# n-Butyl acrylate

| CAS number: | 141-32-2 |
| --- | --- |
| Synonyms: | Acrylic acid ester, n-butyl ester, butyl acrylate,  n-butyl ester, n-butyl propenoate, butyl 2-propenoate, 2-propenoic acid, butyl ester |
| Chemical formula: | C7H12O2 |
| Structural formula: | — |

Workplace exposure standard (interim)

| TWA: | **2 ppm (11 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **Sk., DSEN** |
| IDLH: | **113 ppm** |
| Sampling and analysis: | The recommended value is readily quantifiable through currently available sampling and analysis techniques. |

## Recommendation and basis for workplace exposure standard

An interim TWA of 2 ppm (11 mg/m3) is recommended to protect for respiratory tract irritation in exposed workers. Based on the available evidence, a STEL is not recommended.

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

n-Butyl acrylate is used in the production of chemical polymers and resins for textile and leather finishes. It is also found in inks, toners and adhesive coating materials and paints.

A TWA of 2 ppm is derived using the reported NOAEL of 21 ppm for irritation of ocular, nasal and olfactory cells and applying an uncertainty factor of 10. There is insufficient data to suggest an immediately acute effect at concentrations within 10 times of the recommended TWA. As such it is recommended that the previous STEL of 5 ppm be withdrawn.

The recommended TWA aligns with primary source data. There is insufficient weight of evidence to justify retaining the lower TWA of 1 ppm or recommending a STEL. Investigation of additional data sources is recommended at the next scheduled review.

## 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 and not a respiratory sensitiser according to the GHS.

A skin notation is recommended as animal data indicates systemic effects (sensitisation) after absorption through the skin and supported by dermatitis reports in human case studies.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 2005 TWA: 1 ppm (5 mg/m3); STEL: 5 ppm (26 mg/m3) | |
| Updated in 2005 as part of “Source A Updates”, with WES sourced from Health and Safety Executive (HSE) EH40/2005 Workplace Exposure Limits. |
| ACGIH 2014 TLV-TWA: 2 ppm (11 mg/m3) |
| TLV-TWA calculated to minimise potential for skin, eye and respiratory tract irritation. Calculated UF applied to NOAEL observed in animal studies for irritation effects and systemic toxicity.  An odour threshold of 0.035 ppm noted.  Sufficient evidence of sensitisation in humans and animals determined the DSEN notation; insufficient evidence for RSEN notation.  Insufficient evidence to support any TLV-STEL.  Not classifiable as human carcinogen with insufficient evidence of human and animal data.  TLV is noted to “*not necessarily protect susceptible workers from possible sensitization or an allergic reaction in previously sensitized individuals*”.  Summary of data:  Human:   * Limited data available * Case study examples for sensitisation and cross sensitisation with other acrylates * Evidence of skin irritation and dermatitis in study with dental workers exposed to 0.5% or 1% mixtures (in petrolatum).   Animal:   * Not mutagenic in standard in vitro testing protocols * NOAEL: 21 ppm (111.9 mg/m3); (rats, inhalation 13 wk) * LC50: 1,220–1,681 ppm (Hamster, inhalation 4hr) * LD50: 1,700 mg/kg (rats, dermal) * LD50: 1,700–5,700 mg/kg (rabbits, dermal). |
| DFG 2018 MAK: 2 ppm (11 mg/m3) |
| MAK calculated to prevent worker irritation.  Based on observed damage to rat cilia and olfactory cells in animal studies.  MAK value supported by comparative NOAEC for similar structurally related chemical (ethyl acrylate) and human testing.  Classified as Pregnancy Risk Group C.  Limited human evidence for contact sensitisation. No data on airway sensitisation available.  Skin absorption likely to contribute significantly to the systemic toxicity with positive lymph node assays noted in animals.  Not classified in any germ cell mutagen or carcinogen categories.  Summary of additional data:  Human:   * Limited case study evidence of positive patch test results with reactions observed in (meth) acrylate sensitive populations.   Animal:   * RD50: 340 mL/m3; (mice, inhalation) * NOAEC: 21 mL/m3; (rats, 90 d) * Not mutagenic in Salmonella typhimurium * Possible clastogenic effect in rats after oral administration; no new data for genotoxicity. |
| SCOEL 1993 TWA: 2 ppm (11 mg/m3); STEL: 10 ppm (53 mg/m3) |
| Summary of additional data:   * TWA calculated in the absence of NOAEL in human data. * Calculated STEL proposed to limit exposure that could result in irritation. * Skin sensitiser; may demonstrate “cross-reactions with other acrylates” * No reliable human inhalation data available. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### Secondary source reports relied upon

| Source |  | Year | Additional information |
| --- | --- | --- | --- |
| HSE |  | 2019 | * HSE EH40/2005 WEL: TWA: 1 ppm (5 mg/m3); STEL: 5 ppm (26 mg/m3) * No further data available. |
| NICNAS |  | 2014 | * LD50: >2,000 mg/k/bw (rats and rabbits, dermal) * Skin sensitisation observed in human patch tests * Repeat dose toxicity – not considered to cause serious health damage via dermal exposures * Not considered to have reproductive or developmental toxicity. |
| NTP |  | 2019 | * Genetic toxicity in vitro cytogenetics testing complete - chromosome aberrations positive. |
| US NIOSH |  | 2016 | * IDLH based on animal data with value indicating respiratory depression and escape impairment. |

### 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 – category 1 |
| EU Annex | Skin sensitisation – category 1 |
| ECHA | NA |
| ACGIH | Carcinogenicity – A4, DSEN |
| DFG | H (skin), Sh (dermal sensitiser) |
| SCOEL | NA |
| HCOTN | NA |
| 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: | yes | 4.00 |  | | Dermal LD50 ≤1000 mg/kg: | no |  |  | | Dermal repeat-dose NOAEL ≤200 mg/kg: | no | -3.00 |  | | Dermal LD50/Inhalation LD50 <10: |  |  |  | | *In vivo* dermal absorption rate >10%: | yes | 3.00 |  | | Estimated dermal exposure at WES >10%: |  |  |  | |  |  | 0 | **a skin notation is warranted** | |

### IDLH

| Is there a suitable IDLH value available? | Yes |
| --- | --- |

## Additional information

| Molecular weight: | 128.17 |
| --- | --- |
| 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

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) (2018) n-Butyl acrylate/butyl prop-2-enoate – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (1993) Recommendation from the Scientific Expert Group on Occupational Exposure Limits for n-Butylacrylate. SEG/SUM/41.

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.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2014) 2-Propenoic acid, butyl ester: Human health tier II assessment – IMAP report.

National Toxicology Program (NTP) (2019) NTP-Testing Status 10859-C: n-Butyl acrylate.

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).

UK Health and Safety Executive, (HSE) (2019) *n*-Butyl acrylate – EH40/2005 Workplace Exposure Limits: Summary criteria for occupational exposure limits.

US National Institute for Occupational Safety and Health (NIOSH) (2016) Immediately dangerous to life or health concentrations – n-Butyl acrylate.