# Phosphorus pentachloride

| CAS number: | 10026-13-8 |
| --- | --- |
| Synonyms: | Phosphoric chloride |
| Chemical formula: | PCl5 |

Workplace exposure standard (retained)

| TWA: | **0.1 ppm (0.85 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **70 mg/m3** |
| **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 0.1 ppm (0.85 mg/m3) is recommended to protect for eye and respiratory tract irritation in exposed workers.

## Discussion and conclusions

Phosphorus pentachloride is primarily used as a catalyst, chlorinating and dehydrating agent.

Critical effects of exposure are eye and respiratory tract irritation. Due to the limited data from human and animal studies, ACGIH (2018) and DFG (2001) assign occupational exposure limits by analogy to other compounds. ACGIH set a TLV-TWA at half that of phosphorus trichloride (TLV-TWA 0.2 ppm) as both hydrolyse to produce hydrogen chloride and phosphorus pentachloride is expected to produce 67% more hydrogen chloride. DFG recommend setting a MAK to match the lowest MAK value of the hydrolysis products, which is phosphoryl chloride (MAK 0.2 ppm).

Given the absence of available exposure data, the SWA TWA of 0.1 ppm derived by ACGIH (2018) is recommended to be retained to limit irritant effects.

A review of additional data sources is recommended at the next scheduled review to address the absence of chronic data.

## 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.

# Appendix

### Primary sources with reports

| **Source Year set Standard** |
| --- |
| SWA 1991 TWA: 0.1 ppm (0.85 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 0.1 ppm (0.85 mg/m3) |
| TLV-TWA recommended to minimise the risk of eye and respiratory tract irritation in exposed workers.  Summary of data:  TLV assigned primarily by analogy to phosphorus trichloride as both hydrolyse to produce hydrogen chloride. Phosphorus pentachloride is expected to produce 67% more hydrogen chloride as such the TLV-TWA is half that of phosphorus trichloride.  Human data:   * Reported symptoms due to inhalation include irritation of the eyes and respiratory passage and bronchitis.   Animal data:   * Exposure at 120–130 ppm was fatal to mice in 10 min.   Insufficient data to recommend a skin, sensitiser or carcinogen notation. |
| DFG 1964 MAK: 1 mg/m3 |
| As data on the repeated inhalation is not available the MAK value must be set at the lowest MAK value of the hydrolysis products, in this case phosphoryl chloride: 0.2 ppm (1.272 mg/m3).   * Threshold concentration for the irritating effect on the respiratory tract: 10 mg/m3 (1 min), no other details provided * LC50: 205 mg/m3 (rats) no duration recorded, study was noted as poorly documented * LD50: 600 mg/kg (rats, oral), study was noted as poorly documented * Exposure at 8 or 40 mg/m3 lead to significant reduction in respiratory parameters, no other details provided. |
| 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** |
| --- | --- | --- | --- |
| ECHA |  | 2011 | * No additional information. |

### 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 | NA |
| EU Annex | NA |
| ECHA | — |
| ACGIH | — |
| 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

Insufficient data to assign a skin notation.

### IDLH

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

## Additional information

| Molecular weight: | 208.24 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 8.51 mg/m3; 1 mg/m3 = 0.118 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) (2006) Phosphorpentachlorid – MAK value documentation.

European Chemicals Agency (ECHA) (2019) Phosphorus pentachloride – REACH assessment.

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