CALCIUM SULFATE

CAS number: 7778-18-9

Synonyms: Calcium sulphate, gypsum, plaster of Paris

Chemical formula: $CaSO_4$

Workplace exposure standard (amended)

TWA: **1.5 mg/m^3**

STEL: **—**

Peak limitation: **—**

Notations: **—**

IDLH: **—**

Sampling and analysis: There is uncertainty regarding quantification of the recommended value with currently available sampling and/or analysis techniques

Recommendation and basis for workplace exposure standard

A TWA of 1.5 mg/m^3 is recommended to protect for local effects in the lungs of exposed workers.

Discussion and conclusions

Calcium sulfate is used in cement, wall plaster and gypsum wall board and as a paper filler.

There are limited data available. Specifically, data were inadequate or lacking in the epidemiological studies. A cross-sectional study in gypsum miners and millers exposed for two to twenty-four years identified shortness of breath with no further information on exposure levels reported. Increased chemical sensitivity of the skin and mucous membranes (chemesthetic) effects on the nose and throat at 40 mg/m^3 were reported in an experimental study in volunteers. In a chronic inhalation study, guinea pigs exposed to airborne particles calcium sulfate demonstrated no, or slight effects in the lungs. No measurable adverse effects in the lungs were observed in sub-chronic (three week) inhalation studies in rats exposed to concentrations from 15 to 60 mg/m^3 (ACGIH, 2018). Based on this study, a LOAEL of 15 mg/m^3 in rats was established (HCOTN, 2002).

A TWA of 1.5 mg/m^3 is recommended based on the LOAEL of 15 mg/m^3 established from the sub-chronic inhalation study in rats (HCOTN, 2002) and applying a safety factor of 10 to account for interspecies differences. This TWA is considered to be low enough to protect for reported effects in the lungs from both human and animal studies and an additional safety factor to account for a LOAEL basis is not considered necessary.

Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling on 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/m^3***
ACGIH	***2006***	***TLV-TWA: 10 mg/m^3 (Inhalable particle mass)***
TLV-TWA recommended to protect for long-term respiratory effects and to minimise lung particle clearance effects. Summary of data: Human data: • Experimental study in 12 volunteers: o produced increased chemesthetic effects on the nose and throat at 40 mg/m^3 (highest exposure concentration during exercise) o no effects identified on eyes, nasal secretion, nasal resistance or mucociliary transport at this concentration • Limited epidemiological data o cross-sectional study in 58 gypsum miners and millers exposed for 2–24 yr reported shortness of breath (no exposure levels reported). Animal data: • No adverse effects reported in subchronic inhalation experiment in rats (6 h/d, 5 d/wk for 3 wk at 15 or 60 mg/m^3 fibrous $CaSO_4$) o no fibres in lungs o no difference in Ca levels (no further information) o no observed increase in macrophages in alveolus • Results from a similar study in rats exposed to 15 mg/m^3 were comparable o no toxic effects reported • Chronic study in guinea pigs exposed to airborne levels of 448 million particles/ft^3 for 8 h/d, 5.5 d/wk for 24 mo reported no, or slight, effects in lungs.		
DFG	***2013***	***MAK: 1.5 mg/m^3 (Respirable), 4 mg/m^3 (Inhalable)***
No suitable data available in human or animal studies to derive a MAK value, therefore the general threshold limit values for respirable and inhalable dust are recommended.		
SCOEL	***NA***	***NA***
No report		
OARS/AIHA	***NA***	***NA***
No report		

Source	Year set	Standard
HCOTN	***2002***	***TWA: 0.5 mg/m^3 (Respirable fibres)***

TWA recommended to protect for local effects in the lungs of exposed workers.

Summary of additional data

- Genotoxicity tests with *S. typhimurium* and *S. cerevisiae* with and without metabolic activation were negative
- In rats exposed for 6 h/d, 5 d/wk for 3 wk at 15 mg/m^3 $CaSO_4$, an adaptive effect in the lung was reported and was considered a non-pathological local effect due to physical factors of the fibre
    - this effects could not be excluded in humans
- TWA is derived starting with the LOAEL of 15 mg/m^3 in rats (same study as ACGIH) and applying an overall factor of 30 to account for:
    - the absence of a NOAEL
    - inter- and intraspecies variations
    - differences between exposure patterns.

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	NA
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?	No

Additional information

Molecular weight:	136.14
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m^3; 1 mg/m^3 = 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* on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2013) Calcium sulfate – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2003) Calcium sulphate. Health-based reassessment Administrative Occupational Exposure Limit. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/045.