# Terephthalic Acid

| CAS number: | 100-21-0 |
| --- | --- |
| Synonyms: | p-Benzenedicarboxylic acid, 1,4-benzenedicarboxylic acid, p-dicarboxy-benzene, p-phthalic acid, TA-MP, tephthol, TPA, WR 16262 |
| Chemical formula: | C8H6O4 |

 Workplace exposure standard (new)

| TWA: | **5 mg/m3** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
|  Notations: | **—** |
| IDLH: | **—** |
| **Sampling and analysis**: The recommended value is quantifiable through available sampling and analysis techniques.  |

## Recommendation and basis for workplace exposure standard

A TWA of 5 mg/m3 is recommended to protect for potential effects to the lungs and urinary tract 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

Terephthalic acid is used in the production of polyterphthalic acid esters, as a reagent for alkali in wool and in poultry feeds.

Critical effects of exposure are pulmonary (lung) and urinary tract effects.

Oral and inhalation toxicity of terephthalic acid is very low. Body weight reduction and bladder and ureteral stones are reported in rats fed a diet of five or three per cent dimethylterephthalate (which metabolises into terephthalic acid) over 14 days (ACGIH 2018). A NOAEC of 400 mg/m3 is identified in a 30-minute inhalation exposure study in rats for pulmonary effects (ACGIH 2018). No exposure related adverse effects are reported in two 28-day inhalation studies in rats (DFG 2011).

ACGIH (2018) assigned a TWA based on analogy to particulates not otherwise specified. DFG (2011) assigned a MAK value based on sub-chronic inhalation studies with no exposure related adverse effects at 10 mg/m3.

Given the absence of available chronic exposure data, the TWA of 5 mg/m3 by DFG (2011) is recommended to limit effects to the pulmonary and urinary tract.

A 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 recommended based on the available evidence.

# Appendix

### Primary sources with reports

| Source Year set Standard  |
| --- |
| SWA NA NA |
| No report |
| ACGIH 2001 TLV-TWA: 10 mg/m3 |
| TLV-TWA recommended to minimise the risk of pulmonary and urinary tract effects.Summary of data:TLV-TWA assigned based on analogy to particulate not otherwise specified (NOS) due to limited evidence of systematic absorption and no accumulation in tissue or organs.Human data:* Estimated lifetime daily oral dose of 1.4 mg/kg/d without appreciable effects (no further information)

Animal data:* LD50: 5,000 mg/kg (mice, oral)
* NOAEL: 400 mg/m3 (rats, 30 min) for pulmonary function changes, BAL parameters and histopathology
* Exposure up to 5% or 3% dimethyl terephthalate (metabolises into terephthalic acid) in rats (14 d, oral), symptoms included reduced body weight, bladder and ureteral stones
* Incidence of bladder tumours and squamous metaplasia in the bladder of female rats were 19/118 and 11/118, respectively, in a rat, chronic carcinogenic study at 1,000 mg/kg/d (2 yr). Tumours considered secondary to calculi formation
* Negative results in mutagenicity assays
* Rapidly cleared and did not preferentially accumulate in oral studies on rats.

Insufficient data to recommend a skin, sensitiser or carcinogen notation. |
| DFG 2011 MAK: 5 mg/m3 |
| MAK value derived based on no clinical signs at the highest concentration tested of 10 mg/m3, the actual NOAEC may be higher. Phthalic acids are not metabolized to a large extent and since the acid function is probably decisive for local irritation, possible species diﬀerences should be slight.* No local or systemic eﬀects at exposures up to 10 mg/m3 m-phthalic acid or terephthalic acid (rats, 28 d, inhalation)
* Concentration-dependent minimal degeneration of the tracheal epithelium reported in rats from the lowest concentration of 0.52 mg/m3 up to 3.31 mg/m3 (inhalation, duration not noted):
* local alterations were observed only in the trachea, not in the nose and no eﬀects on the trachea or nose in an analogous inhalation study with m-phthalic acid
* another inhalation study was carried out to investigate whether the finding is a substance-specific eﬀect
* no specific clinical signs reported due to exposure at 1, 3 or 10 mg/m3 (rats, 28 d, inhalation)
* Instillation of 100 mg into one eye of rabbits led to slight erythema 24 h after application
* Negative results in mutagenicity assays.
 |
| 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 | * LC50: >2.02 mg/L (rats, 2 hr)
* LD50: >2,000 mg/kg (rabbits, dermal)
* Negative results in skin sensitisation assay.
 |
| OECD |  | 2001 | * No additional information.
 |

### 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 | NA |
| HCIS | NA |
| 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** |

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### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 166.13 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa:  | 1 ppm = 6.79 mg/m3; 1 mg/m3 = 0.15 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) (2012) o-Phthalic acid [88-99-3; phthalic acid], m-phthalic acid [121-91-5; isophthalic acid], p-phthalic acid [100-21-0; terephthalic acid] – MAK value documentation.

European Chemicals Agency (ECHA) (2011) Terephthalic Acid – REACH assessment.

Organisation for Economic Cooperation and Development (OECD) (2001) SIDS initial assessment profile –Terephthalic Acid (TPA).