# Dicrotophos

| CAS number: | 141-66-2 |
| --- | --- |
| Synonyms: | Bidrin, carbicron, dimethyl cis-2-dimethylcarbamoyl-1-methylvinyl phosphate, ektafos |
| Chemical formula: | C8H16NO5P |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **0.05 mg/m3** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Sk.** |
| IDLH: | **—** |
| **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 0.05 mg/m3 is recommended to protect for cholinesterase inhibition 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

Dicrotophos has been used as a systemic and contact organophosphorus insecticide effective in targeting sucking, boring and chewing pests (ACGIH, 2018).

The critical effect of exposure is cholinesterase inhibition. No quantitative data are available from human studies. In a two-year study in rats, no inhibition of brain cholinesterase was observed at 0.05 mg/kg/day. In a two-year study in dogs, a NOAEL of 0.04 mg/kg/day is reported. A daily oral dose of 0.04 mg/kg, as reported in dogs, is approximately equivalent to a LOAEC of 0.3 mg/m3 (ACGIH, 2018). The HCOTN (2003) assign a TWA of 0.01 mg/m3 to protect for cholinergic effects in workers based on a NOAEL of 0.05 mg/kg/d in rats and what are considered to be conservative derivation factors. ACGIH (2018) recommends a TWA of 0.05 mg/m3 based on the NOAEL of 0.04 mg/kg/day in dogs and using appropriate conversion factors.

Given the evidence, an interim TWA of 0.05 mg/m3 is recommended as derived by ACGIH (2018). This TWA is expected to protect for cholinesterase inhibition in exposed workers. A review 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 dermal absorption in animals.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 0.25 mg/m3 | |
|  |
| ACGIH 2002 TLV-TWA: 0.05 mg/m3 (inhalable vapour and aerosol) |
| TLV-TWA recommended as sufficient to protect against cholinergic and other adverse effects.  Summary of Data:  Human Data:   * No quantitative human data available.   Animal Data:   * LD50: 42 mg/kg (rats, dermal) * LD50:16–21 mg/kg (rats, oral) * LC50: 90 mg/m3 (rats, 4 h) * LC50: 610–910 mg/m3 (rats, 1 h) * Whole blood and plasma cholinesterase was inhibited at 0.5 and 10 mg/kg/d as reported in a 4-wk feeding study in rats * Decreased body weight and reduced cholinesterase activity at 0.5 and 5.0 mg/kg/d reported in a 2‑yr feeding study in rats: * at 0.05 mg/kg/d plasma cholinesterase was inhibited in females only * Slightly excessive salivation and RBC and plasma cholinesterase inhibition at 0.4 mg/kg/d in a 2-yr feeding study in dogs: * there was no inhibition of RBC, brain or plasma cholinesterase at 0.04 mg/kg/d * There was statistically significant increases in SCE in cultures of hamster ovary cells at concentrations ranging from 0.03–1.0 mmol (no further information).   ACGIH converted the 0.04 mg/kg/d NOEL in dogs to an equivalent inhalation concentration of ≈0.3 mg/m3; assuming 70 kg worker, breathing 10 m3, 8 h shift and 100% absorption. No adverse effects observed at exposure levels below that cause cholinesterase inhibition. Therefore, a TLV-TWA of 0.05 mg/m3 is considered sufficient to protect for cholinergic effects (no further explanation on derivation of TLV-TWA).  Assigned an A4, not classified as a human carcinogen. |
| DFG NA NA |
| No report. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2003 TWA: 0.01 mg/m3 |
| Summary of additional data:  Animal Data:   * LD50: 168 mg/kg (rabbits, dermal) * LD50: 11 mg/kg (rabbits, oral) * An acute one day oral neurotoxicity study in rats reported LOAEL of 0.5 mg/kg based on inhibition of plasma, RBC and brain cholinesterase * Decreased body weight, food consumption and inhibition of RBC, plasma and brain cholinesterase ≥0.04 mg/kg/d reported in a 13-wk oral neurotoxicity study in rats. * The TWA was derived using the NOAEL of 0.05 mg/kg/d for inhibition of brain AChE in a 2‑yr feeding study in rats (same study as ACGIH) * adjusted by 7/5 to account for 5 d working week to NAEL of 0.07 mg/kg/d * a factor of 4 for allometric scaling from rats to humans based on caloric demand * uncertainty factor of 9 covering inter- and intraspecies variations results in human NAEL of 0.002 mg/kg/d * TWA justified by conversion of NAEL of 0.002 mg/kg/d in humans to inhalation concentration of 0.01 mg/m3; assuming 70 kg worker, breathing 10 m3/8 h shift and 100% absorption. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |

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 | Skin |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | Skin |
| DFG | NA |
| SCOEL | NA |
| HCOTN | Skin |
| 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 |
| --- |
| |  |  |  |  | | --- | --- | --- | --- | | 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: | yes | 3.00 |  | | *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? | No |
| --- | --- |

## Additional information

| Molecular weight: | 237.19 |
| --- | --- |
| 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.

Health Council of the Netherlands (HCOTN) (2003) Dicrotophos. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/069.