PERFLUOROISOBUTYLENE

CAS number: 382-21-8

Synonyms: Octafluoroisobutylene, octafluoro-sec-butene, PFIB

Chemical formula: C_4F_8

Structural formula: —

Workplace exposure standard (interim)

TWA: —

STEL: —

Peak limitation: **0.01 ppm (0.082 mg/m^3)**

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 0.01 ppm (0.082 mg/m^3) is recommended in the interim to protect for respiratory tract irritation, pulmonary oedema, cyanosis and effects on the haematopoietic system (blood) in exposed workers.

A priority review of the data for the chemical is recommended in the next scheduled review.

Discussion and conclusions

Perfluoroisobutylene (PFIB) is a by-product, formed during tetrafluoroethene production and during thermal degradation of polytetrafluoroethene.

No human toxicological data are available. Based on limited animal data, acute studies appear to show an '*all or none*' response that includes acute pulmonary and adverse systemic effects in other organs. Rats exposed at 0.24 ppm, 0.25 ppm or 0.49 ppm for four hours exhibited changes in conditioned reflexes, pulmonary oedema, hyperpnoea, dyspnoea and increased activity of glutamicoxaloacetic and glutamicpyruvic transaminase in blood serum. While rats exposed at 0.12 ppm exhibited no symptoms in this study. Repeated exposure for 10 days at 0.1 ppm in rats showed mild respiratory impairment, restlessness and cyanosis (ACGIH, 2018).

Given the limited available data and highly toxic nature of the chemical, the current peak limitation of 0.01 ppm (0.082 mg/m^3) by SWA is recommended in the interim and aligns with TLV-Ceiling by ACGIH (2001). A priority evaluation 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.

There are insufficient data to recommend a skin notation.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1991***	***Peak limitation: 0.01 ppm (0.082 mg/m^3)***
ACGIH	***2001***	***TLV-Ceiling: 0.01 ppm (0.082 mg/m^3)***
TLV-ceiling recommended to minimise the risk of respiratory tract irritation, pulmonary oedema, cyanosis and irritation to the haematopoietic system. No specific derivation provided; based on limited animal data but considered relatively consistent. Summary of data: No human data available. Animal data: • 2 h LC_{50}: 1.05 ppm (rats); 0.98–1.6 ppm (mice); 1.2–4.3 ppm (rabbits); 1.05 ppm (guinea pigs); 3.1 ppm (cats) • Exposure at 61–183 ppm to rats, mice and rabbits lethal within 3 min • Changes in conditioned reflexes, oedema in the lungs and increased glutamicoxaloacetic and glutamicpyruvic transaminases activity in blood serum at 0.24 or 0.49 ppm (rats, 4 h, inhalation): o little or no change at 0.12 ppm • Hyperpnoea or dyspnoea in some animals for 3 h post exposure reported at 0.25 ppm (rats, 4 h, inhalation); other effects were hyperaemia, sneezing and mild responsiveness • No signs of observable response or histopathologic changes reported at a repeat exposure of 0.1 ppm in male rats (5 exposure d, 2 rest d, 5 exposure d) • Mild respiratory impairment and restlessness at repeat exposure at 0.1 ppm in rats (10 consecutive d); sometimes followed by cyanosis; no pathological changes • Acute studies appear to show ‘all or none’ response and animals generally recovered if they survived for 24 h following exposure. Chemical produced in conjunction with numerous other materials in industrial processes and therefore, possible additive or synergistic effects associated with exposure to these substances should be considered. Insufficient data to recommend skin, SEN or carcinogenicity notations.		
DFG	***NA***	***NA***
No report.		
SCOEL	***NA***	***NA***
No report.		
OARS/AIHA	***NA***	***NA***
No report.		
HCOTN	***NA***	***NA***
No report.		

Secondary source reports relied upon

Source		Year	Additional information
ECHA	✓	2019	• 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	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	—
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

Insufficient data to assign a skin notation.

IDLH

Is there a suitable IDLH value available?	No

Additional information

Molecular weight:	200.03
Conversion factors at 25°C and 101.3 kPa:	1 ppm = 8.13 mg/m^3; 1 mg/m^3 = 0.122 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.

European Chemicals Agency Regulation (ECHA) (2019) 1-Propene, 1,1,3,3,3-pentafluoro-2-(trifluoromethyl)-: Infocard.