

EDTA

CAS number: 60-00-4

Synonyms: ethylenediaminetetracetic acid, {[2-(Biscarboxymethyl-amino)-ethyl]-carboxymethyl-amino}acetic acid, ethylenedinitrilotetracetic acid, N,N' ethanediylbis[N-(carboxymethyl)glycine], H₄EDTA

Chemical formula: C₁₀H₁₆N₂O₈

Workplace exposure standard (new)

TWA: —

STEL: —

Peak limitation: —

Notations: —

IDLH: —

Sampling and analysis: N/A

Recommendation and basis for workplace exposure standard

A TWA is not recommended at this time. There are insufficient data available to perform a risk based assessment and it is recommended that a priority review of additional data sources be undertaken at the next scheduled review of the WES.

Discussion and conclusions

EDTA is used as a sequestering agent for aqueous metal ions and added to detergents, textile processing and water treatment formulations, and cosmetics.

EDTA displays low oral, inhalational and dermal toxicity. Critical effects are acute irritation of the eyes and mucous membranes and potential developmental toxicity at maternally toxic exposures (DFG, 2009). The available data do not indicate genotoxic or carcinogenic properties based on well-conducted chronic feeding studies in animals (DFG, 2009). Systemic effects arising from dermal absorption is considered negligible due to a very low dermal absorption rate of 0.001% in humans (DFG, 2009).

The available toxicological database lacks chronic inhalational data and does not currently permit the recommendation of a WES (DFG, 2009; SCOEL, 2009). A detailed examination of all available data should be prioritised for review.

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 as there is no indication of systemic effects resulting from skin absorption.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	NA	NA
No report.		
ACGIH	NA	NA
No report.		
DFG	2009	MAK: not established
<p>MAK not established due to absence of inhalational toxicity data. Assessment also considers exposures to Na/Ca salts of EDTA due to comparable dissociation behaviour under physiological conditions.</p> <p>Summary of data:</p> <p>Carcinogenicity studies with mice and rats report negative results at high relative doses, e.g. above the NOAEL for systemic toxicity in rats.</p> <p>Developmental toxicity observed in repeat subcutaneous injection studies is considered unlikely regarding oral or inhalational exposure routes due to very low absorption (5%) <i>via</i> these routes.</p> <p>Weak evidence exists for the sensitising potential of the substance; DFG does not assign a sensitiser notation on this basis.</p> <p>A skin notation is not recommended due to low systemic toxicity. Simultaneous exposure to iron and EDTA should be avoided to minimise potential for formation of iron-EDTA complexes, which have demonstrated renal toxicity; this effect is however considered highly unlikely <i>via</i> repeat inhalational or oral pathways.</p> <p>Human data:</p> <ul style="list-style-type: none"> • Volunteer study reported dermal uptake of 0.001% \equiv 0.02 mg assuming 2,000 cm² skin exposed for 1 h • Inconclusive evidence for allergenic effect in single dose inhalation study with asthmatic volunteers inhaling aqueous aerosol containing up to 500 mg/L EDTA • Very low rate of positive results reported in several volunteer patch tests, treatment range 0.01–10% in water or petrolatum (n=50–1111) <p>Animal data:</p> <ul style="list-style-type: none"> • Reversible eye irritation (rabbits, no further details) • No adverse effects in 2 yr chronic feeding studies at 250–500 mg/kg/d (rats) or 470–940 mg/kg/d (mice) <ul style="list-style-type: none"> ○ no evidence for carcinogenicity; tumour incidences in both species not attributable to substance exposure and comparable to controls ○ slight dose-dependent reduced bw gain in female mice; male mice had reduced bw gain only in 940 mg/kg/d group • Increased urinary zinc excretion, decreased zinc plasma concentrations, diarrhoea (maternal), reduced bw (maternal and foetal), increased prenatal mortality in developmental study at 90 mg/kg <i>via</i> subcutaneous injection (rats, GD 11–15); <ul style="list-style-type: none"> ○ maternal LOAEL 90 mg/kg, foetal NOAEL: 90 mg/kg; no lower concentration tested ○ developmental effects likely caused by zinc sequestration/depletion ○ concentrations up 1,250 mg/kg required in equivalent diet/gavage administration studies due to poor gastrointestinal absorption, toxicity also stems from zinc deficiency <i>via</i> this route 		



Source	Year set	Standard
<ul style="list-style-type: none"> No evidence for genotoxicity <i>in vitro</i> or <i>in vivo</i>; current database suggests adverse effects to chromosomes occur at high concentrations possibly due to the chelating effect of EDTA. 		
SCOEL	2009	TWA: Not assigned
<p>Summary of additional data:</p> <p>TWA not assigned due to insufficient data upon which to base a recommendation.</p> <p>Large particles are likely to be cleared from lungs and absorbed by GIT; small particles likely to be absorbed directly in lungs (no further information).</p> <p>Animal data:</p> <ul style="list-style-type: none"> Mild irritation in single-dose inhalation study (rats, 8 h, concentration not specified) Mild irritation on skin of ear with 50% aqueous solution (rabbits, 20 h); no irritation on skin of back Strong irritant effect when 50 mg applied directly to rabbit eye; reversible in 8 d Chronic feeding/carcinogenicity study suggests no carcinogenic activity (mice, rats, 2 yr, same study as presented in DFG, 2009) Changes in tissue concentrations of Ca, Mg, Fe, and P, but no signs of toxicity at 293 mg/kg/d in repeat oral dose study (rats, 35 d) Low potential for genotoxicity <i>in vivo</i> and <i>in vitro</i>, only at high relative concentrations; agency concludes non-mutagenic to humans. 		
OARS/AIHA	NA	NA
No report.		
HCOTN	NA	NA
No report.		

Secondary source reports relied upon

Source	Year	Additional information
NICNAS	✓ 2018	<ul style="list-style-type: none"> Tier I assessment: Available data indicate that it may be used in cosmetics, but only at low concentrations.
OECD	✓ 2004	<ul style="list-style-type: none"> Negative results of the carcinogenicity study and of the cell transformation assays, and low mutagenic potential only reported at extremely high dose levels indicate there is no concern for carcinogenic potential.

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



Source	Notations
HCIS	—
NICNAS	NA
EU Annex	NA
ECHA	—
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

Insufficient data to assign a skin notation.

IDLH

Is there a suitable IDLH value available? No

Additional information

Molecular weight:	292.24
Conversion factors at 25°C and 101.3 kPa:	1 ppm = Number mg/m ³ ; 1 mg/m ³ = Number ppm
This chemical is used as a pesticide:	<input type="checkbox"/>
This chemical is a biological product:	<input 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
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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) (2009) Ethylendiamintetraessigsäure (EDTA) und ihre Alkalisalze – MAK value documentation.

European Chemicals Agency (ECHA) (2019) EDTA – REACH assessment.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (2009) Recommendation from the Scientific Committee on Occupational Exposure Limits for Edetic acid. SCOEL/SUM/135.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2018) Glycine, N,N'-1,2-ethanediylbis[N-(carboxymethyl)-: Human health tier I assessment – IMAP report.

Organisation for Economic Cooperation and Development (OECD) (2004) Summary Risk Assessment Report – Edetic Acid (EDTA).