DIETHYLAMINE

CAS number: 109-89-7

Synonyms: N,N-Diethylamine, N-Ethylethanamine, DEA, DEN, diethamine, ethanamine, amin, diethyl-

Chemical formula: $(C_2H_5)_2NH$

Workplace exposure standard (amended)

TWA: **2 ppm (6.2 mg/m^3)**

STEL: **10 ppm (30 mg/m^3)**

Peak limitation: **—**

Notations: **Sk.**

IDLH: **200 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 2 ppm (6.2 mg/m^3) is recommended to protect for irritation of the nose and chronic upper respiratory conditions in exposed workers.

A STEL of 10 ppm (30 mg/m^3) is recommended to protect for acute irritation of the nose and eyes in exposed workers.

Discussion and conclusions

Diethylamine is commonly used in pharmaceutical products, in resin manufacturing and in pesticides, dyes, in electroplating processes and as a corrosion inhibitor.

Limited toxicological evidence exists in humans and animals. All primary sources base their recommendations for TWA on irritant nasal critical effects. Seven subjects exposed in separate studies at 12 ppm for 60 min and 25 ppm for 15 min noted nasal irritation (ACGIH, 2018). DFG (2016) reported a NOAEC of 4 ppm in mice for atrophy of the olfactory epithelium which was used to derive the recommended MAK.

A TWA of 2 ppm is recommended as assigned by DFG (2016). This TWA is cited to be protective of irritation of the nose and upper respiratory effects. A STEL of 10 ppm is recommended based on acute nasal irritation from short term exposure at 12 ppm.

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. Although there is limited evidence of human studies and

evidence of systemic effects in rats, the irritant effects of skin exposure will minimise risk of chronic absorption.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1986***	***TWA: 10 ppm (30 mg/m^3); STEL: 25 (75 mg/m^3)***
ACGIH	***2013***	***TLV-TWA: 5 ppm (15 mg/m^3); TLV-STEL: 15 ppm (45 mg/m^3)***

TLV-TWA recommended to minimise potential for irritation of the eyes, skin and upper respiratory tract.

Summary of data:

Human data:

- 7 subjects exposed in separate studies at 12 ppm for 60 min and 25 ppm for 15 min noted nasal irritation
- Eye burns and lung irritation associated with accidental exposures to unknown liquid quantities
- No phototoxic response in dermal testing; but found to be corrosive.

Animal data:

- LD_{50}: 820 mg/kg (rabbits, dermal)
- Rats exposed to single inhalation events (unknown duration) of 18 ppm developed nervous and respiratory system changes
- Not mutagenic in *Salmonella* assays
- No evidence of carcinogenicity.

DFG	***2016***	***MAK: 2 ppm (6.1 mg/m^3)***

MAK recommended to minimise nasal irritation (critical effect).

Summary of additional data:

MAK based on extrapolation of effects from animal to humans (1:2) – mice noted to be more sensitive than rats at same concentrations.

Not classified as carcinogenic or mutagenic.

No data for sensitisation effects of skin or respiratory system.

Human data:

- LOAEC: 10 ppm with nasal irritation identified
- Skin absorption estimated at 128 mg (2,000 cm^2) non-irritating concentrations (0.5%).

Animal data:

- Irritation of the nasal epithelium (rats and mice) identified as the critical effect
- $BMDL_{05}$ NAEC: 4 ppm (mice, 3 mo); atrophy of the olfactory epithelium; rats considered less sensitive than mice at same concentration
- NOAEC systemic effects (spermatotoxicity, rats) noted at 16 ppm
- MAK derived from NAEC of 4 ppm divided by 2 to extrapolate from animals to humans.

SCOEL	***2002***	***TWA: 5 ppm (15 mg/m^3); STEL: 10 ppm (30 mg/m^3)***

TWA recommended to minimise potential of upper respiratory tract irritation. STEL recommended to minimise nose and eye irritation.

Source	Year set	Standard
Summary of additional data: Unclear potential for skin absorption, but evidence of local irritation and inflammation. Human data: • Symptoms of eye and nose irritation observed at 12 ppm (36 mg/m^3; same study as ACGIH (2018) Animal data: • LOAEL determined as 75 mg/m^3 (rats, inhalation) with bronchial lymphoid hyperplasia observed.		
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?	No

The chemical is not a non-threshold based genotoxic carcinogen.

Notations

Source	Notations
SWA	NA
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Carcinogenicity – A4, Skin
DFG	H (skin)
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		
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:		
In vivo 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 = 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) (2016) Diethylamine – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (2002) Recommendation from the Scientific Committee on Occupational Exposure Limits for diethylamine. SCOEL/SUM/91.

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