

ACETONITRILE

CAS number: 75-05-8

Synonyms: Methyl cyanide, cyanomethane

Chemical formula: CH₃CN

Structural formula:

Workplace exposure standard (amended)

TWA: 20 ppm (34 mg/m³)

STEL: —

Peak limitation: —

Notations: Sk.

IDLH: 500 ppm (839.47 mg/m³)

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 20 ppm (34 mg/m³) is recommended to protect for adverse effects in the lungs and to reduce the potential for cyanide accumulation via metabolic processes in exposed workers.

Discussion and conclusions

The recommended TWA is based on data from one experimental study in humans that reported no adverse lung effects in two of three volunteers exposed to 40 ppm.

There is limited human data available. However, the estimated threshold of 5 to 50 ppm in humans is supported by evidence from animal studies with a LOAEL of 100 ppm. An interspecies protection factor of 5 has been applied to derive the recommended TWA of 20 ppm.

Based on the information provided, there are no evident acute effects within an order of magnitude of the recommended TWA and insufficient quantitative data to support a STEL. A STEL has not been recommended.

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.

Skin notation recommended based on lethal accidental exposure case study information in humans and data supporting dermal absorption resulting in systemic toxicity in animals.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 40 ppm (67 mg/m³); STEL: 60 ppm (101 mg/m³)
ACGIH	2002	TLV-TWA: 20 ppm (33 mg/m³)
<p>TLV-TWA recommended to reduce the potential for adverse effects on the lungs of exposed workers.</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> Limited human data exists regarding exposures TLV-TWA is based on one experimental study that exposed 3 volunteers for 4 h at 40 ppm, one subject reported slight tightness of the chest and cooling of the lungs 24 hrs following exposure Several accidental contact case studies reported death following skin and inhalation contact during work tasks; concentrations not reported. <p>Animal data</p> <ul style="list-style-type: none"> NOAEL: 200 ppm; lifetime inhalation studies in rats and mice (undisclosed effects on liver) LC₅₀: 2,693 ppm (mice, 1 h) LD₅₀: 394 to 7,860 mg/kg (rats, dermal, no duration) No evidence of mutagenic effects in bacterial reverse mutation assays. <p>Some effects associated with metabolism to cyanide as reported for both humans and animals. Skin notation recommended based on accidental poisoning from dermal contact (human) and rat LD₅₀ <1,000 ppm.</p> <p>Insufficient data to support a TLV-STEL; TLV-TWA considered protective in the absence of a short-term value.</p> <p>Insufficient data available to assign a Sensitiser notation.</p> <p>Not classifiable as a human carcinogen.</p>		
DFG	2001	MAK: 20 ppm (34 mg/m³)
<p>MAK based on animal studies, supported by the estimation of a threshold value related to the conversion of acetonitrile to cyanide as part of metabolism processes in humans.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> A threshold of 5 - 50 ppm (discounting worst case scenario) estimated based on detoxification capacity in humans (0.1–1.0 mg/kg/h) and worker exposure factors (70 kg, inhaling 10 m³ over 8 h) A 'H' (skin) notation was recommended because dermal LD₅₀ <1,000 mg/kg. 		
SCOEL	NA	NA
No report		
OARS/AIHA	NA	NA
No report		
HCOTN	NA	NA
No report		

Secondary source reports relied upon

Source	Year	Additional information
HSE	✓ 2000	<ul style="list-style-type: none"> TWA of 40 ppm and STEL of 60 ppm No additional information.
NICNAS	✓ 2017	<ul style="list-style-type: none"> LC₅₀: 4,525 mg/m³ (male mice, 1 h); equivalent to 2.3 mg/L (4 h) Classified as 'Acute Toxicity Category 4' (inhalation, dermal and oral) with sufficient human data available to indicate that the current classification is warranted The critical health effects for risk characterisation include systemic acute effects (acute toxicity from oral, dermal and inhalation exposure) Causes eye irritation.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?

No

Notations

Source	Notations
SWA	Skin
HCIS	—
NICNAS	NA
EU Annex	—
ECHA	—
ACGIH	Skin, Carcinogenicity- A4
DFG	H (Skin)
SCOEL	—
HCOTN	—
IARC	—
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

Calculation		
Adverse effects in human case study:	yes	a skin notation is warranted
Dermal LD ₅₀ ≤ 1000 mg/kg:	yes	
Dermal repeat-dose NOAEL ≤ 200 mg/kg:		
Dermal LD ₅₀ /Inhalation LD ₅₀ < 10:		
<i>In vivo</i> dermal absorption rate > 10%:		
Estimated dermal exposure at WES > 10%:		

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight:	41.05
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) (2002) Acetonitrile (2001) – MAK value documentation.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2017) Acetonitrile: Human health tier II assessment – IMAP report.

UK Health and Safety Executive (HSE) (2000) Acetonitrile – EH64: Summary criteria for occupational exposure limits.

US National institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life and health concentrations – acetonitrile.