

HEXACHLORONAPHTHALENE

CAS number: 1335-87-1

Synonyms: Halowax 1014

Chemical formula: $C_{10}H_2Cl_6$

Workplace exposure standard (interim)

TWA: 0.2 mg/m³

STEL: —

Peak limitation: —

Notations: Sk.

IDLH: 2 mg/m³

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

Recommendation and basis for workplace exposure standard

A TWA of 0.2 mg/m³ is recommended to protect for liver damage in exposed workers.

Given the limited data available from the primary sources, it is recommended that a review of additional sources be conducted at the next scheduled review.

Discussion and conclusions

Hexachloronaphthalene is commonly used in electric wire insulation and lubricants.

Limited data indicate the critical effects of exposure as hepatotoxicity and chloracne. Limited toxicological evidence exists in humans and animals. Yellow liver atrophy is reported in industrial settings following exposure to a mixture of penta- and hexachloronaphthalene at 1 to 2 mg/m³. Minor liver damage is reported in rats exposed to a mixture of penta- and hexachloronaphthalene at 1.16 mg/m³ in a repeat exposure study (ACGIH, 2018). Based on a six-week inhalational study in rats that reported liver effects at 1 mg/m³, HCOTN (2000) concluded that an administrative TWA of 0.2 mg/m³ was too high. ACGIH (2001) based a TLV-TWA of 0.2 mg/m³ by analogy to the less toxic pentachloronaphthalene (TLV-TWA of 0.5 mg/m³). DFG (1999) states that because of the lack of data, liver damage in humans cannot be excluded at 0.1 mg/m³.

A TWA of 0.2 mg/m³ is consistent across primary sources and is recommended to be retained in the interim. There are inconsistent data and findings about the potential of hexachloronaphthalene to elicit liver effects in humans. As such it is recommended that a review of additional data sources is undertaken 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 humans.

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APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 0.2 mg/m³
ACGIH	2001	TLV-TWA: 0.2 mg/m³
<p>TLV-TWA recommended to minimise the risk of liver damage and chloracne in exposed workers. The recommendation was in part by analogy to pentachloronaphthalene; no explanation of derivation ('somewhat lower value is indicated').</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> Concentrations of a mixture of penta- and hexachloronaphthalene reported at 1–2 mg/m³ in industrial settings: <ul style="list-style-type: none"> reported case of yellow atrophy of the liver; no further information Contact with insulation comprising a mixture of penta- and hexachloronaphthalene reported outbreaks of chloracne. <p>Animal data:</p> <ul style="list-style-type: none"> Ingestion, inhalation and feeding studies suggested hexachloronaphthalene is more toxic than pentachloronaphthalene Repeated exposure to a mixture of penta- and hexachloronaphthalene at 8.9 mg/m³ (rats, 4.5 mo, inhalation) was fatal: <ul style="list-style-type: none"> symptoms included jaundice, fatty degeneration and centrilobular necrosis of the liver minor liver injury occurred at 1.16 mg/m³. <p>A skin notation is recommended as chlorinated naphthalenes may be absorbed through the skin. Insufficient data to recommend a sensitiser or carcinogen notation.</p>		
DFG	1999	Not Established
<p>Hexachloronaphthalene assessed as larger chlorinated naphthalenes group. Because of lack of data, liver damage in humans cannot be excluded at levels of 0.1 mg/m³.</p> <p>Summary of additional data:</p> <p>Used in WWII in paint on ships hulls with dermal exposure still possible when handling material.</p> <p>Human data:</p> <ul style="list-style-type: none"> Application to ears (50% in oil, 30 d) and dorsal skin (30 mg/g in acetone, 6 wk) led to chloracne (no further information). <p>Animal data:</p> <ul style="list-style-type: none"> Slight dermatitis and reduction of hair follicles in rabbits Hyperkeratosis in pigs and cows 30 mg/g in acetone, 5 d to rabbit ear caused reduction of sebaceous glands. 		
SCOEL	NA	NA
No report.		



Source	Year set	Standard
OARS/AIHA	NA	NA
No report.		
HCOTN	2000	TWA: 0.2 mg/m³
Concludes the present TWA is too high considering the effects found in inhalation studies in rats. Summary of additional data: Human data: <ul style="list-style-type: none"> Exposure to 2 mL at 3% (daily, 6–12 wk, dermal) increase in number of epidermal cells, follicular involvement without erythema, follicular accentuation and comedones Multiple occupational exposure studies link liver damage to long term exposure to various polychlorinated naphthalenes, the weight of these studies is limited given the mixture of compounds and lack of detailed concentration information. Animal data: <ul style="list-style-type: none"> Exposure at 1 mg/m³, (rats, 6 wk, inhalation) resulted in effects in the liver. 		

Secondary source reports relied upon

NIL.

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	NA
HCIS	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Skin
DFG	NA
SCOEL	NA
HCOTN	Skin
IARC	NA



Source	Notations
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
Conclusion:
Adverse effects in human case study: yes
Dermal LD ₅₀ ≤ 1000 mg/kg:
Dermal repeat-dose NOAEL ≤ 200 mg/kg:
Dermal LD ₅₀ /Inhalation LD ₅₀ < 10:
<i>In vivo</i> dermal absorption rate > 10%:
Estimated dermal exposure at WES > 10%:
a skin notation is warranted

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight:	334.8
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:	<input type="checkbox"/>
This chemical is a biological product:	<input type="checkbox"/>
This chemical is a by-product of a process:	<input type="checkbox"/>
A biological exposure index has been recommended by these agencies:	<input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> 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) (1999) Chlorinated naphthalenes– MAK value documentation.

Health Council of the Netherlands (HCOTN) (2000) Hexachloronaphthalene. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/007.

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