# Dichlorotetrafluoroethane

| CAS number: | 76-14-2 |
| --- | --- |
| Synonyms: | CFC-114, cryofluorane, fluorocarbon 114 (freon 114), R-114, tetrafluoro dichloroethane |
| Chemical formula: | C2Cl2F4 |
| Structural formula: | ClF2C–CClF2 |

Workplace exposure standard (retained)

| TWA: | **1,000 ppm (6,990 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **15,000 ppm** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

The current TWA of 1,000 ppm (6,990 mg/m3) is recommended to to protect for narcosis and asphyxia and potential cardiac sensitisation in exposed workers.

## Discussion and conclusions

Dichlorotetrafluoroethane (CFC-114) was previously used as an aerosol propellant, refrigerant, solvent, fire extinguisher, blowing agent and dielectric fluid. It is an ozone-depleting chlorofluorocarbon. Adverse effects include narcosis, asphyxia and cardiac sensitisation.

Human data are limited in the primary sources. Volunteers exposed to individual CFC-114 and a mixture of CFC-12 and CFC-114 of 16­ to 150 g/m3 reported respiratory effects and changes to heartrate. Rabbits and rats exposed for up to nine months at 10,000 ppm showed no significant clinical, haematologic, or histopathologic change. Dogs exposed to between 142,000 and 150,000 ppm for eight hours, twenty-one times, showed blood changes and symptoms ranging from incoordination to occasional convulsions. No reported symptoms in dogs, cats, guinea pigs and rats exposed at 100,000 ppm for 3.5 hours a day for twenty days (ACGIH, 2018).

It is recommended that the current TWA of 1,000 ppm adopted from ACGIH (2018) is retained. This TWA provides a suitable margin of safety to reduce the potential for systemic toxicity and cardiac sensitisation potential in exposed workers.

## 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 warranted based on the available evidence.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 1,000 ppm (6,990 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 1,000 ppm (6,990 mg/m3) |
| TLV-TWA recommended to minimise the potential for reduction of ventilatory lung capacity, arrhythmia/cardiac sensitisation and at extremely high concentrations, narcosis and asphyxia.  Summary of data:  Human data:   * Inhalation exposure of between 16–150 g/m3 to CFC-114 and a mixture of CFC-12 and CFC-114 on 10 subjects for 15, 45, or 60 sec caused significant acute reduction of ventilatory lung capacity, bradycardia and increased variability in heart rate and atrioventricular block; mixtures considered to exert stronger respiratory effects.   Animal data   * Considered a moderate cardiac sensitiser * Exposure at 8,000–47,000 ppm (guinea pigs, 2 h) caused irregular breathing but ‘no toxic action’ * Exposure at 10,000 ppm (mice, 24 h) caused lung haemorrhage but no clinical effects * Based on circulatory/respiratory effects at concentrations >25,000 ppm CFC-114 is classed as an intermediate aerosol propellant in acute toxicity and acts as a bronchoconstrictor * Repeated spraying on skin (rat) and mucous membrane (rabbit eyes) caused local inflammation * Exposures over 21, 8 h shifts at 142,000–150,000 ppm (dogs) caused slight blood changes and neurological symptoms ranging from incoordination to occasional convulsions * Exposure at 200,000 ppm, (2.5 h/d, 5 d/wk over 2 wk) caused a decreased growth rate and some pulmonary and haematologic effects * Rats and rabbits exposed at 10,000 ppm, (2 h/d, 5 d/wk, 8-9 mo) no significant clinical, haematologic, or histopathologic change * Exposure at 100,000 ppm (20 x 3.5 h, over 4 wk) did not report affect dogs, cats, guinea pigs and rats.   Insufficient data available to recommend Skin or SEN notations or a TLV–STEL. |
| DFG 2014 MAK: 1,000 ppm (7,100 mg/m3) |
| No report. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| US NIOSH |  | 2014 | * The revised IDLH of 15,000 ppm based on acute inhalation toxicity data in animals. * 1 h EEGL: 10,000 ppm * 24 h EEGL: 1,000 ppm * Animal data: * LC50: 72,000ppm (rat, 30 min) * LC50: 70,000ppm (mouse, 30 min) * LC50: 75,000ppm (rabbit, 30 min). |

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | Insufficient data |
| --- | --- |
| Is the chemical carcinogenic with a mutagenic mechanism of action? | No |
| **The chemical is not a non-threshold based genotoxic carcinogen.** |  |

## Notations

| Source | Notations |
| --- | --- |
| SWA | — |
| HCIS | — |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | Not classified as carcinogen – A4 |
| 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: | 170.92 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = Number mg/m3; 1 mg/m3 = Number 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®) (2001) 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.

US National Institute for Occupational Safety and Health (NIOSH) (2001) Immediately dangerous to life or health concentrations – Dichlorotetrafluoroethane.