BROMINE PENTAFLUORIDE

CAS number: 7789-30-2

Synonyms: Pentafluoro-λ5-bromane

Chemical formula: BrF_5

Workplace exposure standard (retained)

TWA: **0.1 ppm (0.72 mg/m^3)**

STEL: **—**

Peak limitation: **—**

Notations: **—**

IDLH: **1.7 ppm**

Sampling and analysis: The recommended value is quantifiable through available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.1 ppm (0.72 mg/m^3) is recommended to protect for eye, skin and respiratory irritation in exposed workers.

Discussion and conclusions

Bromine pentafluoride is used as a fluorinating agent in the production of fluorocarbons. High exposure for short periods is reported to cause serious lung injury including pulmonary fibrosis, emphysema, collapse or closing of a lung (atelectasis) and bronchitis. Low exposure results in breathing difficulties and watering of the eyes. Contact with vapour or liquid with skin or eyes causes severe burns.

Limited data exists, preventing clear identification of a NOAEL. However, bromine pentafluoride has similar toxicological properties to chlorine trifluoride (ACGIH 2018). The recommended TWA of 0.1 ppm is based on available data for both bromine pentafluoride and chlorine trifluoride and is considered protective for irritant effects in exposed workers.

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: 0.1 ppm (0.72 mg/m^3)***
ACGIH	***2001***	***TLV-TWA: 0.1 ppm (0.72 mg/m^3)***

TWA recommended to minimise the potential for significant irritation of the eyes, skin and respiratory tract.
Summary of data:
Human data:
• Short-term exposure to high concentrations reported to cause serious lung injury including pulmonary fibrosis, emphysema, atelectasis and bronchitis
  ○ exposure to lower concentrations resulted in breathing difficulties and watering of the eyes (no specific concentrations or further information provided)
• Contact with vapour or liquid causes substantial burns to the skin and eyes.
Animal data:
• Chemical reactivity similar to ClF_3
• LC_{50}: 480 ppm as ClF_3 (rats, 40 min)
• LC_{50}: 96 ppm as ClF_3 (rats, 3.7 h)
• 1/2 dogs and 5/20 rats died during inhalation study to 1.17 ppm for 6 h/d, 5 d/wk for 6 mo
  ○ animals also showed signs of severe eye and respiratory irritation
  ○ symptoms less severe and longer to develop at lower concentrations
• No chronic, carcinogenicity or genotoxicity studies reported.
 	
Available evidence does not present a NOAEL.
The TLV-TWA was historically adopted from ClF_3 and justified due to similar toxicological properties.
Insufficient data to assign skin, sensitiser 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

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?	Yes

Additional information

Molecular weight:	174.9
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.

US National Institute for Occupational Safety and Health (NIOSH) (2017) Immediately dangerous to life or health concentrations – Bromine Pentafluoride.