

CALCIUM CYANAMIDE

CAS number: 156-62-7

Synonyms: Calcium carbimide, lime nitrogen, calcium cyanamid, alzodef, dormex, temposil

Chemical formula: CaCN_2

Workplace exposure standard (amended)

TWA: 0.2 mg/m³

STEL: —

Peak limitation: —

Notations: Sk.

IDLH: —

Sampling and analysis: The recommended value is readily quantifiable through currently available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.2 mg/m³ is recommended to protect for effects on the male reproductive system and for local irritation effects on exposed workers.

Discussion and conclusions

Calcium cyanamide is primarily used as the raw material in the commercial manufacture of calcium cyanide and dicyanamide. Calcium cyanamide is readily converted into cyanamide into the body, which is believed to react with alcohol to form the compound diethyl cyanamide.

Critical effects include local irritant effects and effects on the male reproductive system in mammals (ACGIH, 2018; DFG, 2007; HCOTN, 2004). No data about airborne concentrations of calcium cyanamide and effects on workers in industrial settings are available. Regardless, ACGIH (2018) considers a TWA of 0.5 mg/m³ protective for local irritant effects in exposed workers.

A 52 week oral study with cyanamide in dogs reported a NOAEL of 0.2 mg/kg/day for immature sperm (HCOTN, 2004). Using this value as a starting point and converting as per factors and parameters used by the HCOTN (2004), a TWA of 0.2 mg/m³ is calculated. This TWA is expected to be protective of both irritant and male reproductive effects.

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.

A skin notation is recommended based on evidence of dermal absorption in animals.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 0.5 mg/m³
ACGIH	2001	TLV-TWA: 0.5 mg/m³
<p>TLV-TWA recommended to reduce the potential for irritation of the eyes and respiratory tract in exposed workers and for disulfiram-like effects in exposed workers who consume alcohol after work.</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> • Oral dose 571 mg/kg lethal in humans • Exposure may result in primary skin irritation (erythematous or macular rash) or sensitisation related dermatitis • Skin irritation likely due to lime content • Approximately 0.5–1% of exposed people develop sensitising dermatitis • “Cyanamid Flush” (a transient vasomotor disturbance in upper parts of the body) may develop in exposed workers • Several publications have reported the disulfiram-like effect • No data regarding airborne concentrations in industrial settings. <p>Animal data:</p> <ul style="list-style-type: none"> • 86 mg/m³ reported as lowest dose lethal <i>via</i> inhalation in rats • 10 g/kg of calcium cyanamide applied as an aqueous paste to the clipped abdomens of rabbits (n=5) continuously for 24 h resulted in 2 deaths <ul style="list-style-type: none"> ◦ no deaths at 5 g/kg ◦ severe skin irritation developed after several days • Not carcinogenic in a 107 wk feeding study with various doses ≤400 ppm (rats) and ≤2,000 ppm (mice). 		
DFG	1979	MAK: 1 mg/m³ (inhalable dust)
<p>MAK recommended to reduce disturbance of alcohol metabolism and local irritant effects.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> • Metabolised to cyanamide which is assumed to react with alcohol to form the compound diethyl cyanamide • Acetylcyanamide is also a primary metabolite in humans • A study in 65 workers at a production plant failed to provide evidence of adverse health effects other than moderate alcohol intolerance • A study of 21 exposed and 9 non-exposed male volunteers determined higher concentrations of acetylcyanamide in urine of exposed workers <ul style="list-style-type: none"> ◦ no significant difference in hormone values between groups • LC₅₀: >155 mg/m³ (rats, >4 h, inhalation) • LD₅₀: >2,000 mg/kg in (rabbits, dermal) 		

Source	Year set	Standard
<ul style="list-style-type: none"> Reported to be readily absorbed through the skin. 		
SCOEL	NA	NA
No report.		
OARS/AIHA	NA	NA
No report.		
HCOTN	2004	TWA: 0.2 mg/m³
<p>TWA recommended to protect for effects on the male reproductive system as evidenced in dogs.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> Effects from 3 repeat dose oral studies in male dogs as including chronic inflammation of the testes, atrophy of testicular tubules, atrophy and necrosis of germ epithelium cells, hypo- and aspermatogenesis and reduced spermatocyte counts and immature sperm in the epididymides NOAEL of 0.2 mg/kg/d based on immature sperm in dogs from an unpublished 52 wk feeding study TWA is derived <i>via</i> conversion of the 0.2 mg/kg/d NOAEL using the following factors: <ul style="list-style-type: none"> 7/5 for work week conversion 1.4 for allometric scaling from dogs to humans 9 for inter- and intraspecies variation 70 kg human breathing 10 m³ of air with 100% retention applying a preferred value approach to derive a concentration of 0.2 mg/m³ LD₅₀: 590 mg/kg (rabbits, dermal) Skin notation warranted based on determination that the amount absorbed by the skin is greater than 10% of the amount taken up by inhalation when exposed to the TWA concentration Concluded no mutagenic or genotoxic potential. 		

Secondary source reports relied upon

Source	Year	Additional information
NTP	✓ 1979	No further information.
US NIOSH	✓ 1989	No further information.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?

No

The chemical is not a non-threshold based genotoxic carcinogen.



Notations

Source	Notations
SWA	NA
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Carcinogenicity – A4
DFG	H (skin)
SCOEL	NA
HCOTN	Skin
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

Adverse effects in human case study:

Dermal LD₅₀ ≤ 1000 mg/kg: **yes**

Dermal repeat-dose NOAEL ≤ 200
mg/kg:

Dermal LD₅₀/Inhalation LD₅₀ < 10:

In vivo dermal absorption rate > 10%:

Estimated dermal exposure at WES
> 10%:

consider assigning a skin notation

IDLH

Is there a suitable IDLH value available? No

Additional information

Molecular weight:	80.10
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m ³ ; 1 mg/m ³ = Number ppm
This chemical is used as a pesticide:	<input type="checkbox"/>
This chemical is a biological product:	<input type="checkbox"/>
This chemical is a by-product of a process:	<input type="checkbox"/>
A biological exposure index has been recommended by these agencies:	<input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> 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](#) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2007) Calcium Cyanamide – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2004) Cyanamide and calcium cyanamide. Health-based recommendation on occupational exposure limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/133.

National Toxicology Program (NTP) (1979) Technical Report on bioassay of calcium cyanamide for possible carcinogenicity. National Cancer Institute carcinogenesis technical report series No. 163. DHEW Publication No. (NIH) 79-1719.

US National Institute for Occupational Safety and Health (NIOSH) (1989) Calcium cyanamide: Accessed online July 2019 <https://www.cdc.gov/niosh/npg/npgd0091.html>