# 1-Chloro-1-nitropropane

| CAS number: | 600-25-9 |
| --- | --- |
| Synonyms: | Chloronitropropane, korax |
| Chemical formula: | C3H6ClNO2 |
| Structural formula: |  |

Workplace exposure standard (retained)

| TWA: | **2 ppm (10 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **100 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 2 ppm (10 mg/m3) is recommended to protect for acute pulmonary oedema and irritation of the eyes and mucous membranes in exposed workers.

Given the limited chemical-specific data available from the primary sources for repeat-dose toxicity and carcinogenicity, it is recommended that a review of additional sources be conducted at the next scheduled review.

## Discussion and conclusions

1-Chloro-1-nitropropane is typically used as an additive in rubber cement production and historically used as a fungicide.

Toxicological data are limited, and no human exposure data are currently available (ACGIH, 2018; DFG, 1995; HCOTN, 2004). Reported critical effects in animals are irritation of the eyes and respiratory tract and pulmonary oedema. Positive *in vitro* mutagenicity results have not been supported with further mechanistic or *in vivo* studies. Therefore, no conclusions could be made on the carcinogenic potential of the compound (ACGIH, 2018; DFG, 1995).

In the absence of substance specific human exposure data, the TWA is based on acute exposure data in animals and by comparison to the five-fold less toxic analogue, 1-nitropropane (TLV-TWA of 25 ppm, ACGIH, 2018). A TWA of 2 ppm for 1-chloro-1-nitropropane is derived by applying an uncertainty factor of 10 to the TWA-TLV for 1-nitropropane and rounding down.

The current database for the substance is limited and a detailed examination of the additional data sources should be prioritised in 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.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA Year TWA: 2 ppm (10 mg/m3) | |
|  |
| ACGIH 2017 TLV-TWA: 2 ppm (10 mg/m3) |
| TLV-TWA is recommended to protect for pulmonary oedema and irritation of the eyes and mucous membranes.  Summary of data:  TLV-TWA (1981) replaced previous value of 20 ppm.  Derivation of a reliable TLV-TWA hampered due to insufficient chronic/sub-chronic exposure data.  TLV-TWA is derived from analogy to 1-nitropropane (TLV-TWA: 25 ppm), which is ≈5 times less toxic. The recommended TWA is supported by acute inhalation data from an animal study for 1‑chloro-1-nitropropane. Exposure at the TLV-TWA is expected to equate to a daily inhalation intake of 100 mg; lower than the lowest projected human LD50 of 3,500 mg.  Insufficient data to recommend notations for skin absorption, respiratory or dermal sensitisation and carcinogenicity.  Human data:   * Eye irritation reported in volunteers acutely exposed to >100 ppm 1‑nitropropane.   Animal Data:   * 1-chloro-1-nitropropane is most toxic of 4 possible isomers (no further information provided) * LC50: 12,540 ppm (mice, 3 h) * One inhalational study reported:   + rabbits (n=2) died at 393 ppm for 6 h; guinea pigs (n=2) survived this treatment   + rabbits died at mean exposure of 2,574 ppm (unknown duration); guinea pigs survived this treatment   + no deaths in rabbits and guinea pigs at 1,069 ppm (1 h) or 693 ppm (2 h)   + reported effects included eye and mucous membrane irritation, pulmonary oedema, necrosis of the heart, liver and kidneys * LD50: 50–100 mg/kg (rabbits, oral); 5-fold higher toxicity than 1-nitropropane * Slight skin irritation in repeat dermal dose study (rabbits, 5 mL neat, 2/d, 10 d)   + no effects in mice given similar treatment (neat, 5 drops, daily, 10 d) * Positive mutagenicity in bacterial *in vitro* studies both in presence and absence of metabolic activation * No data on ADME * No signs of carcinogenicity or adverse effects to organ tissue and haematological parameters in chronic inhalational study at 101 ppm of 1-nitropropane (rats, 7 h/d, 5 d/wk, 21.5 mo). |
| DFG 1995 MAK: not yet established |
| Summary of additional data:  Previous MAK of 20 ppm (1958) withdrawn due to limited and variable toxicological information.  No human exposure data presented.  Animal data:   * Narcotic effects for 4–5 h in mice at lethal doses * Elaboration of inhalational study presented in ACGIH, 2017   + no animals died when exposed to 3,705 ppm for 0.5 h, 1,053 ppm for 1 h and 682 ppm for 2 h (rabbits and guinea pigs, 2 per species)   + animals died when exposed to 3,510 ppm for 2 h; death from respiratory tract damage   + autopsy showed dose-dependent oedema, emphysema, collapsed and congested areas in lungs; pathological changes noted in brain, heart, kidney and liver * LD50: 510 mg/kg (mice, oral); LD50: 165 mg/kg (mice, subcutaneous injection) * Mutagenic in bacterial *in vitro* studies, but with unknown mutagenic mechanism of action; no other test systems presented, carcinogenic potential can therefore not be deduced. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2004 TWA: 2 ppm (10 mg/m3) |
| Summary of additional information:  Current available data inadequate to recommend a health-based OEL.  Animal data:   * Elaboration of study presented in ACGIH, 2018 and DFG, 1995   + Animals died if exposure duration at a tested concentration was increased or concentration was increased at a tested duration. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| US NIOSH |  | 1994 | IDLH based on acute inhalation toxicity data in animals. |

### 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 | — |
| 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 |
| --- | --- |

## Additional information

| Molecular weight: | 123.5 |
| --- | --- |
| 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®) (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) (1995) 1-Chloro-1-nitropropane – MAK value documentation.

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

Health Council of the Netherlands (HCOTN) (2004) 1-chloro-1-nitropropane. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/115.

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – 1-chloro-1-nitropropane.