ALDRIN

CAS number:	309-00-2
Synonyms:	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-dimethanonaphthalene, HHDN, octalene
Chemical formula:	$C_{12}H_8Cl_6$
Structural formula:	

Workplace exposure standard (amended)

TWA:	**0.05 mg/m^3**
STEL:	**—**
Peak limitation:	**—**
Notations:	**Carc. 2, Sk.**
IDLH:	**25 mg/m^3**
Sampling and analysis:	There is uncertainty regarding quantification of the recommended value with currently available sampling and/or analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.05 mg/m^3 is recommended to protect for central nervous system (CNS), kidney and liver effects in exposed workers.

Discussion and conclusions

Aldrin is an insecticide similar in toxicity to dieldrin, with critical effects on CNS, liver and kidneys. Workers exposed to 1 to 3 mg/m^3 at the workplace for up to three years reported no adverse health effects. Similarly, various historic worker studies with intakes of 90 to 1,019 µg/kg have not demonstrated adverse effects on life expectancy or cancer incidence (ACGIH, 2018). No adverse effects were reported in 36 male manufacturing plant workers exposed to 5 mg/m^3 for three years. Toxic effects from accidental acute exposures have been reported to reverse rapidly (DFG, 1973). Toxicokinetic information indicates rapid dermal absorption is likely to contribute to systemic toxic effects (ACGIH, 2018).

A NOAEL of 0.1 mg/m^3 was reported in a one-year feeding study dogs and a NOAEL of 4 mg/m^3, reported from a two-year feeding study in rats.

The recommended TWA is based on the NOAELs reported in animal studies and supported by observations of no adverse effects between 1 and 3 mg/m^3 in exposed worker studies. The TWA is considered protective of CNS, kidney and liver effects.

Recommendation for notations

Classified as a category 2 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 as evidence indicates rapid absorption through the skin in animals and dermal absorption by skin contact at the workplace.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	***1990***	***TWA: 0.25 mg/m³***
Exposure standard adopted from the ACGIH TLVs list. • Limited evidence for carcinogenicity in experimental animals • Carcinogenicity through inhalation not demonstrated in animals • Inadequate human evidence for carcinogenicity.		
ACGIH	***2007***	***TLV-TWA 0.05 mg/m³ (0.003 ppm)***
TLV-TWA recommended to minimise the potential for CNS, kidney and liver (summed particulate and vapour phase). Summary of data: Human data: • No adverse effects were noted in 22 workers exposed to ≈1–3 mg/m³ (1–3 yr); primarily through inhalation with some skin contact • Various worker studies with intakes of 90–1,019 µg/d for 24, 35 and 40 yr reported no effect on life expectancy or cancer incidence. Animal data: • NOAEL: 0.025 mg/kg (dogs, 1 yr); ≡ 0.1–0.2 mg/m³ • NOAEL: 0.6 mg/kg (rats, 2 yr); ≡ 4 mg/m³ • LD_{50}: 150–1250 mg/kg (rabbits, dermal) • Reports of rapid dermal absorption leading to systemic effects • Poor offspring survival reported in dogs orally exposed • Negative results in genotoxicity assays.		
DFG	***1973***	***MAK 0.25 mg/m³***
MAK recommended to protect for effects on the CNS, kidney and liver in exposed workers. Summary of additional data: • No adverse effects in 36 male manufacturing plant workers exposed to 5 mg/m³ for 3 yr • Toxic effects (central nervous excitement, restlessness, muscle twitching, convulsions) from accidental acute exposures were reported to reverse rapidly.		
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
APVMA	✓	2016	• Traditional ADI not maintained as no longer used in agricultural practice with no industrial sponsors.

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	Carc.2; Skin
HCIS	Carcinogenicity – category 2
NICNAS	NA
EU Annex	Carcinogenicity – category 2
ECHA	NA
ACGIH	Carcinogenicity – A3; Skin
DFG	H (Skin)
SCOEL	NA
HCOTN	NA
IARC	Carcinogenicity – Group 2B
US NIOSH	SK:SYS

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:	yes	
Dermal LD_{50} ≤1000 mg/kg:	yes	
Dermal repeat-dose NOAEL ≤200 mg/kg:		
Dermal LD_{50}/Inhalation LD_{50} <10:		
In vivo 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:	364.9
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.

Australian Pesticides and Veterinary Medicines Authority (2016) Acceptable Daily Intakes for Agricultural and Veterinary Chemicals

Deutsche Forschungsgemeinschaft (DFG) (1973) Aldrin – MAK value documentation in German language.

International Agency for Research on Cancer (IARC) (2019) Dieldrin and aldrin. IARC Monographs on

Tenth Adaptation to Technical Progress Commission Regulation (EU) No 2017/776 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (the CLP Regulation).

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life and health concentrations – Aldrin.

US National Institute for Occupational Safety and Health (NIOSH) (2015) NIOSH Skin Notation Profiles: Aldrin