

METHYLCYCLOHEXANE

CAS number: 108-87-2

Synonyms: Cyclohexylmethane, hexahydrotoluene

Chemical formula: C₇H₁₄

Structural formula: —

Workplace exposure standard (amended)

TWA: 200 ppm (810 mg/m³)

STEL: —

Peak limitation: —

Notations: —

IDLH: 1,200 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 200 ppm (810 mg/m³) is recommended to protect for liver and kidney effects in exposed workers.

Discussion and conclusions

Methylcyclohexane is used in organic synthesis and as a solvent for cellulose ethers and is one of the components of jet fuel.

Critical effects relating to exposure are adverse kidney effects and possibly effects on the liver and irritation.

No human toxicological data are available. A NOEC of 400 ppm is reported for kidney effects in male rats from a 12-month inhalation study (DFG, 2000; HCOTN, 2001). Using this same study, DFG (2000) and HCOTN (2001) derived different occupational limits. Daily inhalation exposure of monkeys at 370 ppm for 50 days did not result in adverse health effects (ACGIH, 2018). Based on an inhalation study in rabbits with intermittent exposure for ten weeks, US EPA (2013) calculated a human equivalent NOAEC of approximately 204 ppm. Given the evidence originates solely from animals, the current TWA of 400 ppm may not be protective of liver and kidney effects in humans.

Based on the NOEC of 400 ppm in male rats and considering an appropriate margin of safety, the TWA of 200 ppm (810 mg/m³) is recommended as derived by DFG (2000). This concentration is supported by the NOAEC of 204 ppm reported by the USEPA (2013). The recommended TWA is expected to protect for effects on the kidneys and other organs.

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.

DRAFT

APPENDIX

Primary sources with reports

| Source | Year set | Standard |
|--|-------------|--|
| SWA | 1991 | TWA: 400 ppm (1,610 mg/m³) |
| ACGIH | 2001 | TLV-TWA: 400 ppm (1,610 mg/m³) |
| <p>TLV-TWA recommended to minimise the potential for irritation, narcosis and the possibility for liver, kidney or vascular injury.</p> <p>Summary of data:</p> <ul style="list-style-type: none"> No human data presented. No specific derivation is provided but TLV-TWA recommendation is based on evidence in monkeys and in analogy with the comparable acute toxicity of heptane (TLV-TWA, 400 ppm (1,640 mg/m³)). <p>Animal data:</p> <ul style="list-style-type: none"> Prostration in white mice induced following exposure at 7,500–10,000 ppm for 2 h Daily inhalation exposure of monkeys at 370 ppm, 6 h/d for 50 d did not result in adverse health effects; no further exposure data or information provided Slight cellular injury was observed in the liver and kidneys of rabbits exposed via inhalation at 2,880 ppm for 90 h; no signs of intoxication noted Exposure of rabbits 6 h/d for a total of 10 d at 10,000 ppm resulted in convulsions, narcosis and death Vascular, renal and hepatic degeneration have been reported after high, repeated inhalation exposures in animals; no further information is provided. <p>Insufficient data to recommend a skin sensitiser or carcinogen notation or TLV-STEL.</p> | | |
| DFG | 2000 | MAK: 200 ppm (810 mg/m³) |
| <p>MAK recommended to protect for renal toxicity as identified in animals.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> Human data not available NOEC of 400 ppm for kidney effects in male rats; female rats NOEC of 2,000 ppm; inhalation exposure 6 h/d, 5 d/wk for 12 mo; basis for MAK Not irritating to eye of rabbit in Draize test for 1 h. Starting with the NOEC of 400 ppm for kidney effects in rats and applying a factor of 2 for interspecies variation results in a MAK of 200 ppm. | | |
| SCOEL | NA | NA |
| No report. | | |
| OARS/AIHA | NA | NA |
| No report. | | |



| Source | Year set | Standard |
|---|----------|--------------------------------------|
| HCOTN | 2005 | TWA: 48 ppm (200 mg/m ³) |
| TWA recommended to protect for effects in the kidney as identified in animals. Summary of additional data: | | |
| <ul style="list-style-type: none"> TWA based on NOEC of 400 ppm (1,636 mg/m³) (cited by DFG, 2000) as starting point; overall factor of 9 to account for intraspecies variation and confidence in the database. | | |

Secondary source reports relied upon

| Source | Year | Additional information |
|--------|--------|---|
| US EPA | ✓ 2013 | <ul style="list-style-type: none"> Human equivalent NOAEL of 816 mg/m³ (≈204 ppm) based on the NOAEL of 4,570 mg/m³ (highest concentration) in rabbits exposed intermittently via inhalation for 10 wk; effects not presented. |

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 | NA |
| ECHA | NA |
| ACGIH | — |
| 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

Insufficient data to assign a skin notation

IDLH

Is there a suitable IDLH value available? Yes, based on LEL

Additional information

| | |
|---|--|
| Molecular weight: | 98.19 |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 4.01 mg/m ³ ; 1 mg/m ³ = 0.250 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) (2007) Methylcyclohexan – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2005) Methylcyclohexane. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/154.

US Environmental Protection Agency (US EPA) (2013) Provisional Peer-Reviewed Toxicity Values for Methylcyclohexane.

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