# Dichlorofluoromethane

| CAS number: | 75-43-4 |
| --- | --- |
| Synonyms: | Fluorocarbon 21 (Freon 21), fluorodichloromethane |
| Chemical formula: | CHCl2F |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **0.5 ppm (2 mg/m3)** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | — |
| IDLH: | **5,000 ppm** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

An interim TWA of 0.5 ppm (2 mg/m3) is recommended to protect for cardiac arrhythmia and hepatotoxicity in exposed workers.

Given the limited data available from the primary sources, it is recommended that a review of additional sources be conducted at the next scheduled review.

## Discussion and conclusions

Dichlorofluoromethane is commonly used as a propellant, refrigerant, heat exchange fluid and solvent.

Although the acute inhalation toxicity is low, the ACGIH (2018) and DFG (1983) both set a TLV-TWA and MAK, respectively, at 10 ppm by analogy to Chloroform to protect against hepatotoxicity in exposed workers. In a 13-week chloroform inhalation exposure study in rats and mice produced a NOAEC of 5 ppm for increase in cell proliferation in the liver and kidney (ACGIH, 2018). Applying an uncertainty factor of 10 an interim TWA of 0.5 ppm (2 mg/m3) is derived and is considered sufficiently low to minimise the potential for cardiac arrhythmia and hepatotoxicity in exposed workers.

Further assessment is recommended to identify any relevant toxicological data in the literature at the next review. In line with the established evaluation methodology, the current TWA should be retained. However, a TWA of 2 ppm (10 mg/m3) is recommended for chloroform (trichloromethane) following review.

## 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 not recommended as there is no indication of systemic effects resulting from skin absorption.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 10 ppm (42 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 10 ppm (42 mg/m3) |
| TLV-TWA recommended to minimise the risk of cardiac arrhythmia and hepatotoxicity in exposed workers.  Summary of data:  Animal data:   * LC50: 49,900 ppm (rats, 4 h) * 2/12 dogs exposed to 10,000 ppm combined with intravenous epinephrine exhibited serious arrhythmia * Exposure to 10,000 ppm (rats, 6 h/d, 5 d/wk) for 2 wk resulted in centrilobular necrosis, livers were pale and heavy * Pregnant rats were exposed to 10,000 ppm (6 h exposure on gestation days 6–15) resulting in pre-implantation loss.   Insufficient data to recommend a carcinogen, skin or sensitisation notation. |
| DFG 1983 MAK: 10 ppm (43 mg/m3) |
| The MAK was reduced because of evidence that the mechanism of action especially with respect to its hepatotoxicity is more like that of trichloromethane (chloroform).  Summary of additional data:   * Exposure to 25,000 ppm over a short period by various species resulted in arrhythmia both directly and via sensitisation of the heart to adrenaline, tachycardia, myocardial insufficiency and hypotonicity * Exposure to 250,000 ppm (guinea pig, dermal) caused mild irritation * Pregnant rats exposed to 1.5 mg/m3 or 300 mg/m3 resulted in reduced levels of nucleic acids (DNA and RNA) in liver, brain, ovaries and placenta * NOEL: 50 ppm (rats, 90 d, inhalation) * Negative results in mutagenicity assays * In alveolar macrophages from rabbits treated *in vitro* the membrane fluidity is increased and the adsorption behaviour altered.   Chloroform (2000):   * NOEL: 5 ppm (rats, mice, 13 wk, inhalation), increase in cell proliferation in the liver and kidney. |
| SCOEL NA NA |
| No report. |
| 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? | Insufficient data |
| --- | --- |
| Is the chemical carcinogenic with a mutagenic mechanism of action? | Insufficient data |
| **Insufficient data are available to determine if the chemical is a non-threshold based genotoxic carcinogen.** | |

## Notations

| Source | Notations |
| --- | --- |
| SWA | — |
| HCIS | — |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | — |
| DFG | Carcinogenicity – 2 |
| 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: | no |  |  | | Dermal LD50 ≤1000 mg/kg: | no |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  |  | **a skin notation is not warranted** | |

### IDLH

| Is there a suitable IDLH value available? | Yes |
| --- | --- |

## Additional information

| Molecular weight: | 102.92 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 4.21 mg/m3; 1 mg/m3 = 0.237 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*](http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2001) Dichlorofluoromethane – MAK value documentation.

Deutsche Forschungsgemeinschaft (DFG) (2000) Chloroform – MAK value documentation.