



## PYRIDINE

**CAS number:** 110-86-1

**Synonyms:** Azine

**Chemical formula:** C<sub>5</sub>H<sub>5</sub>N

### Workplace exposure standard (amended)

**TWA:** 1 ppm (3.1 mg/m<sup>3</sup>)

**STEL:** —

**Peak limitation:** —

**Notations:** Sk.

**IDLH:** 1,000 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 1 ppm (3.1 mg/m<sup>3</sup>) is recommended to protect for irritation of the upper respiratory tract, and effects in the central nervous system (CNS), liver and kidneys in exposed workers.

### Discussion and conclusions

Pyridine is used in manufacture of other chemicals, paints, dyes, adhesives and rubber products and has reported cosmetic and domestic use as a fragrance compound.

Critical effects of exposure are irritation of the upper respiratory tract and effects in the CNS, liver and kidneys.

Adverse health effects reported in humans exposed to airborne concentrations of 6 to 13 ppm. Effects included headache, temporary vertigo, nervousness, sleeplessness, occasional transient digestive troubles, particularly nausea and vomiting. Lesions in the nasal olfactory epithelium reported in rats exposed at 5 ppm for six hours a day for four days (ACGIH, 2018; SCOEL, 2004). A NOAEL of 7 mg/kg/day is reported in drinking water study in rats for liver and kidney effects. This dose was calculated by ACGIH (2018) to correspond to an inhalation dose of 49 mg/m<sup>3</sup> (15 ppm; ACGIH, 2018). SCOEL (2004) did not derive a TWA but recommended that occupational exposures should be maintained well below 5 ppm.

A TWA of 1 ppm by ACGIH (2018) is recommended. This TWA is expected to be protective of irritation and systemic effects reported in animals and humans.

### 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 due to evidence of dermal absorption and contribution to adverse systemic effects in animals.

DRAFT

## APPENDIX

### Primary sources with reports

Source	Year set	Standard
<b>SWA</b>	<b>1991</b>	<b>TWA: 5 ppm (16 mg/m<sup>3</sup>)</b>
Adopted from ACGIH in 1991.		
<b>ACGIH</b>	<b>2004</b>	<b>TLV-TWA: 1 ppm (3.1 mg/m<sup>3</sup>)</b>
<p>TLV-TWA recommended to minimise irritation and systemic effects.</p> <p>Summary of data:</p> <p>Extremely malodorous. TWA based on NOEL of 7 mg/kg/d in rats for liver and kidney effects; corresponds to an inhalation dose of 49 mg/m<sup>3</sup> (15 ppm) based on a 70 kg worker breathing 10 m<sup>3</sup> per 8-h shift. Integrated with evidence of nasal tissue lesions in rats at 5 ppm 1 ppm as a TWA should minimise the potential for adverse effects.</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>• Air samples at 6–12 ppm caused 7 cases of mild, chronic poisoning in a chemical plant; headache, temporary vertigo, nervousness, sleeplessness, occasional digestive troubles particularly nausea and vomiting; no further details</li> <li>• 5 people who received 1.8–2.5 mL/d for up to 1 mo; 2 subjects showed hepato-renal disease of which 1 died; no further details</li> <li>• Case study of 1 woman who inhaled vapours for 15–20 min; no concentrations reported; symptoms included nervous system inhibition characterised by speech disorders and diffuse cortical affliction; irritation of upper respiratory tract was found; no further information</li> <li>• A case of allergic contact dermatitis in a laboratory technician reported as likely caused by pyridine.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>• Dermal LD<sub>50</sub>: 1,120 mg/kg (rabbit); 1,000–2,000 mg/kg (guinea pig)</li> <li>• Olfactory epithelial damage in rats exposed at 5 ppm, 6 h/d for 4 d; 444 ppm showed only slightly more severe lesions in the olfactory region</li> <li>• NOEL of 7 mg/kg/d in F344/N rat; &lt;8 mg/kg/d in Wistar rat; &lt;15 mg/kg/d in mice from 2 yr drinking water study; liver and kidney changes first sign of adverse effects</li> <li>• Tumour development in rodents following extended and relatively high doses via drinking water.</li> </ul> <p>Single sensitisation case insufficient to recommend a sensitiser notation.</p> <p>Insufficient data to recommend a STEL.</p>		
<b>DFG</b>	<b>2008</b>	<b>Not assigned</b>
<p>Insufficient data to derive a MAK value.</p> <p>No additional data.</p>		

Source	Year set	Standard
<b>SCOEL</b>	<b>2004</b>	<b>Not assigned</b>
A health-based OEL (HBROEL) cannot be derived from the available data. Summary of additional data: <ul style="list-style-type: none"> <li>• A skin, eye and mucous membrane irritant in humans</li> <li>• Low skin sensitising agent in humans</li> <li>• Evidence of carcinogenicity in mice; not considered genotoxic</li> <li>• Based on nasal lesions in rats at 5 ppm (cited by ACGIH, 2004) and adverse health effects in humans exposed to airborne concentrations reportedly in the range 6–13 ppm (cited by ACGIH, 2004) recommend occupational exposures be maintained well below 5 ppm.</li> </ul>		
<b>OARS/AIHA</b>	<b>NA</b>	<b>NA</b>
No report.		
<b>HCOTN</b>	<b>NA</b>	<b>NA</b>
No report.		

## Secondary source reports relied upon

Source	Year	Additional information
NICNAS	✓ 2015	<ul style="list-style-type: none"> <li>• LD<sub>50</sub>: 1,000 mg/kg (rabbits, dermal)</li> <li>• Rats exposed at 10 or 50 ppm 7 h/d, 5 d/wk for 6 mo; increase liver weights; assumed both doses</li> <li>• Workers exposed at 125 ppm for 4 h/d for up to 2 wk reported headaches, dizziness, insomnia, nausea and anorexia</li> <li>• Not considered to be genotoxic.</li> </ul>

## 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	—
HCIS	—
NICNAS	—
EU Annex	NA
ECHA	—
ACGIH	Carcinogenicity – A3
DFG	Carcinogenicity – 3B, H (skin)



Source	Notations
SCOEL	Skin
HCOTN	NA
IARC	Carcinogenicity – Group 2B
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 LD<sub>50</sub> ≤ 1000 mg/kg: **yes**

Dermal repeat-dose NOAEL ≤ 200 mg/kg:

Dermal LD<sub>50</sub>/Inhalation LD<sub>50</sub> < 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? **Yes**

## Additional information

Molecular weight:	79.1
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 3.1 mg/m <sup>3</sup> ; 1 mg/m <sup>3</sup> = 0.323 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
<a href="#">Click here to enter year</a>	

## References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7<sup>th</sup> 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) (2009) Pyridin – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (2004) Recommendation from the Scientific Committee on Occupational Exposure Limits for Pyridin. SCOEL/SUM/106.

International Agency for Research on Cancer (IARC) (2019) Pyridine. IARC Monographs on the evaluation of the carcinogenic risk to humans.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2015) Pyridine: Human health tier II assessment – IMAP report.

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