# 1,1,1,2-Tetrachloro-2,2-difluoroethane

| CAS number: | 76-11-9 |
| --- | --- |
| Synonyms: | FC-112a, CFC-112a,  1,2-difluoro-1,2,2,2-tetrachloroethane,  halocarbon 112a, refrigerant 112a |
| Chemical formula: | C2Cl4F2 |

Workplace exposure standard (interim)

| TWA: | **500 ppm (4,170 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **2,000 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 500 ppm (4,170 mg/m3) is recommended to protect for central nervous system (CNS) effects and liver and kidney damage 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

1,1,1,2-Tetrachloro-2,2-difluoroethane is used primarily as a refrigerant, blowing agent, solvent and corrosion inhibitor.

The critical effects of exposure are CNS liver and kidney damage.

Limited data are available. No adverse effects reported in a 17‑day inhalation study in rats at 1,000 ppm (ACGIH 2018). Slight narcotic effects, hepatocyte degradation and cloudy swelling in the kidneys reported in an acute inhalation study in rats at 5,000 ppm (ACGIH 2018).

In the absence of sufficient human data, the TWA of 500 ppm is recommended to be retained in the interim. This value is protective of the critical effects based on NOAEC of 1,000 ppm and slight, acute effects observed at 5,000 ppm. In view of the limitations of the available data, further assessment of additional sources is recommended during subsequent reviews.

## 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 based on the available evidence.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 500 ppm (4,170 mg/m3) | |
|  |
| ACGIH 2008 TLV-TWA: 100 ppm (834 mg/m3) |
| TLV-TWA recommended to minimise the risk of CNS effects, liver and kidney damage.  Summary of data:  TLV assigned based on effects observed at 5,000 ppm in rats and the sub-chronic NOAEC of 1,000 ppm (specifics on derivation not provided).  Human data:   * Aerosol spray containing fluorocarbon propellant are a source of solvent intoxication: * symptoms due to prolonged exposure include cardiac arrhythmia, bone marrow depression, cerebral degradation and damage to liver, kidneys and peripheral nerves * deaths attributed to inhalation abuse *via* cardiac arrhythmia.   Animal data:   * LD50: >25,000 mg/kg (rats, oral) * No fatalities at 11,500 mg/kg (rabbits, dermal) * LC50: 15,000 ppm (mice, 2 h) * Exposure at 5,000 and 10,000 ppm (rats, 7 h, inhalation) resulted in slight narcotic effects, hepatocyte degradation and cloudy swelling in the kidneys * No effects were observed at 1,000 ppm (rats, 18 h/d, 17 d, inhalation).   Insufficient data to recommend a sensitiser or carcinogen notation. A skin notation is not warranted. |
| DFG 2006 MAK: 200 ppm (1692 mg/m3) |
| The MAK is assigned in analogy to the symmetrical isomer 1,1,2,2-tetrachloro-1,2-difluoroethane. |
| 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 | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | — |
| DFG | — |
| 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: | 203.8 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 8.30 mg/m3; 1 mg/m3 = 0.120 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) (2007) 1,1,1,2-Tetrachlor-2,2- difluorethan – MAK value documentation.

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – 1,1,1,2-Tetrachloro-2,2-difluoroethane.