# Allyl Alcohol

| CAS number: | 107-18-6 |
| --- | --- |
| Synonyms: | Prop-2-en-1-ol, vinyl carbinol |
| Chemical formula: | C3H6O |
| Structural formula: |  |

Workplace exposure standard (amended)

| TWA: | **1 ppm (2.4 mg/m3)** |
| --- | --- |
| STEL: | **4 ppm (9.5 mg/m3)** |
| Peak limitation: | **—** |
| Notations: | **Sk.** |
| IDLH: | **20 ppm** |
| 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 1 ppm (2.4 mg/m3) is recommended to protect for eye and upper respiratory tract irritation and adverse systemic effects in the liver and kidneys in exposed workers.

A STEL of 4 ppm (9.5 mg/m3)is recommended to protect for ocular and upper respiratory tract irritation in acutely exposed workers.

## Discussion and conclusions

Allyl alcohol is a precursor to many specialised compounds used in flame-resistant materials, drying oils and plasticisers. It causes irritation of the eyes and upper respiratory tract in humans and animals and has been reported to produce systemic long-term effects in the liver and other organs (ACGIH, 2018; DFG, 2001; SCOEL, 1993; NICNAS, 2017).

A sub-chronic inhalation study in animals observed adverse effects in the liver and kidneys and reported a NOEL for irritation at 2 ppm. Slight eye irritation in humans has been reported at 5 ppm (ACGIH, 2018; NICNAS, 2017).

The recommended TWA is based on a NOEL of 2 ppm in animals for systemic effects with application of an uncertainty factor of two to account for a lack of robust dose-response data in humans. The STEL is recommended to be retained and is based on reports of irritation of the eye in 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 as evidence indicates absorption through skin resulting in systemic effects in animals and humans.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 2 ppm (4.8 mg/m3); STEL 4 ppm (9.5 mg/m3) | |
|  |
| ACGIH 2001 TLV- TWA: 0.5 ppm (1.2 mg/m3) |
| TLV-TWA recommended to reduce the potential for significant ocular and upper respiratory tract irritation. TLV based primarily on evidence in animals.  Summary of data:  Human data:   * Three cases of acute inhalation exposure related to accidental poisoning (no further data) * effects included dyspnoea, difficulties in ocular accommodation and general malaise in 1 individual * 2 workers exposed to spilled allyl alcohol on floor and clothes resulting in nausea, vomiting and slight haemoptysis; both cases reversible * Eye irritation: slight >5 ppm, severe at 25 ppm; reported as ‘brief exposure’ duration * Systemic toxicity following dermal contact in humans (nausea and vomiting) * Upper respiratory irritation: 5 ppm (no further data).   Animal data:   * Sub-chronic NOEL: 2 ppm (dogs, rats, rabbits, and guinea pigs at 7 h/d, 5 d/wk for 6 mo) * RD50: 1.6–3.9 ppm (mice, 5–30 min) * LD50: 45 mg/kg (rabbits, dermal) * No carcinogenic response in hamsters via gavage or drinking water (study considered inadequate) * Systemic toxicity following dermal contact to liquid in animals (periportal necrosis, congestion of the liver, haematuria, nephritis, and mortality) * Direct acting mutagen in *Salmonella typhimurium* and cultured V79 cells.   Metabolised by alcohol dehydrogenase to acrolein.  No evidence of reproductive effects reported. |
| DFG 2001 NA |
| MAK value not established as a suspected carcinogen (as an analogue of acrolein) and due to limited studies of local toxicity after long-term inhalation exposure.  No additional data presented. |
| SCOEL 1993 TWA: 2 ppm (4.8 mg/m3); STEL 5 ppm (12.1 mg/m3) |
| TWA and STEL recommended to prevent irritation of the eyes and upper respiratory tract in workers.  Summary of additional data:   * TWA based on reported NOAEL of 20 ppm for irritation (rats, 7 h/d, 60 d) and uncertainty factor of 10 for the absence of human data on systemic effects * STEL based on irritation of the eyes and nose commencing at 5 ppm in humans. |
| OARS/AIHA NA NA |
| No report |
| HCOTN NA NA |
| No report |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| NICNAS |  | 2017 | * Case study, volunteers exposed 5 min for 1–3 times/wk; 50d: * 6.25 ppm: olfactory cognition * 12.5 ppm: nose irritation * 25 ppm: slight eye irritation * Reported eye discomfort at 5 ppm, corneal necrosis and temporary blindness at 25 ppm in humans * LC50: 50–76 ppm (rats, 8h) * Inhalation study in dogs, rats, rabbits and guinea pigs (7 ppm; 7 h/d, 5 d/wk for 6 mo): observations of cloudy swelling and focal necrosis of the liver, kidney necrosis of convoluted tubules and proliferation of interstitial tissues * Allyl alcohol, or its metabolite acrolein, not considered to have carcinogenic potential * Not significantly toxic to reproduction or development * Not expected to have skin sensitisation potential. |

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | Yes |
| --- | --- |
| Is the chemical carcinogenic with a mutagenic mechanism of action? | No |
| **The chemical is not a non-threshold based genotoxic carcinogen.** |  |

## Notations

| Source | Notations |
| --- | --- |
| SWA | Skin |
| HCIS | — |
| NICNAS | — |
| EU Annex | — |
| ECHA | NA |
| ACGIH | Carcinogenicity – A4; Skin |
| DFG | Carcinogenicity – 3B; H (skin) |
| 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: | yes | 4.00 |  | | 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 | **a skin notation is warranted** | |

### IDLH

| Is there a suitable IDLH value available? | Yes |
| --- | --- |

## Additional information

| Molecular weight: | 58.08 |
| --- | --- |
| 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) (2001) Allyl alcohol – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (1993) Recommendation from the Scientific Committee on Occupational Exposure Limits for Allyl alcohol. SCOEL/SUM44.

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

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