PERLITE DUST

CAS number: 93763-70-3

Synonyms: —

Chemical formula: $Al_2CaFe_2K_2MgNa_2O_{12}Si$

Structural formula: —

Workplace exposure standard (retained)

TWA: **10 mg/m^3**

STEL: **—**

Peak limitation: **—**

Notations: **—**

IDLH: **—**

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/m^3 is recommended to protect for irritation and chronic respiratory conditions in exposed workers.

Discussion and conclusions

Perlite is used in thermal insulation, lightweight plasters, as an inert carrier and filler, as concrete aggregate and soil improver (HCOTN, 2003).

Critical effects of exposure include effects on the respiratory tract.

Exposure related effects such as development of lung fibrosis (pneumoconiosis) not identified in long-term occupational studies, based on chest radiography and lung function parameters in workers. No effects on the respiratory tract identified in a long-term inhalation study in rats and guinea pigs - NOAEC of 226 mg/m^3 (HCOTN, 2003).

The TWA of 10 mg/m^3 is recommended to be retained and considered to protect for effects on the lungs as assigned by HCOTN (2003). This TWA is for inhalable dust containing no asbestos and less than 0.7 % crystalline silica.

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 not recommended based on the available evidence.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1991***	***TWA: 10 mg/m^3***
ACGIH	***NA***	***NA***
No report.		
DFG	***NA***	***NA***
No report.		
SCOEL	***NA***	***NA***
No report.		
OARS/AIHA	***NA***	***NA***
No report.		
HCOTN	***2003***	***TWA: 10 mg/m^3***

Current administrative exposure limit is 10 mg/m^3. The committee recommends a health-based occupational exposure limit TWA of 5 mg/m^3 as respirable dust and 10 mg/m^3 as inhalable dust for perlite containing <0.7 % crystalline silica.

Human data:

- Chest roentgenograms in 240 men (taken between 1955–1974) who had worked in perlite industry:
  - 2 positive for pneumoconiosis, 7 classified as 'doubtful' and remainder with no pulmonary changes
  - limited exposure data suggested exposures probably >10 mg/m^3
- Examination of chest roentgenograms from 117 men involved in mining and processing of perlite (periods up to 23 yr) showed 2 classified as positive; however, pulmonary changes were not interpreted as pneumoconiosis:
  - no statistically significant correlation found between duration of employment in perlite industry and impact to pulmonary function (measured as forced vital capacity (FVC) and forced expiratory volume (FEV)
  - exposure concentrations and free silica content not reported
  - follow-up study of 152 workers with airborne exposures nearly all <10 mg/m3 did not find evidence of pneumoconiosis
  - pulmonary function in 120 out of 152 workers found negative correlation (not statistically significant) with FCV and FEV and length of employment in perlite industry
  - authors concluded no evidence of perlite-induced pneumoconiosis and perlite continue to be treated as a nuisance dust (when not contaminated with quartz dust above 1%)
- At acceptable levels, dust particles from expanded perlite unlikely to survive long enough in the lung to cause fibrosis

Source	Year set	Standard

- Pulmonary function tests of non-smoking and smoking perlite exposed male workers and unexposed male office workers (all smokers), after average of 12 yr working period:
  - average exposure concentrations in dust samples of 7.5 and 12.83 mg/m^3 and personal respirable dust of 4.56 and 9.89 mg/m^3
  - no correlation between duration of work in perlite areas and pulmonary function but significant correlation between smoking history (in perlite and control workers) and diffusing capacity of the lung for CO
  - all chest radiographs in non-smoking workers were normal, abnormalities in 10/27 smoking perlite workers.

Animal data:

- LD_{50}: >12,960 mg/kg (mice, oral); no signs of toxicity reported; >10,000 mg/kg (rats, oral); highest dose tested
- Exposure at 0 or 6,600 mg/m^3 in guinea pigs (30 min/d, 5 d/wk, 24 wk): minor respiratory distress, increased locomotion and attempts to prevent dust entering airways. Symptoms disappeared 1–2 h after cessation of exposure. Adverse local effects observed including oedematous, lymphoid aggregates and dust particles present in phagocytes. No evidence of pulmonary fibrosis
- NOAEL: 1,500 mg/kg/d (mice, diet, 28 wk), based on slight reduction of growth rate
- Exposure at 226 mg/m^3 (rats and guinea pigs, 18 mo) did not cause significant pulmonary reaction, including fibrosis. Authors concluded perlite acted as inert or nuisance dust.

No data found from mutagenicity or genotoxicity studies.

A skin notation is not considered necessary.

Secondary source reports relied upon

Source		Year	Additional information
AIOH	✓	2016	• Amongst a group of dusts that have WES based on original ACGIH general 'Nuisance Particulates' limit of 10 mg/m^3 for total dust • Due to physical variables including aerodynamic particle size distribution and particle surface area in the dust cloud, 2 TWAs recommended for Dust NOS: ○ 5 mg/m^3 for inhalable fraction ○ 1 mg/m^3 for respirable fraction.
NICNAS	✓	unknown	• Identified as low concern to human health; no further 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	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	NA
DFG	NA
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

Insufficient data to assign a skin notation.

IDLH

Is there a suitable IDLH value available? No

Additional information

Molecular weight:	574.29
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

Australian Institute of Occupational Hygienists (AIOH) (2016) Dusts not otherwise specified (dust NOS) and occupational health issues, Position Paper.

Health Council of the Netherlands (HCOTN) (2003) Perlite. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/086.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) Perlite, expanded: Human health tier I assessment – IMAP report.