# Propoxur

| CAS number: | 114-26-1 |
| --- | --- |
| Synonyms: | Aprocarb, bay 39007, Baygon®, Blattanex®, IMPC,  o-isoproxy-phenyl-N-methycarbamate,  2-isoproxyphenyl-N-methylcarbamate, PHC, Suncide®, Unden® |
| Chemical formula: | C11H15NO3 |
| Structural formula: | — |

Workplace exposure standard (retained)

| TWA: | **0.5 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

A TWA of 0.5 mg/m3 is recommended to protect for cholinergic effects in exposed workers.

## Discussion and conclusions

Propoxur is used as an insecticide.

The critical effect of exposure is cholinesterase (ChE) inhibition, which causes typical cholinergic symptoms.

A NOAEC of 3 mg/m3 for red blood cell (RBC) inhibition is reported in an acute volunteer inhalation study (ACGIH, 2018). Cholinergic symptoms were elicited in humans at an oral dose at 1.5 mg/kg and symptomless RBC ChE inhibition occurred at 1 mg/kg, which is equivalent to an air concentration of 7 mg/m3 over eight hours (ACGIH, 2018). Weak evidence for cholinergic symptoms resulting from putative dermal exposure is reported for exposed workers (ACGIH, 2018). A NOAEC of 18.7 mg/m3 for RBC, plasma and brain ChE inhibition is reported in a sub-chronic study in rats, whereas bladder carcinogenicity was observed at above 2.2 mg/m3 in a chronic exposure study in rats (ACGIH, 2018).

In view of the above information, the TWA of 0.5 mg/m3 is recommended to be retained, as derived by ACGIH (2018). The recommended TWA is expected to be protective of ChE inhibition and subsequent cholinergic effects and potential carcinogenicity observed in rats.

## Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). The ACGIH (2018) recommendation for a carcinogenicity–A3 notation is inconsistent with the current entry in the HCIS database. This evaluation did not find sufficient evidence for carcinogenicity in the remaining source material.

Not classified as a skin sensitiser or respiratory sensitiser according to the GHS.

A skin notation is recommended due to evidence of dermal absorption and contribution to adverse systemic effects.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 0.5 mg/m3 | |
|  |
| ACGIH 2016 TLV-TWA: 0.06 ppm (0.5 mg/m3) |
| TLV-TWA intended to protect for cholinergic effects resulting from ChE inhibition.  Summary of data:  TLV-TWA based on weight of human animal inhalation exposure data, which suggest a NOAEC range between 3–18.7 mg/m3 for ChE inhibition; TLV-TWA of 0.5 mg/m3 therefore sufficiently low.  A3 carcinogenicity notation recommended based on increased incidence of bladder papillomas and carcinomas in chronically fed rats.  Insufficient data to recommend a skin notation; agency notes dermal absorption is an important exposure route based on workplace data.  Human data:   * Cholinergic effects following acute poisoning subside within 24 h * Cholinergic symptoms, likely from dermal exposure, in workers during spray applications * No RBC ChE inhibition at 3 mg/m3 in volunteer inhalation study (n=4, 4 h) * RBC ChE activity at 27% of baseline and gastrointestinal disturbance from single oral dose of 1.5 mg/kg in volunteer study; no cholinergic effects: * RBC ChE activity 60% of baseline at 0.75 and 1 mg/kg ≡5.25 and 7 mg/m3, respectively * 16% of dermal dose systemically available when applied to forearm in volunteer study:   + 18–64% of dermal dose excreted in another study   + further study suggests dermal absorption increases with skin moisture and humidity * Decreased birth length weakly correlated to propoxur exposure in prospective cohort study of pregnant women exposed to mixed pesticides (n=700, 1998–2002).   Animal data:   * LC50: 654 mg/m3 (rats, 4 h) * Non-lethal in 3 dermal application studies at 500, 2,000 and 5,000 mg/kg (respectively chinchillas, rabbits, rats, 24 h): * muscle fasciculations reported in rabbits at 2,000 mg/kg * NOAEL: 1,000 mg/kg (highest tested dose) for irritation, body weight changes, haematological and clinical chemistry changes: * ChE inhibition reported in sub-chronic dermal application study (rabbits, 6 h/d, 5 d/wk, 3 mo) * RBC, plasma and brain ChE inhibition at 31.7 mg/m3 in sub-chronic inhalation study with dose groups 5.7, 18.7 and 31.7 mg/m3 (rats, 6 h/d, 5 d/wk, 12 wk) * NOAEC: 18.7 mg/m3 * No histopathological evidence for carcinogenicity in chronic inhalation study with dose groups 2.2, 10.4, 50.5 mg/m3 (rats, 6.3 h/d, 5 d/wk, 2 yr): * LOAEC: 10.4 mg/m3 ≡0.6 mg/kg/d for ChE inhibition * NOAEC: 2.2 mg/m3 * Dose-related increased incidence of bladder tumours compared to controls in chronic feeding study with dose groups 10, 50, 250 mg/kg/d (rats, 2 yr): * NOAEL: 10 mg/kg/d * Dose-dependent chromosomal aberration in Chinese hamster ovarian cells *in vitro* * DNA damage *in vitro* using metabolic derivatives in human and mammalian cells * Micronucleus formation and chromosomal aberrations *in vivo* at ip dose of 25 mg/kg (mice).   Insufficient data to recommend a sensitiser notation. |
| DFG 1979 MAK: 2 mg/m3 |
| Summary of additional information:  Inadequate human data to derive MAK; sub-chronic inhalation experiment with rats indicates ChE inhibition threshold near 31.7 mg/m3 and NOAEC of 18.7 mg/m3 (also cited in ACGIH, 2018). Taken together with the low saturation point in air of 0.045 mg/m3, MAK of 2 mg/m3 expected to be protective of ChE inhibition and subsequent cholinergic symptoms.  Human data:   * Half-life (t1/2): 8 h, 84% of IV doses excreted within 120 h.   Animal data:   * Non-mutagenic *in vivo* in dominant lethal test (mice, no further details provided).   Insufficient data to assign notations for carcinogenicity, skin absorption, or sensitisation. |
| 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 |  | 2018 | * Tier I: agricultural use not assessed. |
| US EPA |  | 1987 | * Oral reference dose (RfD) principally derived from volunteer single oral dose study, in which 43% inhibition of RBC ChE and mild cholinergic symptoms reported at 0.36 mg/kg; no NOAEL was experimentally determined * Inhalation RfD and carcinogenicity assessment not available. |

### 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 | — |
| HCIS | — |
| NICNAS | — |
| EU Annex | — |
| ECHA | — |
| ACGIH | Carcinogenicity – A3 |
| DFG | — |
| SCOEL | NA |
| 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 |
| --- |
| |  |  |  |  | | --- | --- | --- | --- | | Adverse effects in human case study: | yes | 4.00 |  | | Dermal LD50 ≤1000 mg/kg: | no |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: | no | -3.00 |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | -3 | **a skin notation is warranted** | |

### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 209.24 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 8.56 mg/m3; 1 mg/m3 = 0.12 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) (1979) Propoxur – MAK value documentation, German language edition.

Deutsche Forschungsgemeinschaft (DFG) (2002) Propoxur – MAK value documentation, German language edition.

European Chemicals Agency (ECHA) (2020) Propoxur – REACH assessment.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2018) Phenol, 2-(1-methylethoxy)-, methylcarbamate: Human health tier I assessment – IMAP report.

US Environmental Protection Authority (US EPA) (1987) Integrated Risk Information System (IRIS) Chemical Assessment Summary – Baygon.