BIPHENYL

CAS number:	92-52-4
Synonyms:	Diphenyl, phenylbenzene
Chemical formula:	$C_{12}H_{10}$
Structural formula:	

Workplace exposure standard (retained)

TWA:	**0.2 ppm (1.3 mg/m^3)**
STEL:	**—**
Peak limitation:	**—**
Notations:	**—**
IDLH:	**15.9 ppm (100 mg/m^3)**
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/m^3) 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/m^3. In humans no respiratory effects are reported at exposures below 1 mg/m^3. 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/m^3)***
ACGIH	***2001***	***TLV-TWA: 0.2 ppm (1.3 mg/m^3)***
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/m^3 • Indication of central and peripheral nerve damage and liver changes in historical review of chronic heavy exposures (0.6–123 mg/m^3 average). Animal data: • Nasal mucosa irritation, bronchopulmonary lesions, respiratory symptoms and slight toxic liver and kidney effects seen in rats (300 mg/m^3, inhalation, 7 h/d, 64 d) • Respiratory difficulties in mice (5 mg/m^3, inhalation, 7 h/d, 64 d) • LD_{50}: 3,280 mg/kg (rats, no duration provided, oral) • LD_{50}: 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) • LC_{50}: 275 mg/m^3 (mice, >4 h) and 3,000 mg/m^3 (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/m^3; 1 mg/m^3 = 0.159 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

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* 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.