# Cyanamide

| CAS number: | 420-04-2 |
| --- | --- |
| Synonyms: | Amidocyanogen, carbimide, carbodiimide,  hydrogen cyanamide, carbamonitrile, cyanoamine, cyanogenamide, cyanogen nitride |
| Chemical formula: | CH2N2 |

Workplace exposure standard (amended)

| TWA: | **0.2 mg/m3** |
| --- | --- |
| STEL: | — |
| Peak limitation: | — |
| Notations: | **Carc. 2, Sk., DSEN** |
| IDLH: | — |
| Sampling and analysis: | There is uncertainty regarding quantification of the recommended value with currently available sampling and/or 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 subsequently reduce the potential for local irritation effects in exposed workers.

## Discussion and conclusions

Cyanamide is used as a chemical intermediate for dicyandiamide in melamine production and, as a fumigant, in metal cleaning, refining of ores and the production of synthetic rubber.

Critical effects include local irritant effects and effects on the male reproductive system in mammals. A 52 week oral study with cyanamide in dogs reported a NOAEL of 0.2 mg/kg based on 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 (HCTON, 2004).

The oral NOAEL was converted by HCOTN (2004) to a health based TWA of 0.2 mg/m3 using standard factors and parameters. The recommended TWA of 0.2 mg/m3 is considered to protect for the listed effects.

## Recommendation for notations

Classified as a category 2 carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Classified as a skin sensitiser and not classified as a respiratory sensitiser according to the GHS.

A skin notation is recommended based on evidence in animals supported by the absorption rate by the skin.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 2 mg/m3 | |
|  |
| ACGIH 2001 TLV-TWA: 2 mg/m3 |
| TLV-TWA recommended to minimise the potential for eye and skin irritation in exposed workers and for the Antabuse effects in those who consume alcohol after work.  Summary of data:  Human data:   * Antabuse effects compared with other compounds: * 1/2 as severe as tetraethylthiuram disulfide * 1/6 as severe as thiram; TLV-TWA for thiram recommended at 1 mg/m3 * No further information.   Animal data:   * LD50: 125 mg/kg (rats, oral) * Very irritating and caustic to the skin * 100 mg instilled into eye of rabbits was severely irritating.   Insufficient data to recommend notations for skin, sensitisation and carcinogenicity or a STEL. |
| DFG 2007 MAK: 0.2 ppm (0.35 mg/m3) |
| MAK recommended to protect for systemic and local irritation effects in exposed workers.  Summary of additional data:   * NOAEL of 0.2 mg/kg in dogs * 52 wk feeding study * immature sperm and decreased corpuscular volumes, increased leukocyte counts and decreased platelet counts * Using this NOAEL as a starting point the MAK was derived as follows: * airborne concentrations = (oral dose x oral absorption in animal % x 70 kg human body weight) / (species-specific correction factor x inhalation absorption in humans % x 10 m3 air breathed per 8 h shift) * where: oral dose = 0.2 mg/kg; oral absorption in dogs = 100%; species-specific factor = 1.4; human inhalation absorption 100% * convert daily exposure to 5 d working week (7/5) = 1 mg/m3 x 1.4 = 1.4 mg/m3 (0.8 ppm) * corresponding air concentration of 1.4 mg/m3 (0.8 ppm); as the NOAEL was based on the animal data the derived value is halved (0.4 ppm) then round down to the preferred numeral 0.2 ppm (0.35 mg/m3) * Dermal LD50: 742 mg/kg female rabbit; 901 mg/kg male rabbit. |
| SCOEL 2003 TWA: 1 mg/m3 |
| Summary of additional data:   * TWA based on the same NOAEL of 0.2 mg/kg as reported by DFG (2007) extrapolated to an inhalation concentration of 1.4 mg/m3: * assuming 100% retention and absorption of inhaled material, a breathing volume of 10 m3 in 8 hr and a bw of 70 kg * rounded to 1 mg/m3 * No evidence of mutagenicity or carcinogenicity. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2004 TWA: 0.2 mg/m3 |
| TWA recommended to protect for effects on the male reproductive system as evidenced in dogs.  Summary of additional data:   * Effects from 3 repeated cyanamide oral dose 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 based on immature sperm in dogs 52 wk feeding study (as DFG and SCOEL) * TWA is derived via conversion of the 0.2 mg/kg NOAEL using the following factors: * 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 * 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

NIL.

### 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 | Carcinogenicity – category 2, Skin sensitisation – category 1 |
| NICNAS | NA |
| EU Annex | Carcinogenicity – category 2, Skin sensitisation – category 1 |
| ECHA | NA |
| ACGIH | NA |
| DFG | H (skin), Sh (dermal sensitiser) |
| SCOEL | Skin |
| 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 |
| --- |
| |  |  |  |  | | --- | --- | --- | --- | | Adverse effects in human case study: |  |  |  | | Dermal LD50 ≤1000 mg/kg: | yes | 3.00 |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | 3 | **consider assigning a skin notation** | |

### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 42.04 |
| --- | --- |
| 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) (2007) Cyanamide – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (2003) Recommendation from the Scientific Committee on Occupational Exposure Limits for cyanamide. SCOEL/SUM/100\_rev.

Health Council of the Netherlands (HCOTN) (2004) Cyanamide and calcium cyanamide. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/133.

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