

# METHYL MERCAPTAN

**CAS number:** 74-93-1

**Synonyms:** Mercaptomethane, methanethiol, methyl sulfhydrylate, thiomethyl alcohol, thiomethanol

**Chemical formula:** CH<sub>4</sub>S

**Structural formula:** —

## Workplace exposure standard (retained)

**TWA:** 0.5 ppm (0.98 mg/m<sup>3</sup>)

**STEL:** —

**Peak limitation:** —

**Notations:** —

**IDLH:** 150 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 0.5 ppm (0.98 mg/m<sup>3</sup>) is recommended to protect for respiratory tract irritation, central nervous system (CNS) effects and other systemic effects in exposed workers.

## Discussion and conclusions

Methyl mercaptan is used as an intermediate in pesticides, fungicides and jet fuel production and in the synthesis of methionine and plastics.

Critical effects of exposure are respiratory tract irritation, CNS effects and other systemic effects. Limited data are available in humans. Exposure is reported to produce eye and respiratory tract irritation, dizziness, staggered gait, nausea and vomiting in humans. A NOAEC of 17 ppm is reported in rats in a three month inhalation study for liver effects and body weight changes (ACGIH, 2018; HCOTN, 2000). The DFG (2003) report a LOAEL of 2 ppm for behavioural effects from the same study.

The TWA of 0.5 ppm is consistent across primary sources and on the weight of evidence presented, is expected to be protective of effects on the CNS and irritation.

## 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.

## APPENDIX

### Primary sources with reports

Source	Year set	Standard
<b>SWA</b>	<b>1991</b>	<b>TWA: 0.5 ppm (0.98 mg/m<sup>3</sup>)</b>
<b>ACGIH</b>	<b>2004</b>	<b>TLV-TWA: 0.5 ppm (1.0 mg/m<sup>3</sup>)</b>
<p>TLV-TWA recommended to protect for adverse liver and systemic effects.</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>Potent ocular and dermal irritant in workers</li> <li>Exposure reported to produce eye and respiratory tract irritation, dizziness, staggered gait, nausea and vomiting, pulmonary oedema and liver and renal damage; exposure conditions not specified.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>Rats exposed at 1,400 ppm for 15 min; lethargic or lapsed into a reversible coma</li> <li>An acute inhalation exposure study in female rats reported: <ul style="list-style-type: none"> <li>no effects at 500 ppm for 30–35 min</li> <li>lethargy at 700 ppm and recovery after termination of exposure</li> <li>righting reflex abolished at 1,500 ppm</li> <li>CNS depression, paralysis of locomotor muscles and mucous membrane irritation after exposure at 10,000 ppm for 1 min; death occurred within 14 min.</li> </ul> </li> <li>Rats exposed at 7 h/d, 5 d/wk, 3 mo at either 0, 2, 17 and 57 ppm indicated; <ul style="list-style-type: none"> <li>body weight reduction, equivocal hepatotoxicity at 57 ppm</li> <li>no histopathological differences relative to controls</li> <li>NOEL of 17 ppm; minimal liver effects</li> </ul> </li> <li>Subchronic inhalation study with exposure at 300 ppm (2 h/d, 3 times/wk, 2 mo) reported; <ul style="list-style-type: none"> <li>6 mice fatalities following 15 exposures</li> <li>fatal to remaining population of mice following 25 exposures.</li> </ul> </li> </ul> <p>Insufficient data to assign Skin, SEN or carcinogenicity notations or to recommend a TLV-STEL.</p>		
<b>DFG</b>	<b>2003</b>	<b>MAK: 0.5 ppm (1 mg/m<sup>3</sup>)</b>
<p>MAK recommended to protect for CNS effects and possible irritation of the mucous membranes.</p> <p>Summary of additional data:</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>Odour threshold between 0.0005 and 0.0820 mg/m<sup>3</sup></li> <li>Various worker incidents reported: <ul style="list-style-type: none"> <li>3 workers exposed at high levels (estimated at hundreds of ppm, along with dimethyl sulfide) for 30, 10 and 3–4 min (respectively) resulted in symptoms consistent with methyl mercaptan, namely drowsiness, unconsciousness, apnoea and anoxic convulsions, pulmonary oedema, vomiting and liver function disorders</li> <li>fatality (respiratory arrest and heart failure after 45 min) of a male (19 yr) following a high exposure dose (possibly &gt;10,000 ppm) for a few minutes</li> </ul> </li> </ul>		

Source	Year set	Standard
<ul style="list-style-type: none"> <li>○ pulmonary embolism (4 wk after exposure) of a male (53 yr) concentration not specified, however exposure was inside a tank for 1 h</li> <li>• Hepatic encephalopathy development from impaired liver function following increased blood concentrations is uncertain.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>• LC<sub>50</sub>: 1,664 ppm (mice, 4-h) and 675 ppm (rats).</li> </ul> <p>LOAEL of 2 ppm for behavioural changes in rats; 3 mo study (cited by ACGIH, 2018); basis for MAK; no derivation.</p>		
<b>SCOEL</b>	<b>NA</b>	<b>NA</b>
No report.		
<b>OARS/AIHA</b>	<b>NA</b>	<b>NA</b>
No report.		
<b>HCOTN</b>	<b>2000</b>	<b>TWA: 0.5 ppm (1 mg/m<sup>3</sup>)</b>
TWA recommended to protect for respiratory irritation effects and systemic effects; administrative OEL.		
Summary of additional data:		
<ul style="list-style-type: none"> <li>• NOAEL of 17 ppm (34 mg/m<sup>3</sup>) in rats for concentration-related decrease of body weight; 3 mo study (cited by ACGIH, 2018); justification for TWA; no additional information</li> <li>• No data on irritation in humans and animals.</li> </ul>		

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



Source	Notations
DFG	NA
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

Insufficient data to assign a skin notation.

## IDLH

Is there a suitable IDLH value available? Yes

## Additional information

Molecular weight:	48.11
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m <sup>3</sup> ; 1 mg/m <sup>3</sup> = 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
<a href="#">Click here to enter year</a>	

## 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) (2003) Methyl mercaptan – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2000) Methanethiol. Health-based reassessment of administrative occupational exposure limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/008.

Tenth Adaptation to Technical Progress Commission Regulation (EU Annex) No 2017/776 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (the CLP Regulation).

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

DRAFT