# m-Xylene-ALPHA, ALPHA'-diamine

| CAS number: | 1477-55-0 |  |
| --- | --- | --- |
| Synonyms: | 1,3-Benzenedimethanamine, m-xylene α,α'-diamine, 1,3-bis(aminomethyl)benzene, MXDA,  m-xylenediamine |  |
| Chemical formula: | C8H12N2 |  |

Workplace exposure standard (retained)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **0.1 mg/m3** |
| Notations: | **Sk.** |
| IDLH: | **—** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A peak limitation of 0.1 mg/m3 is recommended to protect for ocular, dermal and gastrointestinal irritation in exposed workers.

This value may not protect susceptible workers from possible sensitisation or an allergic reaction in previously sensitised individuals.

## Discussion and conclusions

m-Xylene-alpha,alpha'-diamine (MXDA) is used as a source for the production of polyamide fibres and resins. It is also used as a starting chemical for the synthesis of m-xylene diisocyanate and as a curing agent for epoxy resins.

The critical effects of exposure are ocular, dermal, and gastrointestinal irritation, and possible sensitisation.

Limited data are available. MXDA is reported as a potent dermatologic sensitiser in workers in plastics manufacturing. Nine cases of sensitisation are reported in the chemical industry workers, without further details. In experimental animals, MXDA is irritating to the eyes and the skin of rabbits, and caused sensitisation in guinea pigs (ACGIH, 2018; DFG, 2005; HCOTN, 2003). The ACGIH (2018) established a TLV-Ceiling of 0.1 mg/m3 based on analogy to p-phenylenediamine.

Given the limited available data, the peak limitation of 0.1 mg/m3 by ACGIH (2018) and HCOTN (2003) is recommended to be retained to limit irritant effects in exposed workers.

## 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. Case-reports in humans indicate dermal sensitiser potential. A review of this notation is recommended.

A skin notation may not be warranted based on the available evidence. However, this evaluation found inconsistencies in the available data from primary sources, including the historical basis for the notation. Therefore, the skin notation is retained and an evaluation of additional sources, including dermal studies, are recommended at the next scheduled review.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 Peak limitation: 0.1 mg/m3 | |
|  |
| ACGIH 2018 TLV-Ceiling: 0.1 mg/m3 |
| TLV-Ceiling recommended to minimise potential for ocular, dermal and gastrointestinal irritation, and possible sensitisation.  Recommended TLV may not necessarily protect susceptible workers from possible sensitisation or allergic reaction in previously sensitised individuals. As such exposures should be kept as low as possible below the recommended TLV.  Summary of data:   * TLV-Ceiling derived based on analogy with p-phenylenediamine (TLV-TWA of 0.1 mg/m3) * Saturated vapor concentration > TLV-C, may exist largely as vapour at that concentration.   Human data:   * Reported as a potent dermatologic sensitiser in workers in plastics manufacturing * Appears to act as a gastrointestinal irritant likely due to caustic nature.   Animal data:   * Undiluted MXDA corrosive to guinea pig skin; 50% emulsion in acetone-dioxane mixture severely irritating: * limited effect produced by a concentration of 10% * Evidence of mild sensitisation following one study with repeated application to guinea pig skin: * observation could not be duplicated in subsequent investigation * Exposure of rats for 1 h to aerosol at 1,740-6,040 mg/m3 resulted in frank ocular irritation, lacrimation and dyspnoea.   Insufficient data to recommend a sensitiser or carcinogenicity notation.  Skin notation based on analogy to p-phenylenediamine (which has since been deleted). |
| DFG 2005 Not assigned |
| Summary of additional data   * Compilation of work-related cases of contact allergies in the chemical industry, 9 sensitisation cases listed; no further details * Dermal sensitiser notation assigned based on this evidence. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2003 Ceiling: 0.1 mg/m3 |
| Administrative OEL.  Summary of additional data   * No qualitative or quantitative data available of dermal absorption. However, it can be expected MXDA will penetrate the skin based on analogy with other aromatic amines * Case studies in humans showed it is a skin sensitiser * LD50: 2,000 mg/kg (rabbit, dermal) * Instillation of one drop of MXDA (concentration not reported) into eyes of rabbits (n=3) caused extensive lachrymation and severe conjunctivitis; eyes returned to normal by the day 3 in two rabbits and day 5 in the third rabbit. |

### Secondary source reports relied upon

NIL.

### 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 | Skin |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | Skin |
| DFG | Sh (dermal sensitiser) |
| SCOEL | NA |
| HCOTN | — |
| 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: |  |  | | 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** | |

### IDLH

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

## Additional information

| Molecular weight: | 136.19 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 5.57 mg/m3; 1 mg/m3 = 0.18 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) (2005) m-Xylylendiamin – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2003) m-xylen-α,α’-ylenediamine. Health-based calculated occupational cancer risk values. The Hague: Health Council of the Netherlands; publication no. 2000/15OSH/092.