# Magnesium oxide (fume)

| CAS number: | 1309-48-4 |
| --- | --- |
| Synonyms: | Periclase, magnesia |
| Chemical formula: | MgO |

Workplace exposure standard (retained)

| TWA: | **10 mg/m3** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **750 mg/m3** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A TWA of 10 mg/m3 is recommended to protect for upper respiratory tract irritation in exposed workers.

## Discussion and conclusions

Magnesium oxide (MgO) powder is used in heat-resistant ceramics, firebricks, pharmaceuticals, food additives and enteric acid-neutralising agents. In solution, it is hydrated to magnesium hydroxide and used as an antacid and cathartic.

Critical effects of exposure from MgO fume is irritation of the upper respiratory tract. Limited toxicological data are available. Following industrial exposures, reported effects include conjunctivitis, nasal catarrh and discoloured sputum. No systemic effects are identified following increased exposures that double the concentration of serum magnesium. Volunteers exposed at 410 to 580 mg/m3 MgO fume for one to nine minutes demonstrated symptoms of metal fume fever and an increase in white blood cell (WBC) count. An approximate NOAEC of 100 mg/m3 based on changes in pulmonary function, or cellular and biochemical parameters is identified in a short-term study in humans (ACGIH, 2018).

The TWA of 10 mg/m3 adopted from ACGIH is recommended to be retained. This TWA is considered protective of irritant effects.

## 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.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 10 mg/m3 | |
|  |
| ACGIH 2003 TLV-TWA: 10 mg/m3 (inhalable particulate mass) |
| TLV-TWA recommended to minimise occupational exposure and irritant effects on the upper respiratory tract associated with magnesium oxide fumes.  TLV-TWA was derived from a NOAEL of 100 mg/m3 divided by a UF of ten to account for the short term of exposure.  Summary of data:  Human data:   * Following industrial exposures, reported effects include conjunctivitis, nasal catarrh and discoloured sputum; no systemic effects noted following increased exposures (doubling serum Mg) * Slight irritation of eyes and nose in 95 workers exposed to dust, concentration not specified * Exposure of volunteers at 410–580 mg/m3 fume for 1–9 min resulted in febrile reaction and leucocytosis (metal fume fever) * Exposure of volunteers at 137 mg/m3 for 15–45 min produced no symptoms or significant change in pulmonary function, or cellular and biochemical parameters * NOAEL of 100 mg/m3 estimated.   Animal data:   * Estimated inhalation of 21–156 mg (fume; 15 min–3 h duration) in cats produced slight hypothermia * at 3 h duration point, obvious dyspnoea when removed from exposure chamber, lethargy and cold to touch * rapid recovery at cessation of exposure * Minor histologic changes in lungs of rats and rabbits exposed for 6 mo to contaminated air at worksite * no exposure concentration specified * Studies of potential carcinogenic effects limited in scope and had confounders * Negative for mutagenicity in standard Ames assay tests.   Insufficient data to recommend sensitiser, skin notation or TLV-STEL. |
| DFG 1991 MAK: 6 mg/m3 (fine dust) |
| Additional information:   * Differing toxic effects depending on whether in the form of dust or fumes; overall hazard associated with fumes expected to be greater than dust * Oral toxicity considered low * Based on limited data, lowest lethal inhaled concentration of 400 mg/m3 reported in humans * Inhalation of fresh MgO fumes (15–29 mg/m3) in volunteers for 5–9 min produced slight increase in body temperature (2/4 individuals). * increased WBC count after 5–6 h * parameters returned to normal following morning (same study as ACGIH, 2018) * Foundry workers exposed to high concentrations of fumes reported episodic high temperatures, sweating and coughing * after 9 yr exposure at the highest concentrations, a severe reduction in pulmonary adaptability to exertion reported (concentrations not specified). |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2004 TWA: 10 mg/m3 |
| Current TWA is considered administrative and based on inert dust.  Additional information:   * Valid data not available from studies in humans or animals of repeated inhalation exposure or potential carcinogenicity * Adverse effects in animals following exposure to fumes commonly included increase in leukocytes and decrease in body temperature, whereas humans experienced increase in body temperature * Effects seen in animals was different to that of metal fume fever * TWA of 10 mg/m3 considered an inert dust; available data shows fumes are not inert; value may be too high. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| NICNAS |  | N.D. | * Identified as low concern to human health. |

### 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 | Carcinogenicity – A4 |
| DFG | NA |
| 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 |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

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

## Additional information

| Molecular weight: | 40.31 |
| --- | --- |
| 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) (1991) Magnesium oxide – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2004) Magnesium oxide (fume). Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/123.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (N.D) Magnesium oxide (MgO): Human health tier I assessment.