# dichloroacetylene

| CAS number: | 7572-29-4 |
| --- | --- |
| Synonyms: | DCA, Dichloroethyne |
| Chemical formula: | C2Cl2 |

Workplace exposure standard (retained)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **0.1 ppm (0.39 mg/m3)** |
| Notations: | **Carc. 2** |
| IDLH: | **—** |
| **Sampling and analysis**: The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A peak limitation of 0.1 ppm (0.39 mg/m3) is recommended to protect for extreme nausea, systemic effects including neurotoxicity and possible risk of cancer in exposed workers.

## Discussion and conclusions

Dichloroacetylene (DCA) is not commercially available in large quantities but can be a generated as a by-product of various processes.

Available human data is limited to observations of poisoning in industrial settings, leading to headaches, loss of appetite, extreme nausea and vomiting (ACGIH, 2018). Animal studies show doses as low as 2 ppm resulted in lower survival times, reduced body weight gain and kidney tumours in mice. Slightly higher concentrations resulted in increased incidences of adenocarcinomas of the kidney and liver tumours in rats. Despite evidence from appropriate animal studies suggesting possible carcinogenic effects, DCA’s genotoxicity has not been sufficiently investigated in humans (HCOTN, 2002).

Disabling nausea was experienced by 85 per cent of individuals exposed for prolonged periods at 0.5 to 1.0 ppm. ACGIH recommended a TLV-Ceiling of 0.1 ppm to protect for nausea and the possibility of more serious systemic effects.

Given the limited toxicological data, a peak limitation of 0.1 ppm is recommended. The recommended peak limitation is also protective for long term effects in the kidneys and liver reported in animals.

## Recommendation for notations

Classified as a category 2 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 |
| --- |
| SWA 1995 Peak limitation: 0.1 ppm (0.39 mg/m3) | |
|  |
| ACGIH 2001 TLV-Ceiling: 0.1 ppm (0.39 mg/m3) |
| TLV-Ceiling recommended to minimise the potential for nausea and more serious systemic effects.  Summary of data:  An A3, confirmed animal carcinogen with unknown relevance to humans; DCA is considered the most toxic and carcinogenic of all chlorinated aliphatic hydrocarbons.  Insufficient data available to recommend Skin or SEN notations.  Human data:   * Toxicity observed following anaesthesia with trichloroethylene (thermal decomposition leads to DCA) * Signs and symptoms of elevated exposure include headache, loss of appetite, extreme nausea and vomiting * Effects of DCA detected in nuclear submarines and space craft crews: * symptoms included loss of appetite, extreme nausea, vomiting, itchy eyes, sore gums, intense jaw pain, headaches and welts on face and mouth * disabling nausea experienced by 85% of individuals exposed for prolonged periods at 0.5–1.0 ppm * Poisoning of 2 workers reported after cleaning a tank containing vinylidene chloride copolymers; the workers experienced polyneuritis of the cranial nerves, amongst other nerve and muscle impairments * Research suggests that DCA is often the cause of poisonings attributed to vinylidene chloride.   Animal data:   * LC50: 124 ppm (mice, 1 h); 19 ppm (mice, 6 h): * deaths attributed to acute renal failure due to necrosis of the kidney tubules in the corticomedullary area. * drain impairments consistent with neurotoxic symptoms observed in humans after DCA intoxication evident * Rats subjected to DCA-TCE mixtures at 2.8, 9.8 and 15.5 ppm for 6 h/d, 5 d/wk for 6 wk: * a continuous 90 d exposure at 2.8 ppm was also conducted * rats in all exposure scenarios experienced a slower rate (than controls) of weight gain/loss and pronounced morphological changes in the kidneys * rats in the 2.8 ppm continuous exposure scenario showed neurological involvement with blindness and hind leg weakness * Multiple studies designed to understand the carcinogenicity: * Mice and rats exposed by inhalation at 2–14 ppm for 6 h/d, 1–2 d/wk, for 12–18 mo, were reported to have increased incidences of adenocarcinomas and cystadenomas of the kidneys and cholangiomas of the liver. |
| DFG 1993 Not assigned |
| No additional information. |
| SCOEL NA NA |
| No Report. |
| OARS/AIHA NA NA |
| No Report. |
| HCOTN 2002 Not assigned |
| Summary of additional data:   * A human carcinogenic evaluation carried out reviewed multiple animal studies (as per ACGIH) and several IARC evaluations * The evaluation concluded that DCA has been insufficiently investigated and whilst the data does not warrant a classification as “carcinogenic to humans”, there remains cause for concern * Recommended classification as a suspected carcinogen to humans. |

### 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 | Carc. 2 |
| HCIS | Carcinogenicity – category 2 |
| NICNAS | NA |
| EU Annex | Carcinogenicity – category 2 |
| ECHA | NA |
| ACGIH | Carcinogenicity – A3 |
| DFG | Carcinogenicity – 2 |
| SCOEL | NA |
| HCOTN | Carcinogenicity – category 3 |
| IARC | Carcinogenicity – Group 3 |
| 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

| Insufficient data to warrant a skin notation. |
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### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 94.93 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 3.88 mg/m3; 1 mg/m3 = 0.26 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 |
| --- | --- |
| 1995 | TWA: 0.1 ppm (0.39 mg/m3) |

## 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) (1993) Dichloroacetylene – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2002) Dichloroacetylene. Evaluation of the carcinogenicity and genotoxicity. The Hague: Health Council of the Netherlands; publication no. 2002/04OSH.

International Agency for Research on Cancer (IARC) (1999). Volume 71, Re-evaluation of some organic chemicals, hydrazine and hydrogen peroxide. IARC Monographs on the evaluation of the carcinogenic risk to humans.

Tenth Adaptation to Technical Progress Commission Regulation (EU) 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).