

n-BUTYLAMINE

CAS number: 109-73-9

Synonyms: Butan-1-amine, 1-aminobutane; n-butylamine

Chemical formula: C₄H₁₁N

Workplace exposure standard (retained)

TWA: —

STEL: —

Peak limitation: 5 ppm (15 mg/m³)

Notations: Sk.

IDLH: 300 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 peak limitation of 5 ppm (15 mg/m³) is recommended to protect for corrosion and irritation of the skin, eye and respiratory tract in exposed workers.

Discussion and conclusions

n-Butylamine is commonly used as an intermediate for pharmaceuticals, dyes, insecticides, emulsifying and synthetic tanning agents and rubber chemicals.

There are limited data from human and animal studies. Available evidence reports butylamine is a skin, eye and respiratory tract irritant (ACGIH, 2018), with the critical effects of exposure to n-butylamine unclear (ACGIH, 2018; DFG, 2016; HCOTN, 2003). Exposure can result in irritation and necrosis of the skin, corrosion of the skin and eyes, headaches and respiratory tract irritation leading to pulmonary oedema. Exposures at 10 to 25 ppm for more than a few minutes are reported as being unpleasant to intolerable. No symptoms are reported at concentrations below 5 ppm (HCOTN, 2003).

Based on reported effects being immediate and the potential for irreversible damage to the skin and eyes, a TWA is not considered sufficiently protective of workers. It is recommended that a peak limitation of 5 ppm will limit immediate and severe effects.

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	Peak limitation: 5 ppm (15 mg/m³)
ACGIH	2001	TLV -Ceiling: 5 ppm (15 mg/m³)
TLV-Ceiling recommended to minimise the potential for headache and dermal, ocular and respiratory tract irritation. Concentrated liquid is corrosive to skin and eyes. Summary of data: Human data: - Exposure leads to headaches, severe skin and eye burns, respiratory tract irritation leading to pulmonary oedema - Exposure to vapours may result in erythema especially in the facial area - Skin around face and neck may become florid within 3 h of exposure with symptoms including itchy and burning sensation - Exposure ultimately leads to desquamation of the affected areas within 3 d - Concentrations of ≈5 ppm are reported as an irritant. Animal data: - LD₅₀: 0.5 mL/kg (guinea pigs, dermal) - LD₅₀: 372 mg/kg (rats, oral) - Rats exposed at 4,000 ppm died within 2–5 min - Rats exposed at 2,000 ppm died within 4 h - Toxicity symptoms in exposed rats included sedation, ataxia, nasal discharge, gasping and salivation, followed by convulsions and ultimately pulmonary oedema at high doses - Necrosis of guinea pig skin following application in skin irritation tests - Maximum damage was observed on rabbit eyes (grade 9/10-point grade) following exposure. Insufficient data to recommend SEN or carcinogenicity notations. - A Skin notation assigned, based on the dermal LD₅₀ and dermal necrosis follow application in guinea pigs.		
HCOTN	2003	Ceiling: 5 ppm (15 mg/m³)
Summary of additional data: Human data: - Exposure to liquid reported to result in severe skin irritation and deep second-degree burns including blistering - Daily exposure at 15–30 mg/m³ (5–10 ppm) led to headaches and nose, throat and eye irritation - Exposures >2–3 min of 30–75 mg/m³ (10–25 ppm) were reported as unpleasant to intolerable - No symptoms reported for concentrations ≤15 mg/m³ (5 ppm).		



Source	Year set	Standard
Animal data: • RD₅₀: 336 mg/kg (male mice, oral, 15 min) • LC₅₀: 4,200 mg/kg (rat, oral, 4 h) • LC₅₀: 800 mg/kg (mice, oral, 2 h) • Severe damage observed on rabbit eyes (grade 8/10-point grade) following exposure • Negative in <i>in vitro</i> mutation assay in bacteria and <i>in vivo</i> micronucleus test in mice. The current ceiling is an administrative OEL. The toxicological database on n-butylamine is too poor to justify recommendation of a health-based OEL.		
DFG	2016	2 ppm (6.1 mg/m³)
MAK recommended to protect for irritant effects. MAK value applies to <i>n</i>-, <i>sec</i>-, <i>iso</i>- and <i>tert</i>-butylamine. Summary of additional data: Animal data: • NOAEC 17 ppm for inflammation of respiratory epithelium (rats, 14 d) • RD₅₀: 84–246 mL/m³ (mice, oral) • LOAEC boundary estimated as 17 mL/m³ (rats, oral).		
SCOEL	NA	NA
No report.		
OARS/AIHA	NA	NA
No report.		

Secondary source reports relied upon

NIL.

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	—
NICNAS	NA
EU Annex	NA
ECHA	NA



Source	Notations
ACGIH	Skin
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

Calculation

Adverse effects in human case study:	yes
Dermal LD ₅₀ ≤ 1000 mg/kg:	yes
Dermal repeat-dose NOAEL ≤ 200 mg/kg:	
Dermal LD ₅₀ /Inhalation LD ₅₀ < 10:	
<i>In vivo</i> dermal absorption rate > 10%:	
Estimated dermal exposure at WES > 10%:	

a skin notation is warranted

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight:	73.14
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m ³ ; 1 mg/m ³ = Click or tap here to enter text. 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) (2016) *n-butylamine* – MAK value documentation.

Deutsche Forschungsgemeinschaft (DFG) (2016) *n-butylamine*: toxicity, genotoxicity and carcinogenicity, classification in a carcinogen category – MAK value documentation

Health Council of the Netherlands (HCOTN) (2003) *n*-Butylamine: Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000.

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