# Dieldrin

| CAS number: | 60-57-1 |
| --- | --- |
| Synonyms: | 2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1a.alpha.,2.beta.,2a.alpha.,3.beta.,6.beta.,6a.alpha.,7.beta.,7a.alpha.) |
| Chemical formula: | C12H8Cl6O |
| Structural formula: | — |

Workplace exposure standard (amended)

| TWA: | **0.1 mg/m3** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Carc. 2, Sk.** |
| IDLH: | **50 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 0.1 mg/m3 is recommended to protect for liver and developmental effects in exposed workers and their progeny.

## Discussion and conclusions

Dieldrin is an organochloride insecticide reported to have been used for control of pests in the corn and citrus industry. No dose-response evidence is identified in humans. The critical effects are liver damage, reproductive effects and impairment of the central nervous system (CNS).

A two-year feeding study in rats reported minimal liver changes at 2.5 ppm. A LOAEL of 2.5 ppm is reported for adverse reproductive effects in a multi-generational reproductive rat study (ACGIH 2018; DFG, 1966). The feeding dose of 2.5 ppm was reported to be equivalent to an eight-hour inhalation concentration of 1.4 mg/m3 (ACGIH, 2018). The US EPA (1988) reported a NOAEL of 0.005 mg/kg/day in rats for liver lesions. A TWA of 0.1 mg/m3 is recommended as assigned by the ACGIH (2018). This TWA is considered to be protective of adverse liver and developmental effects reported in animals.

## 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 based on dermal absorption evidence and systemic effects in animals.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 0.25 mg/m3 | |
|  |
| ACGIH 2010 TLV-TWA: 0.1 mg/m3 |
| TLV-TWA recommended to prevent liver damage, reproductive effects and CNS impairment.  Summary of data:  Human data:   * No studies with exposure data reported * Acute exposure symptoms reported as hyperirritability, convulsions and coma, possible nausea, vomiting and headache * Chronic exposure effects reported as fainting, muscle spasms, tremors and loss of weight * No clear evidence of an association between exposure and the incidence of cancer in agricultural workers.   Animal data:   * 2.5 ppm is the lowest dietary level found to produce minimal changes in rat livers (8 mo and 2 yr feeding studies) (no further information) * 2.5 ppm fed to rats reduced the number of pregnancies, reduced the numbers of young per litter and slightly reduced the survival times of the litters (no further information) * Dermal LD50: 60 mg/kg (male rat) and 90 mg/kg (female rats); 250–350 mg/kg in rabbits * Studies in animals and humans show that dieldrin is absorbed through intact skin.   TWA of 0.1 mg/m3 justified by following explanation: 2.5 ppm ≡ 1.4 mg/m3; assuming 100%, 70 kg worker and 10 m3 of air breathed per 8 h shift.  No evidence of mutagenicity.  Insufficient data to recommend a SEN notation or TLV-STEL. |
| DFG 1966 MAK: 0.25 mg/m3 |
| MAK based on oral toxicity in animals and experimental comparison with DDT and lindane.  Summary of additional data:   * Multi-generational feeding study in rats; 2.5, 12.5 and 25 ppm daily; decrease in number of pregnancies for the duration of the feeding; decrease mortality in newborns; no further information (cited by ACGIH, 2018). |
| 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 |
| --- | --- | --- | --- |
| NICNAS |  | N.D. | * Not considered to pose an unreasonable risk to the health of workers and public health on the basis of the Tier I IMAP assessment. |
| US EPA |  | 1998 | * NOAEL of 0.1 ppm (0.005 mg/kg/d for liver lesions; (rat, 2 yr feeding); LOAEL of 1.0 ppm (0.05 mg/kg/d) * NOEL of 0.005 mg/kg/d for increased liver weight; (dog, 2 yr feeding) * Carcinogenic in 7 strains of mice when administered orally. |

### 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 | Carc. 2 |
| NICNAS | — |
| EU Annex | — |
| ECHA | — |
| ACGIH | Carcinogenicity – A3, Skin |
| DFG | H (skin) |
| SCOEL | — |
| HCOTN | NA |
| IARC | — |
| 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: |  |  |  | | Dermal LD50 ≤1000 mg/kg: | yes | 3.00 |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | 3 | **consider assigning a skin notation** | |

### IDLH

| Is there a suitable IDLH value available? | Yes |
| --- | --- |

## Additional information

| Molecular weight: | 380.91 |
| --- | --- |
| 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 |
| --- | --- |
| 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*](http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2002) Dieldrin – MAK value documentation.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (N.D.) Dieldrin: Human health tier I assessment – IMAP report.

US Environmental Protection Authority (US EPA) (1988) Integrated Risk Information System (IRIS) Chemical Assessment Summary Dieldrin.

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

US National Institute for Occupational Safety and Health (NIOSH) (1969) Immediately dangerous to life or health concentrations – Dieldrin.