, inhalation) increased the number of abnormal sperm, another similar study produced contradictory results. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2000 TWA 8 hours: 0.1 ppm (0.1 mg/m3) |
| Current TWA is an administrative value only.  Recommendations by DECOS for a health-based TWA of 0.01 ppm are derived from LOAEL of 0.13 mg/m3 for lung effects in subacute rat study. Application of an overall assessment factor of 9 to account for starting from a LOAEL and for intraspecies variation results in preferred value of 0.01 mg/m3. No interspecies assessment factor considered necessary.  Summary of additional data:   * LC50: 36.2 mg/m3 (31.5 ppm) (mice, 4 h) * NOAEL: 1 ppm (1.2 mg/m3) (mice, 8 h, inhalation) for effects on lung * LOAEL: 0.11 ppm (0.13 mg/m3) (rats, 6 h/d, 5 d/wk, 8 wk, inhalation) for effects on the lungs (same study as DFG). |

### 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 | NA |
| DFG | — |
| SCOEL | NA |
| 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

Insufficient data to assign a skin notation.

### IDLH

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

## Additional information

| Molecular weight: | 27.66 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 1.15 mg/m3; 1 mg/m3 = 0.873 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) (2000) Diborane – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2000) Diborane. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000 / 15OSH.

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