# Phosphorus pentasuLFide

| CAS number: | 1314-80-3 |
| --- | --- |
| Synonyms: | Diphosphorus pentasulfide, phosphorus persulfide |
| Chemical formula: | P2S5 |
| Structural formula: | — |

Workplace exposure standard (retained)

| TWA: | **1 mg/m3** |
| --- | --- |
| STEL: | **3 mg/m3** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **250 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 1 mg/m3 and STEL of 3 mg/m3 is recommended to protect for respiratory irritation 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

Phosphorus pentasulfide is primarily used as a chemical intermediate, in matches and for introducing sulphur into organic compounds.

The critical effect of exposure is eye, skin and respiratory irritation.

There are limited exposure data in both human and animals. Phosphorus pentasulfide hydrolyses to phosphoric acid and hydrogen sulfide in moist air. The TLV-TWA of 1 mg/m3 and STEL of 3 mg/m3 by ACGIH (2018) is based on analogy to phosphoric acid.

The SWA TWA of 1 mg/m3 and STEL of 3 mg/m3 are the same as the TLV -TWA and STEL by ACGIH and are recommended to be retained to limit irritant effects.

A priority 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.

A skin notation is not warranted based on the available evidence.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 1 mg/m3; STEL: 3 mg/m3 | |
|  |
| ACGIH 2001 TLV-TWA: 1 mg/m3; TLV-STEL: 3 mg/m3 |
| TLV-TWA recommended to minimise the risk of eye, skin, and respiratory tract irritation exposed workers.  Summary of data:  Due to the lack of toxicity data and as phosphorus pentasulfide hydrolyses in moist air to phosphoric acid (and hydrogen sulfide), the toxicity data and TLV-TWA for phosphoric acid (TLV-TWA 1 mg/m3 and STEL 3 mg/m3) are considered applicable for phosphorus pentasulfide.  Human data:   * Primary inhalation effect is respiratory irritation, pulmonary irritation estimated at 10 mg/m3, no other details provided * Phosphorus poisoning occurs most commonly as a result of ingestion, death results from gastroenteritis, hepatic and renal failure and in some cases acute myocardial infarction.   Animal data:   * No animal data specific to phosphorus pentasulfide was reviewed, symptoms of acute poisoning include: * monocytosis and fatty degeneration of the Kupffer cells in guinea pigs * acute hepatic necrosis in dogs and rats * accumulates in rat liver with peak concentrations at 2–3 h (oral) * skin contact can induce severe burns, can be absorbed through burned rabbit skin to induce acute electrocardiographic alterations.   Insufficient data to recommend a skin, sensitiser or carcinogen notation. |
| DFG 2004 Not assigned |
| Due to insufficient data, the existing MAK value is suspended.  Summary of additional data:   * LD50: 389 mg/kg (rats, oral), 750 mg/kg (mice, oral) * LD50: 3,160 mg/kg (rabbits, dermal) * No observed adverse effects at 100 mg/kg/d (rats, 28 exposure, 43 d, oral). |
| 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 | * Negative results in *S. typhimurium* mutagenicity assay. |

### 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 | NA |
| 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

| Calculation |
| --- |
| |  |  |  |  | | --- | --- | --- | --- | | Adverse effects in human case study: | no |  |  | | Dermal LD50 ≤1000 mg/kg: | no |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  |  | **a skin notation is not warranted** | |

### IDLH

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

## Additional information

| Molecular weight: | 444.56 |
| --- | --- |
| 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) (2004) diphosphorpentasulfid – MAK value documentation.

European Chemicals Agency (ECHA) (2011) Diphosphorus pentasulphide – REACH assessment.

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