

DIVINYL BENZENE

CAS number: 1321-74-0

Synonyms: Diethenylbenzene, DVB, 1,4-divinylbenzene, vinylstyrene

Chemical formula: C₁₀H₁₀

Workplace exposure standard (interim)

TWA: 10 ppm (53 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 (53 mg/m³) is recommended to protect for irritation of the eyes, skin and respiratory tract and potential liver damage 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

Divinyl benzene is used as a starting material in the manufacture of various polymers.

Critical effects are eye, skin and respiratory tract irritation and, at much higher concentrations, potential central nervous system (CNS) depression. Limited animal studies indicate a potential for liver damage above approximately 100 ppm (ACGIH, 2018). The toxicological database for the substance is currently very limited.

In the absence of reliable substance-specific human exposure data and limited animal exposure data, the current TWA of 10 ppm is retained in the interim. The current TWA agrees with the current recommendation by the ACGIH (2018), which is derived from a NOAEC for nasal inflammation and systemic effects on the liver reported in rats (ACGIH, 2018).

The current database indicates that divinyl benzene is not genotoxic based on several *in vitro* and *in vivo* assays (ACGIH, 2018; NTP, 2006). However, evidence for lung and kidney carcinogenicity from chronic animal inhalational studies is equivocal (NTP, 2006) and investigation of additional data sources for this endpoint should be prioritised for review during subsequent evaluations.

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.

DRAFT

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 10 ppm (53 mg/m³)
ACGIH	2001	TLV-TWA: 10 ppm (53 mg/m³)
<p>TLV-TWA intended to minimise potential for irritation to eyes, skin, and respiratory tract.</p> <p>Summary of data:</p> <p>TLV-TWA derived from NOAEL of 25 ppm divinyl benzene mixed with 20 ppm ethyl vinyl benzene in a sub-chronic inhalational study with rats and by analogy to the structurally related mono-substituted congener, styrene.</p> <p>Human data:</p> <ul style="list-style-type: none"> Mild respiratory, skin and eye irritation reported in acutely exposed workers; no data on chronic effects available Plant surveys indicate average exposures of 0.4 ppm with peaks of 4 ppm to workers. <p>Animal data:</p> <ul style="list-style-type: none"> LD₅₀: 2,155–4,640 mg/kg (rats, oral); male rats more susceptible than females, lethargy/CNS effects begin at 630 mg/kg Mild irritation/pain response when 0.1 mL applied to eyes (rabbits, 30 sec); pain increases when washed with water, effects resolve in 1 h Lethal >3 d when applied undiluted to skin at 7,950 mg/kg (rabbits, 24 h); mild erythema and exfoliation at sub-chronic exposure of 1–2 mL (5 d/wk, 2 wk), systemic effects not discussed No adverse effects at 645 in single inhalational dose study (rats, 7 h): <ul style="list-style-type: none"> nasal discharge at 2,340 ppm ataxia, irregular heart rate, eye irritation at 3,312 ppm, bw loss and lethargy during 14 d observation period lethal within 24 h at 4,835 ppm; haematuria in survivors similar effects in addition to lung inflammation observed at 27,317 ppm (rats, 2 h) Sub-chronic inhalational exposure studies with respective mixed exposures to 25, 101, or 252 ppm divinyl benzene and 20, 79 and 199 ppm ethyl vinyl benzene (rats, 6 h/d, 5 wk, duration not specified) <ul style="list-style-type: none"> NOAEC of 25:20 ppm (divinyl benzene: ethyl vinyl benzene) inflammation and degradation of nasal cavity observed above 101:79 ppm, increased bw, liver weight and abdominal fat at 252:199 ppm mice exposed to 101:79 ppm under same exposure regimen presented similar symptoms as well as kidney damage; NOAEL of 10:8 ppm (mice) Not genotoxic <i>in vitro</i>. <p>Insufficient data to recommend a TLV-STEL or notations for carcinogenicity, skin absorption or sensitisation.</p>		



Source	Year set	Standard
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
NTP	✓ 2006	<ul style="list-style-type: none">Chronic inhalation study with exposure groups 100, 200, and 400 ppm (rats, 6 h/d, 5 d /wk, 2 yr) and 10, 30 and 100 ppm (mice, 6 h/d, 5 d/wk, 2 yr):<ul style="list-style-type: none">Rats:<ul style="list-style-type: none">bw decrease in 400 ppm groupslightly higher incidence of kidney tumours in males, significantly increased nephropathyslight increase in brain tumours in 200 ppm males, slight, non-significant increase observed 100 ppmdegenerative and regenerative changes to nasal epithelium in all exposure groupsstudy concluded equivocal evidence for carcinogenicity in males, but negative for femalesMice:<ul style="list-style-type: none">bw decrease in males at 100 ppm and at 30-100 ppm in femalesnon-significant increase in lung tumour incidence in males at 100 ppm, increased incidence in females of all groups, some significantly greater than controls (not specified)nasal lesions observed in most exposed micestudy concluded equivocal evidence for carcinogenicity in females, but negative for malesNon-genotoxic <i>in vitro</i> or <i>in vivo</i>.

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	—
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	—
DFG	NA
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

Insufficient data to assign a skin notation.

IDLH

Is there a suitable IDLH value available?

No

Additional information

Molecular weight:	130.19
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 5.32 mg/m ³ ; 1 mg/m ³ = 0.188 ppm
This chemical is used as a pesticide:	<input type="checkbox"/>
This chemical is a biological product:	<input type="checkbox"/>
This chemical is a by-product of a process:	<input type="checkbox"/>



Molecular weight:	130.19
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 5.32 mg/m ³ ; 1 mg/m ³ = 0.188 ppm
This chemical is used as a pesticide:	<input type="checkbox"/>
A biological exposure index has been recommended by these agencies:	<input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> 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.

National Toxicology Program (NTP) (2006) Toxicology and carcinogenesis studies of divinylbenzene-HP. NTP Technical report series No. 534. DHHS (NIH) Pub No 1-290.