# 1,1-Dichloro-1-nitroethane

| CAS number: | 594-72-9 |
| --- | --- |
| Synonyms: | Ethide |
| Chemical formula: | C2H3Cl2NO2 |

Workplace exposure standard (retained)

| TWA: | **2 ppm (12 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **25 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 (12 mg/m3) is recommended to protect for significant irritation of the eyes, skin, mucous membranes and respiratory tract and decrease the risk of bronchitis and pulmonary oedema in exposed workers.

## Discussion and conclusions

1,1-Dichloro-1-nitroethane is used as a fumigant for produce and in organic synthesis.

The critical effects are irritation of the mucous membranes and respiratory tract and potential bronchitis and pulmonary oedema. No relevant human toxicity data is available. No irritation was observed in animals exposed to concentrations up to 25 ppm (ACGIH, 2018). Exposures at concentrations higher than 170 ppm for longer than thirty minutes caused oedema, congestion, haemorrhage and bronchitis in the lungs of rabbits and guinea pigs. Changes in the heart muscles, as well as damage to the kidneys and liver were also reported (ACGIH, 2018).

It is recommended that the current TWA of 2 ppm is retained. In support, the ACGIH (2018) recommend a TLV-TWA of 2 ppm considering this concentration is conservative and significantly less than the reported NOAEL of 25 ppm for pulmonary irritation observed in animals and is considered protective for irritant effects 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.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 2 ppm (12 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 2 ppm (12 mg/m3) |
| TLV-TWA recommended to minimise the potential for significant irritation of the eyes, skin, mucous membranes and respiratory tract from acute exposures to decrease the risk of bronchitis and pulmonary oedema in exposed workers.  This limit is conservative as it is much lower than the NOAEL for pulmonary irritation observed in animals and is protective of workers for irritation and systemic effects.  Insufficient data to recommend Skin, Sen and carcinogenicity notations, or a TLV-STEL.  Summary of data:  Human data:   * No data on human toxicity available.   Animal data:   * LD50: 150–200 mg/kg (rabbits, oral) * A series of inhalation experiments conducted on rabbits and guinea pigs: * exposures ranged from 10 min–204 h with concentrations 25–15,600 ppm * the lowest lethal concentration reported at 52 ppm with animals exposed for 18.75 h * concentrations ≥15,600 ppm resulted in death of all animals within 12 h after 75 min * immediate physiologic effects included closed eyes, sneezing, coughing and increased lacrimal and nasal secretions * longer exposure durations with higher concentrations resulted in excessive bronchial secretion * no irritation or discharges were observed at 25 ppm (NOAEL) * the most prominent gross pathology observed in the lungs of animals exposed at >170 ppm >30 min included haemorrhage and varying degrees of acute bronchitis; changes in the heart muscle and general vascular damage in all organs (including kidneys and liver) also reported * Dermal application on animal skin developed swelling and irritation with no deaths reported. |
| DFG 2000 NA |
| No suitable human studies were available to assess the toxicity, and the available (and limited) experimental animal studies did not yield sufficient information for the establishment of MAK.  No notations assigned. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2004 TWA: 2 ppm (10 mg/m3) |
| Reported mutagenic in *S. typhimurium.*  No additional human or animal data was reported. Additionally, no information regarding reproduction toxicity or genotoxicity (*in vitro* or *in vivo*) available. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| US NIOSH |  | 1994 | * REL of TWA 2 ppm (10 mg/m3) and 10 ppm (60 mg/m3) Ceiling * IDLH of 25 ppm reported, 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 | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | — |
| DFG | — |
| SCOEL | NA |
| HCOTN | — |
| IARC | NA |
| US NIOSH | — |

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 assign a skin notation.

### IDLH

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

## Additional information

| Molecular weight: | 143.95 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 5.89 mg/m3; 1 mg/m3 = 0.170 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) (2000) 1,1-Dichloro-1-nitroethane – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2004) 1,1-Dichloro-1-nitroethane. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/118.

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