

HEXAFLUOROACETONE

CAS number: 684-16-2

Synonyms: HFA

Chemical formula: C_3F_6O

Structural formula: —

Workplace exposure standard (interim)

TWA: 0.1 ppm (0.68 mg/m³)

STEL: —

Peak limitation: —

Notations: Sk.

IDLH: 9 ppm (61 mg/m³)

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

Recommendation and basis for workplace exposure standard

An interim TWA of 0.1 ppm (0.68 mg/m³) is recommended to protect for kidney and testicular damage in exposed workers and developmental effects on the foetus.

Given the limited data available from the primary sources and the severity of the potential effects on the foetus, it is recommended that a review of additional sources be conducted as a priority at the next scheduled review.

Discussion and conclusions

Hexafluoroacetone is used as a chemical intermediate, solvent and polymer adhesive.

Critical effects of exposure include renal dysfunction and testicular damage as well as potential effects on the foetus. Limited data in humans exist in the primary sources. Available animal data indicates a NOAEC of 0.1 ppm in rats based on gross biochemical, haematological or histopathological changes (ACGIH, 2018). A LOAEC of 0.11 ppm (0.76 mg/m³) is reported in rats based on fetotoxic effects (HCOTN, 2000). There is inconsistency in the primary sources regarding end-point for fetotoxicity (ACGIH, 2018; HCOTN, 2000).

The current TWA of 0.1 ppm (0.68 mg/m³) is recommended to be retained in the interim until sufficient data is made available to resolve uncertainties. This TWA is expected to protect for potential effects in the foetus in exposed workers.

Given the severity of the potential outcomes of exposure to hexafluoroacetone, 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.

A skin notation is recommended based on evidence suggesting potential dermal absorption and adverse systemic effects in animals.

DRAFT

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 0.1 ppm (0.68 mg/m³)
ACGIH	2001	TLV-TWA: 0.1 ppm (0.68 mg/m³)
<p>TLV-TWA recommended to minimise the risk of renal dysfunction and testicular damage in exposed workers.</p> <p>Summary of data:</p> <p>Animal data:</p> <ul style="list-style-type: none"> Exposure to 60, 100, 200, 300 ppm (rats, inhalation; 4 h): <ul style="list-style-type: none"> 300 ppm: lethal 200 ppm: injury to liver, kidney, testes and thymus 100 ppm: damage to testes 60 ppm: (6 h/d) decreased spermatogenesis, bone marrow erythropoiesis at 10 d NOAEC: 0.1 ppm (rats and dogs, 6 h/d, 5 d/wk, 90 d) for gross biochemical, haematologic or histopathological changes. TLV based mainly on this study: <ul style="list-style-type: none"> severe acute injury at 12 ppm (rats and dogs) including renal dysfunction NOAEL: 13 mg/kg/d (rats, 14 d, dermal) for testicular degeneration and atrophy NOAEL: 1 mg/kg/d (rats, GD 6–16, dermal) for litter size, weight, foetal resorptions and increase in soft tissue and external abnormalities; but a definite teratogenic response not concluded. <p>A skin notation is warranted as dermal application to rats indicated systemic effects (testicular degeneration and possible developmental toxicity).</p> <p>Insufficient data to recommend a sensitiser or carcinogen notation.</p>		
DFG	NA	NA
No report.		
SCOEL	NA	NA
No report.		
OARS/AIHA	NA	NA
No report.		



Source	Year set	Standard
HCOTN	2000	TWA: 0.1 ppm (0.7 mg/m³)
<p>Recommends a health-based OEL of 0.05 mg/m³.</p> <p>Summary of additional data:</p> <p>Human data:</p> <ul style="list-style-type: none"> • LC₅₀: 1,898 mg/m³ (rats, 3 h) • LOAEC: 0.11 ppm (0.76 mg/m³) (rats, 6 h/d, GD 7–16) for fetotoxic effects; applies a safety factor of 18 to account for absence of NOAEL and inter- and intraspecies difference and rounding according to HCOTN methodology to arrive at recommendation of 0.05 mg/m³ • Negative in mutagenicity assays. 		

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	Skin
DFG	NA
SCOEL	NA
HCOTN	NA
IARC	NA
US NIOSH	Skin

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

Adverse effects in human case study: no

Dermal LD₅₀ ≤ 1000 mg/kg:

Dermal repeat-dose NOAEL ≤ 200 mg/kg: yes

Dermal LD₅₀/Inhalation LD₅₀ < 10:

In vivo dermal absorption rate > 10%:

Estimated dermal exposure at WES > 10%:

consider assigning a skin notation

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight: 166.02

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
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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.

Health Council of the Netherlands (HCOTN) (2001) Hexafluoroacetone. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/023.

US National Institute for Occupational Safety and Health (NIOSH) (2016) Immediately dangerous to life or health value profile – Hexafluoroacetone.