# n-Propyl nitrate

| CAS number: | 627-13-4 |
| --- | --- |
| Synonyms: | Nitric acid n-propyl ester |
| Chemical formula: | C3H7NO3 |
| Structural formula: | — |

Workplace exposure standard (amended)

| TWA: | **25 ppm (107 mg/m3)** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | — |
| IDLH: | **500 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 25 ppm (107 mg/m3) is recommended to protect for methaemoglobinaemia and central nervous system (CNS) effects in exposed workers.

The pervious STEL is recommended to be withdrawn as there is a lack of evidence for immediate acute toxicity within ten times of the recommended TWA.

## Discussion and conclusions

*n*-Propyl nitrate is used as ignition catalyst for fuel, in the production of rocket fuels and as an intermediate in organic synthesis.

Critical effects of exposure are CNS effects and methaemoglobinaemia.

The toxicological data are limited. During an inhalation experiment in animals with n-propyl nitrate, one laboratory collaborator complained of a sweet, sickening odour and a feeling of light-headedness. The airborne concentration was estimated at 50 ppm (DFG, 2011). Exposure of three dogs at 260 ppm for 26 weeks resulted in haemoglobinuria, mild anaemia and mild CNS depression during the first two weeks of exposure. The symptoms persisted for two to three weeks (ACGIH, 2018; DFG 2011). From this study, DFG (2011) report a LOAEC of 260 ppm. Rats exposed *via* inhalation at 10,000 ppm for four hours suffered cyanosis, methaemoglobinaemia, and fatalities (ACGIH, 2018).

The SWA TWA of 25 ppm (107 mg/m3) is same as reported by ACGIH and is recommended to be retained. It is cited to minimise the potential for methaemoglobinaemia and effects on the CNS.

STEL is recommended to be withdrawn because of insufficient data to suggest an immediately acute effect at concentrations within ten times the recommended TWA.

## 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: 25 ppm (107 mg/m3); STEL: 40 ppm (172 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 25 ppm (107 mg/m3); TLV-STEL: 40 ppm (172 mg/m3) |
| TLV-TWA and TLV-STEL recommended to minimise the potential for methaemoglobinaemia, cyanosis and hypotension.  Summary of data:  No human data are available. TLV-TWA and TLV-STEL justification is based on animal studies, it is expected that exposures severe enough to induce methaemoglobinaemia in humans are unlikely because lower concentrations produce profound sensory irritation, headache and nausea.  Animal data:   * Inhalation exposure at 10,000 ppm for 4 h by rats produced cyanosis, methaemoglobinaemia and death * Dogs exposed *via* inhalation for 6 h/d, 5 d/wk at 260 ppm; no deaths observed after 6 mo; haemoglobinuria, mild anaemia and slight depression observed during the first 2 wk of exposure * No evidence of systemic toxicity following topical application identified.   Insufficient data to recommend a carcinogenicity, sensitiser or skin notation. |
| DFG 2011 Not assigned |
| Not able to derive MAK due to lack of data.  Summary of additional data:   * Critical effects from exposure are vasodilation, CNS effects and methaemoglobinaemia * Setting of MAK *via* analogy is not possible * During an inhalation experiment in animals, one collaborator complained of a sweet, sickening odour and a feeling of light-headedness, concentration estimated at 50 ppm: * threshold in humans at 50 ppm * Cited by ACGIH (2018); exposure of 3 dogs to 260 ppm for 26 wk initially led to haemoglobinuria, mild anaemia and mild CNS depression; symptoms persisted for 2–3 wk; no deaths; 260 ppm reported as LOAEC. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2004 TWA: 25 ppm (110 mg/m3) |
| Administrative OEL; considers the toxicological database too poor to justify recommendation of a HBROEL.  No additional information. |

### 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 | — |
| NICNAS | — |
| 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 |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

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

## Additional information

| Molecular weight: | 105.09 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 4.29 mg/m3; 1 mg/m3 = 0.233 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) (2011) n-Propylnitrat – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2004) Propyl nitrate. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/127.

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – n-Propyl nitrate.