

BROMOFORM

CAS number: 75-25-2

Synonyms: Tribromomethane, methyl tribromide, methenyl tribromide

Chemical formula: CHBr_3

Workplace exposure standard (retained)

TWA: 0.5 ppm (5.2 mg/m³)

STEL: —

Peak limitation: —

Notations: —

IDLH: 850 ppm

Sampling and analysis:

The recommended value is readily quantifiable through currently available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.5 ppm (5.2 mg/m³) is recommended to protect for possible liver and kidney effects in exposed workers. This TWA is also expected to protect for irritation of the respiratory tract and eyes.

Discussion and conclusions

Bromoform is used as a chemical intermediate, in the synthesis of pharmaceuticals and a solvent for waxes, greases and oils.

Effects in humans following exposure to vapour are reported as irritation of the respiratory tract, pharynx and larynx, lacrimation and salivation. Lethargy, headache and vertigo are also reported at smaller doses (ACGIH, 2018).

A one month feeding study in rats reported vacuolisation and swelling of the liver and a LOAEL of 56.4 mg/kg (ACGIH, 2018). When converted, a 70 kilogram worker exposed to a TWA of 0.5 ppm, breathing 10 m³ of air over an eight hour shift would receive a dose orders of magnitude below this reported LOAEL. Therefore, in the absence of additional data, and in line with the ACGIH TWA-TLV, a TWA of 0.5 ppm is recommended. The recommended TWA is considered to be protective for liver and kidney effects in exposed workers as reported in animal studies and protective for irritation and lacrimation reported in humans.

Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling on Chemicals (GHS). In a two year study in rats, the incidence of neoplastic changes in the large intestine was clearly increased in female rats but not significantly increased in male rats. The carcinogenic classification appears inconsistent with the data examined. No carcinogenicity notation is recommended at this time and a review of the carcinogenicity classification is recommended.

Not classified as a skin sensitiser or respiratory sensitiser according to the GHS.

A skin notation is not recommended as there is no indication of systemic effects resulting from skin absorption.

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APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 0.5 ppm (5.2 mg/m ³)
ACGIH	2009	TLV-TWA: 0.5 ppm (5.2 mg/m ³)
<p>TLV-TWA recommended to protect for possible liver and kidney effects and for upper respiratory tract irritation and lacrimation in exposed workers.</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> Quantitative exposure-response information not available Exposure to vapour reported to cause effects including irritation of the respiratory tract, pharynx and larynx, lacrimation and salivation Reported CNS depression with coma and loss of reflexes following accidental ingestion Lethargy, headache, and vertigo resulting from smaller doses (no further information) Absorbed through human breast skin <i>in vitro</i> with a dermal absorption coefficient of 0.21 cm/h at 25°C. <p>Animal data:</p> <ul style="list-style-type: none"> LOAEL of 56.4 mg/kg for liver effects (rats, oral, 1 mo) Male and female rats developed histological changes in liver and thyroid following a range of doses in drinking water (>90 d) <ul style="list-style-type: none"> effects were reversed in groups given tap water for 90 d following dosing reversibility suggest adaptive changes rather than adverse effects Some evidence of carcinogenicity in male rats and clear evidence of carcinogenicity in female rats based on increased incidences of adenomatous polyps and adenocarcinomas of the large intestine (up to 200 mg/kg, corn oil gavage, 5 d/wk, 103 wk) <ul style="list-style-type: none"> no evidence of carcinogenicity in mice dosed simultaneously (up to 100 mg/kg) Aberrant crypt foci in colons of rats (but not mice) following administration in drinking water (1,100 mg/L, 13 wk). <p>Inconsistent and inconclusive results in genotoxicity tests:</p> <ul style="list-style-type: none"> positive, negative and inconclusive in <i>Salmonella</i> mutagenicity tests mutagenic in <i>Salmonella</i> RSJ100 strain but no significant result when human whole blood cultures expressing and lacking GST were assessed using the Comet assay DNA damage reported in <i>E. coli</i> positive result on <i>Drosophila</i> sex-linked recessive lethal assays negative result in <i>Drosophila</i> reciprocal translocation assays positive in mouse lymphoma cell mutation assay SCE positive against various cell lines chromosomal aberrations in bone marrow reported in rats (up to 253 mg/kg intraperitoneally) but not in mice no DNA strand breaks reported in rats (F-344; up to m80 mg/kg <i>via</i> oral gavage). <p>Insufficient evidence to recommend a skin or sensitiser notations.</p>		

Source	Year set	Standard
DFG	1996	Not assigned
Insufficient evidence to establish a MAK. Summary of additional data:		
<ul style="list-style-type: none"> Results from <i>in vivo</i> and <i>in vitro</i> tests suggest some genotoxic potential Dermal LD₅₀: >1,000 mg/kg Carcinogen category 3B: animal studies have yielded evidence of carcinogenic effects that is not sufficient for classification of the substance in one of the other categories. 		
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
US EPA	✓ 1987	<ul style="list-style-type: none"> Based on inadequate human data and sufficient evidence of carcinogenicity in animals Classification – B2; probable human carcinogen Genotoxic in several assay systems Structurally related to other trihalomethanes which have been verified as either probable or possible carcinogens.

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	NA
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Carcinogenicity – A3
DFG	Carcinogenicity – 3B

Source	Notations
SCOEL	NA
HCOTN	NA
IARC	Carcinogenicity – Group 3
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
<p>Adverse effects in human case study:</p> <p>Dermal LD₅₀ ≤ 1000 mg/kg: no</p> <p>Dermal repeat-dose NOAEL ≤ 200 mg/kg:</p> <p>Dermal LD₅₀/Inhalation LD₅₀ < 10:</p> <p><i>In vivo</i> dermal absorption rate > 10%:</p> <p>Estimated dermal exposure at WES > 10%:</p> <p style="text-align: right;">a skin notation is not warranted</p>

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight:	252.75
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:	<input type="checkbox"/>
This chemical is a biological product:	<input type="checkbox"/>
This chemical is a by-product of a process:	<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.

Deutsche Forschungsgemeinschaft (DFG) (1996) Tribromomethane – MAK value documentation.

International Agency for Research on Cancer (IARC) (1999) Volume 71 re-evaluation of some organic chemicals, hydrazine and hydrogen peroxide. IARC Monographs on the evaluation of the carcinogenic risk to humans.

US Environmental Protection Authority (US EPA) (1993) Integrated Risk Information System (IRIS) Chemical Assessment Summary – Bromoform.

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