

---

# **1-Chloro-1-nitropropane**

(CAS No: 600-25-9)

Health-based Reassessment of Administrative Occupational Exposure Limits

---

Committee on Updating of Occupational Exposure Limits,  
a committee of the Health Council of the Netherlands

---

No. 2000/15OSH/115, The Hague, June 8, 2004

---

---

Preferred citation:

Health Council of the Netherlands: Committee on Updating of Occupational Exposure Limits. 1-Chloro-1-nitropropane; Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands, 2004; 2000/15OSH/115.

---

all rights reserved

---

---

## 1 Introduction

The present document contains the assessment of the health hazard of 1-chloro-1-nitropropane by the Committee on Updating of Occupational Exposure Limits, a committee of the Health Council of the Netherlands. The first draft of this document was prepared by MA Maclaine Pont, M.Sc. (Wageningen University and Research Centre, Wageningen, the Netherlands).

In May 1999, literature was searched in the databases Medline, Toxline, and Chemical Abstracts, starting from 1966, 1981, and 1937, respectively, and using the following key words: 1-chloro-1-nitropropane, chloronitropropane, 600-25-9, korax, and lanstan.

In February 2001, the President of the Health Council released a draft of the document for public review. No comments were received.

An additional search in Toxline and Medline in January 2004 did not result in information changing the committee's conclusions.

---

## 2 Identity

name	:	1-chloro-1-nitropropane
synonyms	:	propane, 1-chloro-1-nitro; chloronitropropane; korax; lanstan
molecular formula	:	C <sub>3</sub> H <sub>6</sub> ClNO <sub>2</sub>
structural formula	:	H <sub>3</sub> C-CH <sub>2</sub> -CHClNO <sub>2</sub>
CAS number	:	600-25-9

---

## 3 Physical and chemical properties

molecular weight	:	123.54
boiling point	:	142°C
melting point	:	not available
flash point	:	62°C (closed cup)
vapour pressure	:	at 25°C: 0.8 kPa
solubility in water	:	poorly soluble (at 20°C: 0.6 g/100 mL)
log P <sub>octanol/water</sub>	:	1.13 (estimated)
conversion factors	:	at 20°C, 101.3 kPa: 1 mg/m <sup>3</sup> = 0.19 ppm 1 ppm = 5.15 mg/m <sup>3</sup>

Data from ACG91, <http://esc.syrres.com>.

1-Chloro-1-nitropropane is a colourless liquid with an unpleasant odour. It is combustible when exposed to heat, flame (sparks), and oxidisers. It is moderately

---

explosive when exposed to heat. When heated to decomposition, it emits toxic fumes of Cl<sub>2</sub>, NO<sub>x</sub>, and CO (ACG91).

---

#### **4 Uses**

1-Chloro-1-nitropropane is used as a fungicide (ACG91). According to the on-line database of the Dutch Pesticide Authorisation Board (CTB)\*, 1-chloro-1-nitropropane is at the present not permitted for its use as an active ingredient in pesticides in the Netherlands.

---

#### **5 Biotransformation and kinetics**

The committee did not find data on the biotransformation and kinetics of 1-chloro-1-nitropropane.

---

#### **6 Effects and mechanism of action**

##### Human data

The committee did not find data on effects in humans following (occupational) exposure to 1-chloro-1-nitropropane.

##### Animal data

Application of undiluted 1-chloro-1-nitropropane (in two 5 mL portions with an interval of 30 minutes) on 10 consecutive days to the shaved abdominal skin of rabbits caused slight erythema (Mac45). In mice, no irritation was observed following application of 5 drops of undiluted test substance for 10 days (Gre98).

Irritation of the eyes and nose was observed in rabbits and guinea pigs (n=2/species/group) exposed to high (not specified) concentrations of 1-chloro-1-nitropropane (concentration range: 2000-32,000 mg/m<sup>3</sup>; exposure periods: 30-360 minutes) (Mac45).

In mice, a 3-hour LC<sub>50</sub> of 66,000 mg/m<sup>3</sup> (12,540 ppm) has been reported. In the surviving animals, narcotic effects persisting for 4-5 hours were observed (Gre98). Groups of 2 rabbits and 2 guinea pigs were exposed to concentrations of 1-chloro-1-nitropropane ranging from 2000 to 32,000 mg/m<sup>3</sup> (38-6080 ppm) with exposure periods from 30-360 minutes. All animals survived exposure to

---

\* at: <http://www.ctb-wageningen.nl>.

---

19,000 mg/m<sup>3</sup> (3610 ppm) for 30 minutes, 5400 mg/m<sup>3</sup> (1026 ppm) for 60 minutes, and 3500 mg/m<sup>3</sup> (665 ppm) for 120 minutes. In any experiment in which the duration of exposure in relation to any one of these concentrations was increased, or in any in which the concentration was increased above those levels without a corresponding decrease in length of exposure, at least one animal died. All 4 animals died when exposed to 18,000 mg/m<sup>3</sup> (3420 ppm) for 120 minutes. Lethal exposures resulted mainly in severe respiratory tract damage, characterised by pulmonary oedema and congestion with occasional emphysema and atelectasis. Macroscopic and microscopic changes were also seen in brain, heart, liver, and kidneys (Mac45).

The oral LD<sub>50</sub> in rabbits was between 50 and 100 mg/kg bw (Mac45). In mice, the oral and subcutaneous LD<sub>50</sub> values were 510 and 165 mg/kg bw, respectively (Gre98).

1-Chloro-1-nitropropane induced mutations in *S. typhimurium* strains TA98 and TA100, with and without rat and hamster liver metabolic activation (Zei92).

The committee did not find data from studies on the effects (including carcinogenicity and reproduction toxicity) of 1-chloro-1-nitropropane following repeated exposure and on the mutagenic or genotoxic effects in mammalian cell systems or intact animals.

---

## 7 Existing guidelines

The current administrative occupational exposure limit (MAC) for 1-chloro-1-nitropropane in the Netherlands is 10 mg/m<sup>3</sup>, 8-hour TWA.

Existing occupational exposure limits for 1-chloro-1-nitropropane in some European countries and in the USA are summarised in the annex.

---

## 8 Assessment of health hazard

The committee did not find data on the effects in humans following (occupational) exposure to 1-chloro-1-nitropropane.

The committee did not find data on the biotransformation and kinetics or from studies on the effects (including carcinogenicity and reproduction toxicity) of 1-chloro-1-nitropropane following repeated exposure and on the mutagenic or genotoxic effects in mammalian cell systems or intact animals.

1-Chloro-1-nitropropane was not irritating following (repeated) application to the shaved skin of rabbits. High vapour concentrations caused irritation to the eyes and nose of guinea pigs and rabbits. Exposure to lethal concentrations

---

caused severe respiratory tract damage, characterised by pulmonary oedema and congestion, as well as brain, heart, liver, and kidney injury, in rabbits en guinea pigs.

1-Chloro-1-nitropropane induced mutations in a reversion assay in *S. typhimurium*.

The committee considers the toxicological database on 1-chloro-1-nitropropane too poor to recommend a health-based occupational exposure limit.

The committee concludes that there is insufficient information to comment on the level of the present MAC-value.

---

## References

- ACG91 American Conference of Governmental Industrial Hygienists (ACGIH). 1-Chloro-1-nitropropane. In: Documentation of the threshold limit values and biological exposure indices. 6th ed. Cincinnati OH, USA: ACGIH®, 1991: 295-6.
- ACG03 American Conference of Governmental Industrial Hygienists (ACGIH). Guide to occupational exposure values - 2003. Cincinnati OH, USA: ACGIH®, 2003: 23.
- ACG04 American Conference of Governmental Industrial Hygienists (ACGIH). 2004 TLVs® and BEIs® based on the documentation of the Threshold Limit Values for chemical substances and physical agents & Biological Exposure Indices. Cincinnati OH, USA: ACGIH®, 2004: 19.
- Arb02 Arbejdstilsynet. Grænseværdier for stoffer og materialer. Copenhagen, Denmark: Arbejdstilsynet, 2002: 19 (At-vejledning C.0.1).
- DFG03 Deutsche Forschungsgemeinschaft (DFG): Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area. List of MAK and BAT values 2003. Maximum concentrations and biological tolerance values at the workplace. Weinheim, FRG: Wiley-VCH Verlag & Co. KGaA, 2003; rep no 39.
- EC04 European Commission: Directorate General of Employment and Social Affairs. Occupational exposure limits (OELs); [http://europe.eu.int/comm/employment\\_social/health\\_safety/areas/oels\\_en.htm](http://europe.eu.int/comm/employment_social/health_safety/areas/oels_en.htm).
- Gre98 Greim H, ed. 1-Chloro-1-nitropropane. In: Occupational toxicants. Critical data evaluation for MAK values and classification of carcinogens. Weinheim, FRG: Wiley-VCH Verlag & Co. KGaA, 1998: 27-9 (Vol11).
- HSE02 Health and Safety Executive (HSE). EH40/2002. Occupational Exposure Limits 2002. Sudbury (Suffolk), England: HSE Books, 2002: 14.
- Mac45 Machle W, Scott EW, Treon JF, et al. The physiological response of animals to certain chlorinated mononitroparaffins. *J Ind Hyg Toxicol* 1945; 27: 95-102.
-

- Swe00 Swedish National Board of Occupational Safety and Health. Occupational exposure limit values and measures against air contaminants. Solna, Sweden: National Board of Occupational Safety and Health, 2000; Ordinance AFS 2000:3.
- SZW04 Ministerie van Sociale Zaken en Werkgelegenheid (SZW). Nationale MAC-lijst 2004. The Hague, the Netherlands: Sdu Uitgevers, 2004: 21.
- TRG03 TRGS 900. Grenzwerte in der Luft am Arbeitsplatz; Technische Regeln für Gefahrstoffe. BArBl 2003; (9).
- Zei92 Zeiger E, Anderson B, Haworth S, et al. Salmonella mutagenicity tests: V. Results from the testing of 311 chemicals. Environ Mol Mutagen 1992; 19 (suppl 21): 2-13.

## Annex

Occupational exposure limits for 1-chloro-1-nitropropane in various countries.

country - organisation	occupational exposure limit		time-weighted average	type of exposure limit	note <sup>a</sup>	reference <sup>b</sup>
	ppm	mg/m <sup>3</sup>				
the Netherlands - Ministry of Social Affairs and Employment	2	10	8 h	administrative		SZW04
Germany - AGS	20	100	8 h			TRG03
- DFG MAK-Kommission	-	-				DFG03
Great Britain - HSE	-	-				HSE02
Sweden - Arb02	-	-				Swe00
Denmark - Arb02	2	10				Arb02
USA - ACGIH	2	-	8 h	TLV		ACG04
- OSHA	20	100	8 h	PEL		ACG03
- NIOSH	2	10	10 h	REL		ACG03
European Union - SCOEL	-	-				EC04

<sup>a</sup> S = skin notation; which means that skin absorption may contribute considerably to body burden; sens = substance can cause sensitisation.

<sup>b</sup> Reference to the most recent official publication of occupational exposure limits.