

CHLOROACETALDEHYDE

CAS number: 107-20-0

Synonyms: 2-chloroacetaldehyde, chloroacetaldehyde monomer, 2-chloro-1-ethanal, monochloroacetaldehyde

Chemical formula: C_2H_3ClO

Structural formula: —

Workplace exposure standard (retained)

TWA: —

STEL: —

Peak limitation: 1 ppm (3.2 mg/m³)

Notations: Carc. 2

IDLH: 45 ppm

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 1 ppm (3.2 mg/m³) is recommended to protect for irritation of the eyes, skin, mucous membranes and respiratory tract in exposed workers.

Discussion and conclusions

Chloroacetaldehyde is primarily used in the synthesis of pharmaceuticals.

In humans, exposure is reported to cause a burning sensation in the upper respiratory tract and the mucous membranes of the nasal and oral passages. It is also reported to cause increased ventilation rate, bronchial constriction, choking and coughing. Following exposure at low concentrations adverse effects are reversible, returning on re-exposure. No airborne concentration data are presented in relation to human studies. A NOAEL of 1.6 ppm (5.2 mg/m³) for systemic effects is reported in a sub-chronic inhalation study of rats, mice, rabbits and guinea pigs. Exposing rats to 5 ppm (no duration provided) resulted in eye and nasal irritation (ACGIH, 2018; DFG, 1999).

The current peak limitation of 1 ppm (3.2 mg/m³) is considered protective of respiratory and irritant effects.

Recommendation for notations

Classified as a category 2 carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Not classified as a skin sensitizer or respiratory sensitizer according to the GHS.

Dermal uptake is reported in animals. However, there are insufficient data to recommend a skin notation.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	Peak limitation: 1 ppm (3.2 mg/m³)
ACGIH	2001	TLV-Ceiling: 1 ppm (3.2 mg/m³)
<p>TLV-Ceiling recommended to minimise the potential for irritation of the eyes, skin, mucous membranes and respiratory tract in exposed workers.</p> <p>Summary of data:</p> <p>Analogy with other aldehydes suggests that the recommended TLV-ceiling will not be protective for all irritation effects.</p> <p>Human data:</p> <ul style="list-style-type: none"> Burning sensation in the mucous membranes of the nasal and oral passages and the upper respiratory tract, increased ventilation rate, bronchial constriction, choking and coughing reported following inhalation At low concentrations adverse effects were reversible after 5–10 minutes following removal <ul style="list-style-type: none"> effects returned upon re-exposure Vapour concentrations producing even a slight irritation in humans potentially injurious (no exposure data provided). <p>Animal data:</p> <ul style="list-style-type: none"> LD₅₀: 67 mg/kg (rabbits, dermal) Demonstrated acutely toxic effects (lethality) <i>via</i> inhalation in mice Rats, mice, guinea pigs and rabbits exposed 7 h/d, 5 d/wk for 6 mo at 1.6 ppm reported no adverse effects in growth, mortality, haematology, organ weights and gross and microscopic examination Inhalation at 5 ppm in rats caused eye and nasal irritation and slight growth retardation in males. <p>Positive mutagenicity in <i>Salmonella typhimurium</i>; <i>Aspergillus nidulans</i> and <i>Streptomyces coelicolor</i>.</p>		
DFG	1999	Not assigned
<p>No MAK recommended due to carcinogenic and genotoxic potential.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> No skin sensitisation following Magnusson-Kligman test on guinea pigs Genotoxic <i>in vitro</i> and produces DNA adducts with mutagenic effects; genotoxicity <i>in vitro</i> not yet documented Increased incidence of liver tumours found in a 2 yr study with male mice dosed orally. 		
SCOEL	NA	NA
No report.		

Source	Year set	Standard
OARS/AIHA	NA	NA
No report.		
HCOTN	NA	NA
No report.		

Secondary source reports relied upon

NIL.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic? Yes

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	NA
HCIS	Carcinogenicity – category 2
NICNAS	—
EU Annex	Carcinogenicity – category 2
ECHA	NA
ACGIH	NA
DFG	Carcinogenicity – 3, H (skin)
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:

Dermal LD₅₀ ≤ 1000 mg/kg: **yes**

Dermal repeat-dose NOAEL ≤ 200 mg/kg:

Dermal LD₅₀/Inhalation LD₅₀ < 10:

In vivo dermal absorption rate > 10%:

Estimated dermal exposure at WES > 10%:

consider assigning a skin notation

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight: 78.50

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
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[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](#) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (1999) Chloroacetaldehyde – MAK value documentation.

Tenth Adaptation to Technical Progress Commission Regulation (EU) 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).

US National Institute for Occupational Safety and Health (NIOSH) (1994) Immediately dangerous to life or health concentrations – Chloroacetaldehyde.

DRAFT