

HEXACHLOROCYCLOPENTADIENE

CAS number: 77-47-4

Synonyms: 1,2,3,4,5,5'-hexachloro-1,3-cyclopentadiene, perchlorocyclopentadiene, hexachloro-1,3-cyclopentadiene, 1,2,3,3,4,5-hexachloro-1,4-cyclopentadiene, HCCP

Chemical formula: C_5Cl_6

Structural formula: —

Workplace exposure standard (interim)

TWA: 0.01 ppm (0.11 mg/m³)

STEL: —

Peak limitation: —

Notations: —

IDLH: —

Sampling and analysis: There is uncertainty regarding quantification of the recommended value with available sampling and/or analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.01 ppm (0.11 mg/m³) is recommended to protect for skin and respiratory tract irritation and possible systemic effects in exposed workers.

Discussion and conclusions

Hexachlorocyclopentadiene is used as an intermediate in the manufacture of chlorinated pesticides. It is highly irritating and has pungent odour.

Limited human data are available. Critical effects of exposure include skin and respiratory tract irritation and potential kidney damage. A case report in workers noted irritant effects. A LOAEC of 0.11 mg/m³ (0.01 ppm) for pigmentation of the respiratory epithelium of the nose, trachea and lungs and laryngeal lesions is identified in rats and mice (HCOTN, 2003). In reference to the observed effects in same study, DFG (2001) stated that the 'relevance [to humans] is still unclear'. The US EPA (2001) reports a human equivalent concentration NOAEC of 0.024 mg/m³ based on inflammation of the nose in mice in a chronic inhalation study. A study of animals exposed at 0.15 ppm for seven hours per day over 150 days reported irritation of eyes, skin, and mucous membrane, respiratory tract and pulmonary oedema and kidney and liver injury (ACGIH, 2018).

A TWA of 0.01 ppm is consistent across primary sources and is recommended to be retained in the interim. Noting there are inconsistent data about the potential of hexachlorocyclopentadiene to elicit irritation and systemic effects, it is recommended that an investigation 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.

There are insufficient data to recommend a skin notation.

DRAFT

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 0.01 ppm (0.11 mg/m³)
ACGIH	2001	TLV-TWA: 0.01 ppm (0.11 mg/m³)
<p>TLV-TWA recommended to minimise the potential for eye, skin, mucous membrane and respiratory tract irritation. Additionally, reported responses of pulmonary oedema and kidney and liver injury in animals.</p> <p>Summary of data:</p> <p>Human data:</p> <ul style="list-style-type: none"> Limited human data Case study of 145 workers accidentally exposed: <ul style="list-style-type: none"> 59% reported eye irritation; 27% throat irritation medical examination of 41 workers 3 d after showed proteinuria and elevation of serum LDH levels. <p>Animal data:</p> <ul style="list-style-type: none"> Mortality in rabbits following single exposure at 1.5 ppm (15.9 mg/m³) for 7 h Rabbits, rats, mice and guinea pigs exposed at 0.15 ppm (1.7 mg/m³) for 7 h on 150/216 d; eye, skin, mucous membrane and respiratory tract irritation; pulmonary oedema and kidney and liver injury; 4/5 mice died: <ul style="list-style-type: none"> animals exposed at 0.34 ppm for 7 h/d, 5 d/wk; all mice and rats died after 20 exposures; 4/6 rabbits died after 25 exposures; guinea pigs survived 30 exposures Mice exposed at 0.01, 0.05 or 0.2 ppm; no increases in neoplasm (no further details). <p>Insufficient data to assign skin or sensitiser notation of TLV-STEL.</p>		
DFG	2001	Not assigned
<p>Summary of additional data:</p> <p>Insufficient data in humans to derive MAK.</p> <ul style="list-style-type: none"> Rats and mice; inflammation and necrosis of the respiratory tract following exposure; pigmentation of the respiratory epithelium of the nose, trachea and lungs and increased incidence of metaplastic changes in the larynx in female rats at 0.11 mg/m³; unknown human relevance (no further information) NOAEC of 0.56 mg/m³ (≈0.5 ppm) systemic effects in rats; 30 wk inhalation study Skin notation based on estimated skin resorption based on models: <ul style="list-style-type: none"> saturated aqueous solution concentration of 0.1% skin surface area: 2,000 cm², 1 h intake estimates of 31 and 0.3 mg; geometric mean of ≈3 mg expose at systemic NOAEC for 8 h assuming 10 m³ air inhaled; 5.6 mg intake contribution of skin resorption would be very high; 3 mg vs 5.6 mg. 		



Source	Year set	Standard
SCOEL	NA	NA
No report.		
OARS/AIHA	NA	NA
No report.		
HCOTN	2003	TWA: 0.01 ppm (0.11 mg/m³)
Summary of additional data: Current TWA is administrative and not health-based.		
<ul style="list-style-type: none"> Rats exposed at 0, 0.11, 0.57, or 2.28 mg/m³, 6 hours/day, 5 days/week for 2 yr (also cited by DFG, 2001): <ul style="list-style-type: none"> LOAEC of 0.11 mg/m³ (0.01 ppm) for laryngeal lesions as well as pigmentation of the respiratory epithelium of the nose, the bronchioles and the bronchi Recommends a health-based OEL TWA 0.0009 ppm (0.01 mg/m³); based on LOAEC with application of uncertainty factor of 12 for absence of NOAEC, intra- and interspecies variation and the type of critical effect Critical effect local; skin notation not warranted. 		

Secondary source reports relied upon

Source	Year	Additional information
US EPA	✓ 2001	<ul style="list-style-type: none"> Human equivalent NOAEC of 0.024 mg/m³ based on NOAEC of 0.56 mg/m³ in mice suppurative inflammation of the nose; chronic inhalation study.

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	H (skin)
SCOEL	NA



Source	Notations
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? No

Additional information

Molecular weight:	272.77
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
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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.

Deutsche Forschungsgemeinschaft (DFG) (2001) Hexachlorcyclopentadien – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2003) Hexachlorcyclopentadiene. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/081.