

HYDROGEN PEROXIDE

CAS number: 7722-84-1

Synonyms: Hydrogen dioxide, hydroperoxide, perhydrol

Chemical formula: H_2O_2

Structural formula: —

Workplace exposure standard (amended)

TWA: 0.5 ppm (0.7 mg/m³)

STEL: —

Peak limitation: —

Notations: —

IDLH: 75 ppm

Sampling and analysis: The recommended value is quantifiable through available sampling and analysis techniques.

Recommendation and basis for workplace exposure standard

A TWA of 0.5 ppm (0.7 mg/m³) is recommended to protect for dermal, eye and pulmonary irritation in exposed workers.

Discussion and conclusions

Hydrogen peroxide is widely used for bleaching or deodorizing of textiles, wood pulp, hair and fur and in the treatment of water and sewage.

The critical effects of exposure are irritation of the eyes, skin, mucous membranes and respiratory tract. A NOAEC of 0.5 ppm is reported in workers exposed for eight hours a day over one year. In the same study, eye and throat irritation, a blocked nose, coughing and asthma symptoms were observed at 1.2 ppm. No adverse findings in lung function tests are reported in workers exposed at up to 0.67 ppm for up to 11 years. A NOAEC of 2 ppm is identified in a 28-day inhalation study in rats (DFG, 2011). No robust evidence has been presented to support the TWA of 1 ppm as recommended by ACGIH (2018).

Based on the NOAEC of 0.5 ppm in workers and no adverse lung function findings from chronic exposure at 0.67 ppm, the TWA of 0.5 ppm (0.7 mg/m³) derived by DFG (2011) is recommended to protect for irritation in exposed workers. This decision is supported by the NOAEC of 2 ppm in rats and the irritation observed in workers at 1.2 ppm.

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 data in animals indicating low dermal absorption.

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1991	TWA: 1 ppm (1.4 mg/m³)
ACGIH	2001	TLV-TWA: 1 ppm (1.4 mg/m³)
<p>TLV-TWA recommended to minimise the potential for irritation of the eyes, skin, mucous membranes and respiratory tract and bleaching of hair.</p> <p>Summary of data:</p> <p>Derivation of TLV-TWA not provided.</p> <p>Human data:</p> <ul style="list-style-type: none"> No data were reported regarding dose Extreme irritation and inflammation of the nose and throat following inhalation of high concentrations Severe systemic poisoning resulted in headache, dizziness, vomiting, diarrhoea, tremors, numbness, convulsions, pulmonary oedema, unconsciousness and shock No further information provided. <p>Animal data:</p> <ul style="list-style-type: none"> Dogs exposed at 7 ppm of 90% hydrogen peroxide; 6 h/d, 5 d/wk for 6 mo; skin irritation, sneezing, lacrimation and bleaching of hair Rabbits exposed at 22 ppm daily for 3 mo; irritation noted around the nose, hair bleached; no eye injury. <p>Insufficient data to recommend a skin or sensitiser notation or TLV-STEL.</p>		
DFG	2011	MAK: 0.5 ppm (0.7 mg/m³)
<p>Summary of additional data:</p> <ul style="list-style-type: none"> Cancer risk for humans considered negligible NOAEC of 0.5 ppm in workers; 8 h exposure (no peak) ≈1 yr; <ul style="list-style-type: none"> 1.2–2.4 ppm, with peaks at 8 ppm reports of eye and throat irritation, a blocked nose, coughing and asthma symptoms; no further information No adverse findings in lung function tests in workers exposed at ≤0.67 ppm for between 2–11 yr (frequency of exposure not clear) NOAEC of 2 ppm; 28 d inhalation study in rats; irritation effects MAK based on NOAEC in humans. 		
SCOEL	NA	NA
No report.		
OARS/AIHA	NA	NA
No report.		



Source	Year set	Standard
HCOTN	2002	Not assigned
Summary of additional data:		
<ul style="list-style-type: none"> • Carcinogenicity and genotoxicity evaluation • Inadequate evidence for the carcinogenicity. 		

Secondary source reports relied upon

Source	Year	Additional information
NICNAS	✓ 2014	<ul style="list-style-type: none"> • LD₅₀: 9,200 mg/kg in rabbits • Corrosive to rabbit eye in Draize test • Corrosive to the skin and eyes and is a respiratory irritant.

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	NA
NICNAS	NA
EU Annex	NA
ECHA	NA
ACGIH	Carcinogenicity – A3
DFG	Carcinogenicity – 4
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:
Dermal LD₅₀ ≤ 1000 mg/kg:
Dermal repeat-dose NOAEL ≤ 200 mg/kg:
Dermal LD₅₀/Inhalation LD₅₀ < 10:
In vivo dermal absorption rate > 10%:
Estimated dermal exposure at WES > 10%:

no

a skin notation is not warranted

IDLH

Is there a suitable IDLH value available? Yes

Additional information

Molecular weight:	34.02
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) (2011) Hydrogen peroxide – MAK value documentation.

Health Council of the Netherlands (HCOTN) (2001) Hydrogen peroxide. Evaluation of the carcinogenicity and genotoxicity. The Hague: Health Council of the Netherlands; publication no. 2002/11OSH.

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.

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

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