# Bisphenol A diglycidyl ether

| CAS number: | 1675-54-3 |
| --- | --- |
| Synonyms: | 2-[[4-[2-[4-(Oxiran-2-ylmethoxy)phenyl]propan-2-yl]phenoxy]methyl]oxirane, oligomer 340,  BPDGE, BADGE |
| Chemical formula: | C21H24O4 |

Workplace exposure standard (new)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Sk., DSEN** |
| IDLH: | **—** |
| Sampling and analysis: | Not applicable. |

## Recommendation and basis for workplace exposure standard

Insufficient evidence exists to establish a TWA. 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

Bisphenol A diglycidyl ether is used in the manufacture of epoxy resins and polycarbonates for food packaging. It has a very low vapour pressure and generally does not occur as an aerosol; therefore, inhalation exposure is only expected during work with powdered polymers. Skin contact may occur during production or use of epoxy resins.

No useful data was identified for inhalation exposure for either humans or animal studies. A patch test on 34 persons with contact dermatitis from epoxy resin exposure produced a reaction in all volunteers. Insufficient data exists to demonstrate respiratory sensitisation, and evidence in existing studies does not permit conclusions of the genotoxic potential in humans. Evidence was also limited in animals. A dermal LD50 of greater than 800 mg/kg was reported in mice. Reproductive toxicity was not observed in rabbits exposed either dermally or orally, or in rats exposed orally (DFG, 2003, HCOTN, 2013).

Based on the dataset available, 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).

Classified as a skin sensitiser but not classified as a respiratory sensitiser according to the GHS.

A skin notation is recommended based on evidence indicating adverse systemic effects in animals.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA NA NA | |
| No report. |
| ACGIH NA NA |
| No report. |
| DFG 2003 Not assigned |
| A MAK cannot be established as the database is considered insufficient.  Summary of data:  Bisphenol A diglycidyl ether (BADGE) has a very low vapour pressure and generally does not occur as an aerosol; inhalation exposure is only expected during work with powdered polymers.  During the spraying of paint powder, concentrations of 0.005–0.2 mg/m3 were detected in the breathing zone of the user and of 0.002–0.008 mg/m3 in the air of the room.  Skin contact may occur during production or use of epoxy resins.  Human data:   * No useful data for inhalation exposure * Patch test on 34 persons with contact dermatitis from epoxy resin exposure produced a reaction in all volunteers * Insufficient data to demonstrate respiratory sensitisation * Evidence in existing studies is inconclusive for genotoxic potential in humans.   Animal data:   * No inhalation studies identified * LD50: >800 mg/kg (mice, dermal) * Reproductive toxicity not observed in rabbits exposed either dermally or orally or in rats exposed orally * Causes gene mutation in *in vitro* bacterial and mammalian cells and gene conversion in yeasts * *In vivo* tests resulted in no micronuclei or chromosomal aberrations in bone marrow or germ cells and no DNA strand breaks in the liver. |
| SCOEL NA NA |
| No report. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN 2013 Not assigned |
| Summary of additional data:   * No information on human studies related to the carcinogenicity * No studies on inhalation exposure were available * There is limited evidence of carcinogenicity in experimental animals. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| NICNAS |  | 2015 | * Resin has reported commercial use in adhesives * Reported a TWA 0.1–1 mg/m3 in countries such as Latvia and Russia * BADGE is rapidly absorbed after ingestion but slowly absorbed through the skin * The critical health effects for risk characterisation include local effects (irritation and skin sensitisation) * A study showed that a 5 h exposure to 8x10-6 ppm did not cause any deaths or effects in six male albino rats * Classified as hazardous with the risk phrase 'Irritating to eyes' * Classified as hazardous with the risk phrase 'Irritating to skin' * NOAEL of 15 mg/kg/d (rats, oral) * Not considered to be genotoxic based on the available 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 | Skin sensitisation – category 1 |
| NICNAS | Skin sensitisation |
| EU Annex | Skin sensitisation – category 1 |
| ECHA | NA |
| ACGIH | NA |
| DFG | Carcinogenicity – 3A, H (skin), Sh (dermal sensitiser); |
| SCOEL | NA |
| HCOTN | — |
| IARC | Carcinogenicity – Group 3 |
| 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: | yes | 3.00 |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: |  |  |  |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  |  | | *In vivo* dermal absorption rate >10%: |  |  |  |  | | Estimated dermal exposure at WES >10%: |  |  |  |  | |  |  | 3 | **consider assigning a skin notation** | | |

### IDLH

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

## Additional information

| Molecular weight: | 340.42 |
| --- | --- |
| 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

Deutsche Forschungsgemeinschaft (DFG) (2003) Bisphenol A diglycidyl ether – MAK value documentation.

International Agency for Research on Cancer (IARC) (1999) Volume 71 re-evaluation of some organic chemicals, hydrazine and hydrogen peroxide. IARC Monographs on the evaluation of the carcinogenic risk to humans.

Health Council of the Netherlands (HCOTN) (2013) Bisphenol A diglycidal ether. Health-based recommendation on occupational exposure limits. The Hague: Health Council of the Netherlands; publication no. 2013/25.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2015) Diglycidyl ether of bisphenol A-based epoxy resins: Human health tier II assessment – IMAP report.

Tenth Adaptation to Technical Progress Commission Regulation (EU Annex) No 2017/776 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (the CLP Regulation).