

## DIMETHYLAMINE

**CAS number:** 124-40-3

**Synonyms:** DMA, N-methylmethamine, methanamine, N-methyl-

**Chemical formula:**  $C_2H_7N$

**Structural formula:** —

### Workplace exposure standard (amended)

**TWA:** 2 ppm (3.8 mg/m<sup>3</sup>)

**STEL:** —

**Peak limitation:** —

**Notations:** —

**IDLH:** 500 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 (3.8 mg/m<sup>3</sup>) is recommended to protect for irritation of the eyes, nose and upper airways in exposed workers.

The previous STEL of 6 ppm (11 mg/m<sup>3</sup>) is recommended to be withdrawn as there is a lack of evidence for immediate acute toxicity within ten times of the recommended TWA.

### Discussion and conclusions

Dimethylamine is used as an accelerator in vulcanising rubber, tanning, manufacture of soaps, solvents, pharmaceutical preparations and in textile chemicals. Certain fish, meat, dairy and grains contain dimethylamine.

Critical effects of exposure include irritation of the respiratory and gastrointestinal tract. Very limited toxicological data in humans are available. A NOEC of 10 ppm was reported based on the effects in the respiratory and nasal epithelium in animals in a two-year inhalation study (ACGIH, 2018). NICNAS (2015) and SCOEL (1991) considered the NOEC of 10 ppm as a LOAEC. Another study showed rats and mice exposed at 10 ppm for 12 months developed lesions of the nasal epithelium (DFG, 2002).

The current TWA of 2 ppm is recommended to be retained based on the weight of evidence. The recommended TWA is protective for irritation effects reported in animals. No data was identified to support the recommendation of a STEL.

### 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. Sensitisation is reported in animal studies and a review of the classification of skin sensitisation is recommended.

There are insufficient data to recommend a skin notation.

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# APPENDIX

## Primary sources with reports

Source	Year set	Standard
<b>SWA</b>	<b>1991</b>	<b>TWA: 2 ppm (3.8 mg/m<sup>3</sup>); STEL: 6 ppm (11 mg/m<sup>3</sup>)</b>
<b>ACGIH</b>	<b>2014</b>	<b>TLV-TWA: 5 ppm (9.2 mg/m<sup>3</sup>); TLV-STEL: 15 ppm (27.6 mg/m<sup>3</sup>)</b>
<p>TLV-TWA and TLV-STEL recommended to minimise the potential for irritation of the respiratory and GIT.</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>No data presented.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>Irritating and corrosive to eyes and skin of test animals</li> <li>LC<sub>50</sub>: 4,700 ppm (rats, 4 h)</li> <li>10 min RD<sub>50</sub>: 511 ppm (mice); 573 ppm (rats)</li> <li>No fatalities or signs of toxicity at 5 ppm continuous exposure for 90 d (rats, guinea pigs, rabbits, dogs and monkeys); interstitial inflammatory changes noted in lungs of each species</li> <li>NOEC 10 ppm for respiratory irritation in rats and mice; 6 h/d, 5 h/d for 2 yr               <ul style="list-style-type: none"> <li>severe lesions at 175 ppm, moderate at 50 ppm with interstitial inflammatory changes noted in the lungs of each species</li> <li>concentration-dependent toxicity noted</li> </ul> </li> <li>Positive sensitisation response in the guinea pig.</li> </ul> <p>TLV-TWA and TLV-STEL based on reported NOEC of 10 ppm in rats; no derivation provided</p> <p>Insufficient data to recommend respiratory sensitisation or skin notation.</p> <p>Unpleasant odour at TLV-TWA level.</p>		
<b>DFG</b>	<b>1993</b>	<b>MAK: 2 ppm (4 mg/m<sup>3</sup>)</b>
<p>MAK recommended to protect for mucosal damage in workers</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>Highly caustic and can produce 'chemical burns' to skin; potential eye damage from vapour</li> <li>One inadequate inhalation study identified; unspecific methodology; experimental data and parameters missing.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>LC<sub>50</sub>: 4,700 ppm (rats, 4 h); 1 h exposure resulted in laboured breathing, restlessness or apathy and convulsions; marked signs of irritation of the exposed mucous membranes of the mouth, nose and eyes</li> <li>Continuous inhalation exposure of 15 rats, 15 guinea pigs, 3 rabbits, 2 dogs and 3 monkeys to 5 ppm (9 mg/m<sup>3</sup>) for 90 d; no symptoms of toxicity identified</li> <li>No exposure-related lesions in rats exposed to 10, 30 or 100 ppm for 6 h/d, 5 d/wk for 90 d</li> <li>Rats and mice exposed to 10 ppm 6 h/d, 5 d/wk for 12 mo developed lesions of the nasal epithelium</li> <li>No increase in the incidence of neoplasms identified in a 2 yr inhalation carcinogenicity study in mice</li> <li>MAK of 2 ppm based on nasal lesions in animals at 10 ppm; no derivation details provided.</li> </ul>		

Source	Year set	Standard
<b>SCOEL</b>	<b>1991</b>	<b>8-hour TWA: 2 ppm (3.8 mg/m<sup>3</sup>); STEL: 5 ppm (9.4 mg/m<sup>3</sup>)</b>
Summary of additional data:		
<ul style="list-style-type: none"> <li>Considered 10 ppm NOEL (reported in ACGIH, 2018) as an LOAEC; applied UF of 5 to derive TWA</li> <li>No information on derivation of STEL.</li> </ul>		
<b>OARS/AIHA</b>	<b>NA</b>	<b>NA</b>
No report.		
<b>HCOTN</b>	<b>NA</b>	<b>NA</b>
No report.		

## Secondary source reports relied upon

Source	Year	Additional information
NICNAS	✓ 2015	<ul style="list-style-type: none"> <li>Dermal LD<sub>50</sub>: 3,900 mg/kg (species not identified)</li> <li>LOAEC of 10 ppm for local effects based on respiratory and nasal epithelia in animals</li> <li>NOAEC of 50 ppm for systemic effects based on reduced bw gain and changes in clinical chemistry and haematology in animals.</li> </ul>

## 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	DSEN, Carcinogenicity – A4
DFG	H (skin)
SCOEL	—
HCOTN	NA
IARC	NA

Source	Notations
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: no
Dermal LD <sub>50</sub> ≤ 1000 mg/kg: no
Dermal repeat-dose NOAEL ≤ 200 mg/kg:
Dermal LD <sub>50</sub> /Inhalation LD <sub>50</sub> < 10:
<i>In vivo</i> dermal absorption rate > 10%:
Estimated dermal exposure at WES > 10%:
<b>a skin notation is not warranted</b>

## IDLH

Is there a suitable IDLH value available? Yes

## Additional information

Molecular weight:	45.08
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 1.84 mg/m <sup>3</sup> ; 1 mg/m <sup>3</sup> = 0.54 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 7<sup>th</sup> 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) (1993) Dimethylamine – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (1991) Recommendation from the Scientific Committee on Occupational Exposure Limits for Dimethylamine. SCOEL/SUM/11B.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2015) Methanamine, N-Methyl-: Human health tier II assessment – IMAP report.

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

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