DECABORANE

CAS number: 17702-41-9

Synonyms: —

Chemical formula: $B_{10}H_{14}$

Structural formula: —

Workplace exposure standard (retained)

TWA: **0.05 ppm (0.25 mg/m^3)**

STEL: **0.15 ppm (0.75 mg/m^3)**

Peak limitation: —

Notations: **Sk.**

IDLH: **15 mg/m^3**

Sampling and analysis: The recommended value is quantifiable through available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.05 ppm (0.25 mg/m^3) is recommended to protect for headache, nausea and dizziness in exposed workers.

A STEL of 0.15 ppm (0.75 mg/m^3) is recommended to protect for central nervous system (CNS) effects from acute exposures in workers.

Discussion and conclusions

Decaborane is used as an olefin polymerisation catalyst and in rocket propellant. Toxicological data are limited and no human exposure data are currently available. Based on available animal data it has high inhalational acute toxicity and medium to high dermal acute toxicity.

The ACGIH recommendation for the TLV-TWA of 0.05 ppm and TLV-STEL of 0.15 ppm is based, in part, by analogy to diborane and pentaborane. The estimated daily dose at the recommended TWA is less than half of the known LOAEL (0.15 ppm) derived from animal studies (ACGIH, 2018).

The recommended TWA and STEL are considered protective for the potential headache, nausea, dizziness and CNS effects in exposed workers. Investigation of additional data sources is recommended at the next scheduled review to identify any other relevant toxicological data.

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 suggesting potential dermal absorption and adverse systemic effects in animals.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1991***	***TWA: 0.05 ppm (0.25 mg/m^3); STEL: 0.15 ppm (0.75 mg/m^3)***
ACGIH	***2001***	***TLV-TWA: 0.05 ppm (0.25 mg/m^3); TLV-STEL: 0.15 ppm (0.75 mg/m^3)***
TLV-TWA and TLV-STEL recommended to minimise the potential for headache, nausea, dizziness and CNS effects at higher concentrations. Summary of data: Human data: • CNS effects observed in animal studies have been reported in exposed workers (concentration unknown) • Onset of symptoms can be delayed by up to 48 h after exposure with symptoms persisting up to 72 h. Animal data: • LC_{50}: 46 and 12 ppm (rats and mice, 4 h) • LD_{50}: 71 and 740 ppm (rabbits and rats, dermal), acute symptoms included convulsions, weakness, tremors, hyperexcitability and narcosis • Airborne exposure to 4.5 ppm, 5–6 h/d (up to 6 mo) was fatal for various animal species demonstrating wide-ranging susceptibility. Fatalities seen in: ○ rabbits; 3 exposures ○ dogs, monkeys; 4–15 exposures; ○ mice; 10–100 exposures ○ rats; 135 exposures • LOEL corresponding to 0.15 ppm based on behavioural observation in monkeys injected with 3–6 mg/kg. TLV derived partially by analogy with diborane and pentaborane. Insufficient data to assign a sensitiser notation.		
DFG	***2001***	***MAK: 0.05 ppm (0.25 mg/m^3)***
The MAK is based on the LOEL corresponding to 0.15 mL/m^3 in monkeys as reported by ACGIH. Due to limited data, an uncertainty factor of 2 is applied with the resulting value rounded down.		
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	Skin
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Skin
DFG	H (skin)
SCOEL	NA
HCOTN	NA
IARC	NA
US NIOSH	

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 LD_{50} ≤1000 mg/kg:	yes
Dermal repeat-dose NOAEL ≤200 mg/kg:	
Dermal LD_{50}/Inhalation LD_{50} <10:	
In vivo dermal absorption rate >10%:	
Estimated dermal exposure at WES >10%:	
	consider assigning a skin notation

IDLH

Is there a suitable IDLH value available?	Yes

Additional information

Molecular weight:	122.22
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m^3; 1 mg/m^3 = 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* on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2001) Dekaboran – MAK value documentation.

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