

2-ETHYLHEXANOL

CAS number: 104-76-7

Synonyms: 2-Ethylhexan-1-ol, isooctanol, octyl alcohol

Chemical formula: C₈H₁₈O

Structural formula: —

Workplace exposure standard (new)

TWA: 1 ppm (5.33 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 1 ppm (5.33 mg/m³) is recommended to protect for central nervous system (CNS) depression including headaches, fatigue, dizziness and nausea; as well as nasal and throat irritation in exposed workers.

Discussion and conclusions

2-Ethylhexanol (EH) is used in the production of plasticisers and lubricants.

Critical effects include CNS depression and eye and upper respiratory irritation. Human exposure chamber studies where healthy volunteers were exposed for four hours determined a NOAEC of 1.5 ppm for eye and nasal irritation (SCOEL, 2011). No neurobehavioral impairment was observed at 20 ppm in the same study. No signs of irritation were reported in rats repeatedly exposed at 120 ppm or under a single exposure event at 164 ppm (SCOEL, 2011). Evidence of carcinogenicity in animals remains inconclusive.

Based on the NOAEC of 1.5 ppm in humans, the recommended TWA of 1 ppm is considered protective for irritation and CNS 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.

A skin notation is not recommended based on the data available.

APPENDIX

Primary sources with reports

| Source | Year set | Standard |
|--|-------------|-------------------|
| SWA | NA | NA |
| ACGIH | NA | NA |
| No report. | | |
| SCOEL | 2011 | TWA: 1 ppm |
| TWA recommended to minimise the effects of irritation of the eyes and airways. | | |
| Summary of data: | | |
| Occupational exposure result in headaches, dizziness and fatigue, but specific concentrations unavailable due to limited human data. A NOAEL of 1.5 ppm for nasal and eye irritation was developed from human chamber studies. Animal data suggests exposure to ≥ 164 ppm in rats can induce symptoms of CNS depression, with a NOAEL of 120 ppm reported in some studies. | | |
| Human data: | | |
| <ul style="list-style-type: none"> Study involving healthy volunteers subjected to 1.5, 10 and 20 ppm (4 h duration) determined NOAEL of 1.5 ppm for nasal and eye irritation, and NOAEL of 20 ppm for neurobehavioral impairment 29 workers in an EH production site did not develop allergic reactions (sensitisation) Laboratory workers experienced headaches, dizziness, fatigue and gastrointestinal disorders <ul style="list-style-type: none"> the results could not be verified because of co-exposure with other compounds other studies identifying similar symptoms following EH exposure cannot confidently report on the effects because of co-exposure with other agents Reported odour threshold of 0.08–0.13 ppm. | | |
| Animal data: | | |
| <ul style="list-style-type: none"> LC₅₀ (rats, 4 h): 164 ppm (890 mg/m³) to 978 ppm (5,300 mg/m³) LD₅₀ (rats, oral): 2,049–7,000 mg/kg LD₅₀ (dermal): 1,980 to $\geq 2,600$ mg/kg (rabbits), >3,000 mg/kg (rats) Symptoms of acute intoxication included apathy, dyspnoea, cyanosis and loss of coordination Inhalation study to 0, 15, 40 and 120 ppm for 6 h/d, 5 d/wk for 90 d reported no symptoms for all dose groups <ul style="list-style-type: none"> NOAEC of 120 ppm (in rats) determined Repeated dermal exposure to 0, 417 and 834 mg/kg/d, and female rats exposed to the higher concentrations developed lymphopenia and reduced spleen weight <ul style="list-style-type: none"> females exposed under all concentrations showed increased triglyceride levels Majority of genotoxicity studies reported negative results for <i>in vitro</i> and <i>in vivo</i> test There is insufficient evidence for a carcinogenic notation Adverse developmental effects not observed in rats or mice exposed to an EH saturated atmosphere (approximately 160 ppm or 850 mg/m³) or oral doses $\leq 1,300$ mg/kg/d <ul style="list-style-type: none"> in female mice/rats, higher concentrations resulted in embryotoxic, fetotoxic and teratogenic effects. | | |



| Source | Year set | Standard |
|--|-------------|--|
| Insufficient evidence to assign carcinogenicity classification or skin notation for EH. | | |
| DFG | 2011 | MAK: 10 ppm (54 mg/m³) |
| Summary of additional data: Human data: No additional human toxicity information available. Animal data: <ul style="list-style-type: none"> Chronic oral study reported a NOAEL of 50 mg/kg/d (rats) and 200 mg/kg/d (mice) <ul style="list-style-type: none"> higher concentrations can result in increased mortality, and changes in weight of kidneys, liver and general bw Identified to be moderately irritating to rabbit skin, and a moderate to severe eye irritant to rabbit eyes. | | |
| OARS/AIHA | NA | NA |
| No report. | | |
| HCOTN | NA | NA |
| No report. | | |

Secondary source reports relied upon

| Source | Year | Additional information |
|--------|--------|---|
| NICNAS | ✓ 2013 | <ul style="list-style-type: none"> LD₅₀: 3,290 mg/kg (rats, oral) Median LC₅₀: <5 mg/L for rats Dermal subacute NOAEL: < 1,660 mg/kg for rats. |
| OECD | ✓ 1995 | <ul style="list-style-type: none"> Acute animal inhalation toxicity data determined LC₅₀: ≥1.2 to <5.3 mg/L Repeat 90 d toxicity studies in rats determined inhalation NOAEL of ≥ 0.639 mg/kg/d. |

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 | — |
| NICNAS | — |



| Source | Notations |
|----------|-----------|
| EU Annex | NA |
| ECHA | NA |
| ACGIH | NA |
| DFG | — |
| SCOEL | — |
| 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 LD ₅₀ ≤ 1000 mg/kg: | No |
| Dermal repeat-dose NOAEL ≤ 200 mg/kg: | Insufficient Data |
| Dermal LD ₅₀ /Inhalation LD ₅₀ < 10: | Insufficient Data |
| In vivo dermal absorption rate > 10%: | No data |
| Estimated dermal exposure at WES > 10%: | No data |

A skin notation is not warranted

IDLH

Is there a suitable IDLH value available? No

Additional information

| | |
|---|--|
| Molecular weight: | 130.23 |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 5.33 mg/m ³ ; 1 mg/m ³ = 0.19 ppm |
| This chemical is used as a pesticide: | <input type="checkbox"/> |
| This chemical is a biological product: | <input checked="" type="checkbox"/> |
| This chemical is a by-product of a process: | <input type="checkbox"/> |
| A biological exposure index has been recommended by these agencies: | <input type="checkbox"/> ACGIH <input type="checkbox"/> DFG <input type="checkbox"/> SCOEL |



Workplace exposure standard history

| Year | Standard |
|--|----------|
| Click here to enter year | |

References

Deutsche Forschungsgemeinschaft (DFG). (2012). 2-Ethylhexanol – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL). (2011). Recommendation from the Scientific Committee on Occupational Exposure Limits for 2-ethylhexanol. SCOEL/SUM/158.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS). (2013). 1-Hexanol, 2-ethyl: Human health tier II assessment – IMAP report.

Organization for Economic Co-operation and Development (OECD). (1995). SIDS Initial Assessment Profile. 2-Ethylhexanol.