# PCBs (42% Chlorine)

| CAS number: | 53469-21-9 |
| --- | --- |
| Synonyms: | Aroclor 1242®, chlorinated biphenyl, chlorinated diphenyl, PCB, PCB 1242, polychlorinated biphenyl, trichlorobiphenyl |
| Chemical formula: | C12H7Cl3 (approximate) |
| Structural formula: | — |

Workplace exposure standard (amended)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Sk.** |
| IDLH: | **5 mg/m3** |
| **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

Polychlorinated biphenyls (PCB) are used in insulating liquids, synthetic rubber, plasticisers, flame retardants and wide range of similar products. There is lack of evidence that this chemical is used or generated in Australian workplaces or that it presents a potential for legacy exposure.

PCB are a group of 209 possible congeners that differ by the number and position of chlorine atoms at biphenyl. This evaluation relates to information specifically regarding PCB containing 42% chlorine and does not address the wide range of PCBs.

Critical effects of exposure to PCB (42%) are liver injury and chloracne. Irritation of the eyes, mucous membranes and respiratory tract may also occur as a result of exposure. While carcinogenicity is demonstrated in animal studies when exposed orally, there is no evidence of cancers *via* inhalation.

Limited toxicological data are available. Seven cases of mild to moderate chloracne are reported among workers exposed at approximately 0.1 mg/m3 of PCB vapour. No further details are provided. A study in 34 workers reported complaints of burning of eyes, face and skin associated with exposure at 0.32 to 2.22 mg/m3 for between five and 23 years. Some abnormal values are identified in hepatic (liver) function tests. However, the mean for the group was within the normal range (ACGIH, 2018). Exposure at 10 mg/m3 is reported as unbearably irritating (NIOSH, 1994).

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). Evidence suggest some PCB may have carcinogenic properties and a review of the classification is recommended.

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

A skin notation is recommended based on a report that PCB are absorbed through the skin of animals, causing fatty degeneration of the liver.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1997 TWA: 1 mg/m3; STEL: 2 mg/m3 | |
| Adopted from ACGIH.   * Carcinogenicity review concluded certain PCB (particularly with >50% chlorine) produced benign and malignant liver neoplasms in mice and rats after oral administration * Carcinogenicity of PCB through inhalation not demonstrated in animals * Limited evidence for carcinogenicity of PCB in humans. |
| ACGIH 2001 TLV-TWA: 1 mg/m3 |
| TLV-TWA recommended to minimise the potential for irritation of the eyes, skin and respiratory tract, liver injury and chloracne.  Summary of data:  No derivation provided; may not protect for chloracne in sensitive individuals.  Human data:   * 7 cases of mild to moderate chloracne among workers exposed at ≈0.1 mg/m3 * Reports of deaths due to atrophy of the liver following exposure to fumes of PCB and chloronaphthalenes; few identified reports of systemic poisoning to just PCB * 34 workers exposed at 0.32–2.22 mg/m3 for 5–23 yr; complaints of burning of eyes, face and skin; some abnormal values in hepatic function test but mean for group normal * Concentration of 10 mg/m3 reported as unbearably irritating.   Animal data:   * No detectable effects in cats, rabbits, guinea pigs, rats, mice exposed at 1.9 mg/m3 150 times for 7 h, 7 mo; 17 x 7-h exposures over 24 d at 8.6 mg/m3 demonstrated no injury * Absorbed through skin, causing fatty degeneration of the liver. No further information. |
| DFG 2014 1.1 mg/m3 |
| No report provided. MAK obtained from website.  Note: Separate MAK of 0.003 mg/m3 recommended for a range of chlorinated biphenyls to protect for effects in the liver.  Summary of data:   * Human data not suitable to derive MAK value; animal data used * MAK considers varying toxicity of dioxin-like chlorinated biphenyls, the toxicity of the non-dioxin-like chlorinated biphenyl and ubiquitous background levels. |
| 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 |
| --- | --- | --- | --- |
| US NIOSH |  |  | * OSHA PEL of 1 mg/m3 * NIOSH REL: 0.001 mg/m3 TWA; NIOSH considers some chlorinated biphenyls a potential occupational carcinogen as per OSHA carcinogen policy * Reported concentrations >10 mg/m3 unbearably irritating, no further information * Several deaths due to atrophy of the liver occurred among workers chronically exposed to the fumes of chlorinated biphenyls and chloronaphthalenes. |

### 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 | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | Skin |
| DFG | Carcinogenicity – 4 |
| 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 |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

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

## Additional information

| Molecular weight: | 266.5 |
| --- | --- |
| 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) (2014) Access via website.

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