

# PHENYLPHOSPHINE

**CAS number:** 638-21-1

**Synonyms:** Phosphine, phenyl-

**Chemical formula:**  $C_6H_7P$

**Structural formula:** —

## Workplace exposure standard (amended)

**TWA:** —

**STEL:** —

**Peak limitation:** —

**Notations:** —

**IDLH:** —

**Sampling and analysis:** N/A

## Recommendation and basis for workplace exposure standard

This chemical has been nominated for removal from the Workplace exposure standards for airborne contaminants due to a lack of evidence that it is used or generated in Australian workplaces or that it presents a potential for legacy exposure. Therefore, a TWA is not recommended.

## Discussion and conclusions

Phenylphosphine is used as a chemical reagent and an intermediate. Potential exposures occur when phenylphosphinates are heated above 200°C. There is lack of evidence that this chemical is used or generated in Australian workplaces or that it presents a potential for legacy exposure.

Based on limited animal data, the critical effects of exposure include testicular degeneration, haematological changes (anaemia, decreased haemoglobin and haematocrit) and dermatitis.

The only reported human study involved an odour panel that readily detected the presence of the chemical at 0.57 ppm (2.6 mg/m<sup>3</sup>), describing the odour as obnoxious (ACGIH, 2018; HCOTN, 2000). A LOAEL of 0.6 ppm for testicular degeneration, haematological effects and dermatitis is reported in animals from a sub-chronic inhalation study (ACGIH, 2018; HCOTN, 2000). ACGIH (2018) considers daily exposures at 2.2 ppm to constitute a frank-effect level and 0.6 ppm the threshold-effect level for systemic toxicity. ACGIH (2018) recommend a peak limitation of 0.05 ppm (0.23 mg/m<sup>3</sup>). HCOTN (2000) recommend a health-based OEL (HBROEL) of 0.01 ppm (0.05 mg/m<sup>3</sup>), while an administrative occupational exposure limit (OEL) of 0.05 ppm is currently in place.

This chemical has been nominated for removal from the WES list. A TWA is not recommended.

## 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 sensitizer or respiratory sensitizer according to the GHS.

There are insufficient data to recommend a skin notation.

DRAFT

## APPENDIX

### Primary sources with reports

| Source                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Year set    | Standard                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------|
| <b>SWA</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>1991</b> | <b>TWA: 0.05 ppm (0.23 mg/m<sup>3</sup>) (Peak limitation)</b> |
| <b>ACGIH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>2001</b> | <b>TLV-Ceiling: 0.05 ppm (0.23 mg/m<sup>3</sup>)</b>           |
| <p>TLV-Ceiling recommended to minimise the potential for reproductive, haematologic or dermatologic changes.</p> <p>Summary of data:</p> <p>Used as a chemical reagent or intermediate and potential exposures occur when phenylphosphinates are heated &gt;200°C.</p> <p>Human data:</p> <ul style="list-style-type: none"> <li>0.57 ppm detected by 3-person odour panel, described as obnoxious; lower concentrations not evaluated.</li> </ul> <p>Animal data:</p> <ul style="list-style-type: none"> <li>4 h LC<sub>50</sub> of 38 ppm (rats); effects included red ears, excessive salivation, lacrimation, face-pawing and dyspnoea; no effects noted in tissue</li> <li>Rats exposed at 0 or 7.6 ppm (inhalation, 4 h/d, 5 d/wk, 10 exposures): <ul style="list-style-type: none"> <li>decreased weight gain, mild respiratory irritation, temporary dermatitis around mouth and feet and increased haematopoiesis in spleen in exposed rats</li> </ul> </li> <li>Exposure at 0, 0.6 or 2.2 ppm (inhalation, 6 h/d, 5 d/wk, 90 d) in male and female rats and dogs: <ul style="list-style-type: none"> <li>0.6 ppm in rats: hypersensitivity to sound and touch, mild hyperaemia, mild dermatitis</li> <li>2.2 ppm in rats: anaemia, decreased haemoglobin and haematocrit (reversed following cessation of exposure), mild haemolytic anaemia, dermatitis and severe testicular degeneration (did not return to normal during post-exposure observation)</li> <li>0.6 and 2.2 ppm in dogs: some hind-leg tremor, intermittent loss of appetite, nausea, diarrhoea and lacrimation</li> <li>2.2 ppm in dogs: mild testicular degeneration (reversible).</li> </ul> </li> </ul> <p>Insufficient data to recommend skin, SEN or carcinogenicity notations.</p> |             |                                                                |
| <b>DFG</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>NA</b>   | <b>NA</b>                                                      |
| No report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                |
| <b>SCOEL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>NA</b>   | <b>NA</b>                                                      |
| No report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                |
| <b>OARS/AIHA</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>NA</b>   | <b>NA</b>                                                      |
| No report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                |



| Source                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Year set    | Standard                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------|
| <b>HCOTN</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>2000</b> | <b>Ceiling limit: 0.05 ppm (0.25 mg/m<sup>3</sup>)</b> |
| Summary of additional data:                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                        |
| <ul style="list-style-type: none"> <li>• Current administrative OEL</li> <li>• No data on exposed workers, mutagenicity, genotoxicity or carcinogenicity have been found</li> <li>• Should be considered very toxic by inhalation</li> <li>• LOAEL of 0.6 ppm (from 90-d inhalation study in rats, also cited in ACGIH, 2001) used as starting point for HBROEL. An overall assessment factor of 54 was applied to derive recommended TWA of 0.01 ppm (0.05 mg/m<sup>3</sup>).</li> </ul> |             |                                                        |

## Secondary source reports relied upon

| Source   | Year   | Additional information                                  |
|----------|--------|---------------------------------------------------------|
| US NIOSH | ✓ 2007 | • NIOSH REL=ceiling 0.05 ppm (0.25 mg/m <sup>3</sup> ). |

## 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      | NA        |
| HCIS     | NA        |
| NICNAS   | NA        |
| EU Annex | NA        |
| ECHA     | NA        |
| ACGIH    | NA        |
| DFG      | NA        |
| 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? No

## Additional information

|                                                                     |                                                                                            |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Molecular weight:                                                   | 110.1                                                                                      |
| Conversion factors at 25°C and 101.3 kPa:                           | 1 ppm = 4.6 mg/m <sup>3</sup> ; 1 mg/m <sup>3</sup> = 0.22 ppm                             |
| This chemical is used as a pesticide:                               | <input type="checkbox"/>                                                                   |
| This chemical is a biological product:                              | <input type="checkbox"/>                                                                   |
| This chemical is a by-product of a process:                         | <input type="checkbox"/>                                                                   |
| A biological exposure index has been recommended by these agencies: | <input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> SCOEL |

## Workplace exposure standard history

| Year                     | Standard |
|--------------------------|----------|
| Click here to enter year |          |

## References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7<sup>th</sup> Edition Documentation, CD-ROM, Single User Version. Copyright 2018. Reprinted with permission. See the [TLVs® and BEIs® Guidelines section](#) on the ACGIH website.

Health Council of the Netherlands (HCOTN) (2000) Phenylphosphine. Health-based Reassessment of Administrative Occupational Exposure Limits. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/013.

US National Institute for Occupational Safety and Health (NIOSH) (2007) NIOSH Pocket Guide To Chemical Hazards – Phenylphosphine.