# Methyl ethyl ketone peroxide

| CAS number: | 1338-23-4 |
| --- | --- |
| Synonyms: | 2-Butanone peroxide, MEKP |
| Chemical formula: | C8H16O4 |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **0.2 ppm (1.5 mg/m3)** |
| Notations: | **—** |
| 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 (1.5 mg/m3) is recommended to protect for skin and eye irritation and possible liver and kidneys effects in exposed workers.

Given the limited data available, it is recommended that a review of the data for the chemical be conducted at the next scheduled review.

## Discussion and conclusions

Methyl ethyl ketone peroxide (MEKP) is used to initiate polymerisation of plastic monomers and as a catalyst in cross-linking unsaturated polyester resins (ACGIH, 2001).

Limited human and animal toxicity data are available. Effects described in humans are mainly from accidental ingestion or exposure. Critical effects of exposure include severe oesophagitis, gastritis, necrosis, rapid hepatic failure, respiratory failure from ingestion, and nose and throat irritation, headaches, dizziness and breathing problems by inhalation (ACGIH, 2018; HCOTN, 2002). Five out of 30 workers exposed to MEKP (with various other ketones and acrylic resin compounds) at 0.19 to 1.24 mg/m3 (0.026 to 0.17 ppm) had a significant decrease in pulmonary function over the course of their shift (HCOTN, 2002).

Given the lack of repeat exposure data and severe oesophagitis and gastritis observed in humans and severe skin lesions observed in animals, a peak limitation of 0.2 ppm (1.5 mg/m3) is recommended in the interim as assigned by ACGIH (2018) and HCOTN (2002). The peak limitation is considered sufficiently low to minimise the potential for nose, throat and eye irritation in acute exposures. Investigation of additional data sources is recommended at the next scheduled review.

## 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. Further review of additional data sources is recommended as there is limited evidence to indicate work-related contact dermatitis is possible in humans (HCOTN, 2002).

There are insufficient data to recommend a skin notation. However, it is recommended a further review of data be undertaken on dermal absorption and sensitisation as there is limited evidence of contact dermatitis reported in humans.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 Peak limitation: 0.2 ppm (1.5 mg/m3) | |
|  |
| ACGIH 2001 TLV-CEILING: 0.2 ppm (1.5 mg/m3) |
| TLV-ceiling recommended to minimise potential for irritant effects in skin and eyes and possible adverse effects on liver and kidneys. TLV-Ceiling recommended based on similar toxicity and irritant nature to hydrogen peroxide.  Summary of data:  Human studies:   * Severe oesophagitis and gastritis in individuals ingesting up to 2 oz 60% MEKP solution: * narrowing and scarring of oesophagus also occurred.   Animal studies:   * LC50: 170 ppm (mice, 4 h) * LC50: 200 ppm (rats, 4 h); petechiae and gross haemorrhage common * LD50: 65 mg/kg (rats, IP) and 484 mg/kg (rats, gavage) * Topical administration (5 d/wk for 13 wk) caused necrotic, inflammatory and regenerative skin lesions at application site: * NOAEL for histopathologic skin lesions not determined as lesions observed at daily doses as low as 1.07 mg (rats) and 0.357 mg (mice) * Inadequate studies on potential carcinogenic properties * Varying mutagenic results: * negative result in *S. typhimurium* strains * positive result in mouse lymphoma assay * induced SCE and chromosomal aberrations in cytogenetic tests * negative result for frequency of micronucleated erythrocytes in mice following topical applications (5 d/wk for 13 wk).   Insufficient data to recommend skin, SEN or carcinogenicity notations. |
| DFG 1990 Not assigned |
| Summary of additional data:   * Lowest known lethal dose in humans is 480 mg/kg * MAK could not be determined due to insufficient data. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2002 Ceiling limit: 0.2 ppm (1.5 mg/m3) |
| Summary of additional data:   * Exposure generally by inhalation of aerosolised MEKP during spraying in some manufacturing processes or by dermal exposure to aerosol or liquid * Ingestion results in acute toxic symptoms including GI bleeding, abdominal burns, necrosis, stomach perforation, oesophageal structure, severe metabolic acidosis, rapid hepatic failure, and respiratory failure * Patch testing has resulted in allergic contact dermatitis in workers * Survey of workers exposed to various ketones and acrylic resins with MEKP primary contaminant, showed 5/30 workers had significant decrease in pulmonary function over their shift: * exposure range was 0.19–1.24 mg/m3 * main symptoms included nose and throat irritation, headaches, dizziness and breathing difficulty * Inadequate data for repeat inhalation studies * Inadequate studies on potential carcinogenic properties * Human and experimental animal data indicate MEKP is severely irritating to eyes and skin * Several work-related allergic contact dermatitis with positive reactions to MEKP upon patch testing reported (no further information) * Committee concluded insufficient information to comment on administrative value. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| ECHA |  | 2019 | * Substance has not been registered under the REACH Regulation; no additional information. |

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | Insufficient data |
| --- | --- |
| Is the chemical carcinogenic with a mutagenic mechanism of action? | Insufficient data |
| **Insufficient data are available to determine if the chemical is a non-threshold based genotoxic carcinogen.** | |

## Notations

| Source | Notations |
| --- | --- |
| SWA | — |
| HCIS | — |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | — |
| DFG | — |
| SCOEL | NA |
| HCOTN | — |
| 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 |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

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

## Additional information

| Molecular weight: | 176.24 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 7.20 mg/m3; 1 mg/m3 = 0.139 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) (1990) Peroxide, organische – MAK value documentation.

European Chemicals Agency Regulation (ECHA) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Health Council of the Netherlands (HCOTN) (2002) Methyl ethyl ketone peroxide. Health-based reassessment of administrative occupational exposure limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/050.