# Biphenyl

| CAS number: | 92-52-4 |
| --- | --- |
| Synonyms: | Diphenyl, phenylbenzene |
| Chemical formula: | C12H10 |
| Structural formula: |  |

 Workplace exposure standard (retained)

| TWA: | **0.2 ppm (1.3 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
|  Notations: | **—** |
| IDLH: | **15.9 ppm (100 mg/m3)** |
| Sampling and analysis: | The recommended value is readily quantifiable through currently available sampling and analysis techniques.  |

## Recommendation and basis for workplace exposure standard

A TWA of 0.2 ppm (1.3 mg/m3)is recommended to protect for nasal mucosal irritant effects and respiratory conditions in exposed workers.

## Discussion and conclusions

Biphenyl is used mainly in the production of heat-transfer fluids and dye carriers. The critical effects of exposure in animals are irritation of the nasal mucous membranes and respiratory symptoms (breathing difficulties) at exposures at and above 5 mg/m3. In humans no respiratory effects are reported at exposures below 1 mg/m3. Carcinogenicity is reported in animals at very high oral doses (4,500 mg/kg over two years). However, there is limited data from human studies to support carcinogenicity effects from chronic exposures and this is not expected to be a critical effect of exposure.

The recommended TWA is expected to protect workers from irritation effects and reduce the risk of developing respiratory symptoms.

## 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 recommended as there is no evidence of systemic effects resulting from skin absorption.

# Appendix

### Primary sources with reports

| Source Year set Standard  |
| --- |
| SWA 1991 TWA: 0.2 ppm (1.3 mg/m3) |
|  |
| ACGIH 2001 TLV-TWA: 0.2 ppm (1.3 mg/m3) |
| TLV-TWA recommended to minimise the potential for irritation of nasal mucous membranes and respiratory difficulties.Summary of data:Human data:* Evidence of transient nausea, vomiting and bronchitis when exposed to vapours (concentration not specified)
* No detectable respiratory, blood or urinary changes at airborne concentrations <1 mg/m3
* Indication of central and peripheral nerve damage and liver changes in historical review of chronic heavy exposures (0.6–123 mg/m3 average).

Animal data:* Nasal mucosa irritation, bronchopulmonary lesions, respiratory symptoms and slight toxic liver and kidney effects seen in rats (300 mg/m3, inhalation, 7 h/d, 64 d)
* Respiratory difficulties in mice (5 mg/m3, inhalation, 7 h/d, 64 d)
* LD50: 3,280 mg/kg (rats, no duration provided, oral)
* LD50: 2,400 mg/kg (rabbits, no duration provided, oral).

Sufficient data not available to recommend a skin or sensitiser notation. |
| DFG 2012 NA |
| MAK not established due to potential carcinogenicity.Limited human studies available. Summary of additional data:Animal data:* Bladder tumours observed in rats in connection with bladder stones following high oral doses (31/43 with bladder stones; 4,500 mg/kg over 2 yr)
* LC50: 275 mg/m3 (mice, >4 h) and 3,000 mg/m3 (rats, >7 h)
* No observable reproductive toxicity effects observed in rats
* No genotoxic effect observed in bacteria metabolic activation systems.
 |
| SCOEL Year NA |
| No report.  |
| OARS/AIHA Year NA |
| No report. |
| HCOTN Year NA |
| No report. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| US EPA |  | 2013 | * NOAEL of 500 ppm for non-neoplastic kidney lesions in female rats exposed in 2 yr diet
* Liver tumour data suggestive of evidence for carcinogenic potential only
* Should not pose a risk of urinary tumours in humans where calculi formation is not occurring
* No epidemiological studies of carcinogenicity in humans.
 |

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | No |
| --- | --- |
| **The chemical is not a non-threshold based genotoxic carcinogen.** |  |

## Notations

| Source | Notations  |
| --- | --- |
| SWA | – |
| HCIS | – |
| NICNAS | – |
| EU Annex | – |
| ECHA | – |
| ACGIH | – |
| DFG | H (skin) |
| SCOEL | – |
| HCOTN | – |
| IARC | – |
| US NIOSH | – |

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: | 154.20 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa:  | 1 ppm = 6.3 mg/m3; 1 mg/m3 = 0.159 ppm |
| This chemical is used as a pesticide: |[x]
| This chemical is a biological product: |[ ]
| This chemical is a by-product of a process: |[x]
| A biological exposure index has been recommended by these agencies: | [ ]  ACGIH [ ]  DFG [ ]  SCOEL  |

## Workplace exposure standard history

| Year | Standard |
| --- | --- |
|  |  |

## 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) (2001) Biphenyl – MAK value documentation.

US Environmental Protection Agency (US EPA) (2013) Chemical Assessment Summary – Biphenyl

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