# Methyl Vinyl Ketone

| CAS number: | 78-94-4 |
| --- | --- |
| Synonyms: | Acetyl ethylene, 3-buten-2-one, 3-butene-2-one, butanone, delta(3)-2-butenone, methylene acetone, methyl vinyl acetone, gamma-oxo-alpha-butylene |
| Chemical formula: | C4H6O |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **0.2 ppm (0.6 mg/m3)** |
| Notations: | **Sk.** |
| IDLH: | **—** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A peak limitation of 0.2 ppm (0.6 mg/m3) is recommended to protect for skin, eye and respiratory tract irritation and dermal sensitisation in exposed workers.

Given the limited data available from the primary sources, it is recommended that a review of additional sources be conducted at the next scheduled review.

## Discussion and conclusions

Methyl vinyl ketone is used as a precursor to produce styrene-methyl vinyl ketone polymers, as an alkylating agent, a component of resins, and an intermediate in the synthesis of steroids and vitamins.

The critical effects of exposure are irritation of the skin, eyes and respiratory tract, and potentially dermal sensitisation.

Limited toxicological data exists in humans and animals. It is reported to be a severe skin, eye and respiratory tract irritant. Severe damage in the mucous membranes of the respiratory passages, pulmonary oedema and CNS damage is reported in animals following single short exposures (15 to 20 minutes in duration) at concentrations starting at 41.3 ppm (DFG, 1994). An RD50 of 5.28 ppm in mice is reported and used by ACGIH (2018) to derive a TLV-Ceiling of 2 ppm. Repeated inhalation of 10 ppm induced severe symptoms of intoxication in various animal species. No effects were observed in rats and rabbits exposed at 0.3 ppm for 4.5 months (DFG, 1994). Skin sensitisation is reported in humans and animals.

Given the limited available data, an interim peak limitation of 0.2 ppm (0.6 mg/m3) is recommended as assigned by ACGIH (2018). This value is reported to be protective of irritation of the skin, eyes and respiratory tract, and the risk of dermal sensitisation. A priority evaluation of the evidence is recommended at the next scheduled review of this occupational exposure standard.

## 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. Evidence suggest skin sensitising potential in animals and humans and an amendment of the classification is recommended.

A skin notation is recommended based on systemic effects in humans and animals following dermal exposure.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA NA NA | |
|  |
| ACGIH 2001 TLV-CEILING: 0.2 ppm (0.6 mg/m3) |
| TLV-Ceiling recommended to minimise the potential for irritation of the skin, eyes, and respiratory tract and the risk of dermal sensitisation or allergic type reactions.  Summary of data:  Human data:   * No exposure data available * Severe skin, eye, and respiratory tract irritant * Inhalation exposure may can produce an anaesthetic type of respiratory depression, dyspnoea, and gasping * Reported to be readily absorbed through the skin leading to systemic toxicity.   Animal data:   * 4-h LC50 of 2.4 ppm rat; 2.8 ppm mice * RD50: 5.28 ppm (male mice).   TLV-Ceiling of 0.2 ppm based on the relative irritancy derived from the mouse RD50 of 5.28 ppm and an investigation conducted into the relationship of toxicity of molecules of industrial interest; no details of the investigation were provided); no further information. |
| DFG 1998 Not assigned |
| Summary of additional data:  Human data:   * Odour threshold of 0.2 ppm * Threshold for irritation of respiratory tract 1.7 ppm in humans * 1 report of skin sensitisation in worker; no further information.   Animal data:   * Positive skin sensitisation results in 2 animal experiments * Severe damage in the mucous membranes of the respiratory passages, pulmonary oedema and CNS damage following single short exposures in test animals: * rats and mice exposed at 41.3 ppm for 15–20 min effects included: death, severe mucosal irritation, dyspnoea, CNS damage * rabbits exposed at 1,500 ppm for 10 min; death from pulmonary oedema with dyspnoea and convulsions * cats, rabbits, guinea pigs, rats, mice exposed at 50 ppm for 60 min; mucosal irritation in all species; cats also dyspnoea and vomiting * Repeated inhalation of 10 ppm induced severe symptoms of intoxication in various species;1 ppm led to marked weight loss in some animals; no further information * No effects observed in rats and rabbits exposed at 0.3 ppm for 4.5 mo; no further information * Toxic amounts of the substance are readily absorbed through the skin; dipping the tails of rats and mice for 2 h into solutions of methyl vinyl ketone led to agitation, dyspnoea, blue colouration of visible mucous membranes and the skin of the tail and later to apathy. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### 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 | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | DSEN, Skin |
| DFG | H (skin), Sh (dermal sensitiser) |
| SCOEL | NA |
| 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: |  |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  |  | **a skin notation is warranted** | |

### IDLH

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

## Additional information

| Molecular weight: | 70.09 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 2.87 mg/m3; 1 mg/m3 = 0.35 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) (1998) Methyl vinyl ketone– MAK value documentation.