

ACETONE

CAS number: 67-64-1

Synonyms: Propanone, propan-2-one, dimethyl ketone

Chemical formula: C_3H_6O

Structural formula:

Workplace exposure standard (amended)

TWA: 250 ppm (594 mg/m³)

STEL: 500 ppm (1,187 mg/m³)

Peak limitation: —

Notations: —

IDLH: 2,500 ppm (10% LEL)

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

Recommendation and basis for workplace exposure standard

A TWA of 250 ppm (594 mg/m³) and STEL of 500 ppm (1,187 mg/m³) are recommended to protect for upper respiratory tract and eye irritation and central nervous system symptoms in exposed workers.

Discussion and conclusions

There is no clearly defined NOAEL in humans. However, evidence indicates that irritation of the upper respiratory tract and eyes is experienced below 500 ppm. Weak and reversible central nervous symptoms are reported at concentrations at and below 500 ppm in human studies. An uncertainty factor of 2 applied to the reported 500 ppm threshold was considered appropriate. In support, a NOEL is reported at 250 ppm in humans. The recommendation considers that repeated exposures to acetone results in sensory habituation and acclimatisation (ACGIH, 2015).

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

APPENDIX

Primary sources with reports

Source	Year set	Standard
SWA	1990	TWA: 500 ppm (1,195 mg/m³); STEL: 1,000 ppm (2,380 mg/m³)
TWA and STEL recommended to minimise sensory irritation in exposed workers.		
ACGIH	2015	TLV-TWA: 250 ppm (594 mg/m³); TLV-STEL: 500 ppm (1,187 mg/m³)
TLV-TWA and TLV-STEL recommended to minimise the risk of upper respiratory tract (URT), eye irritation and CNS impairment.		
Summary of data:		
Human data:		
<ul style="list-style-type: none"> • A chamber exposure study of 6 male volunteers reported slight irritation at 250 ppm for 6 h/d for 6 d • The same study found much stronger complaints of odour and immediate irritation of the URT and eyes at 500 ppm • A short-term chamber exposure study of 32 naïve volunteers and adjusted workers reported very strong classification of odour and irritation (naïve subjects) and weak to moderate classification (workers); exposed to 800 ppm for 20 min • A study of 110 workers exposed to an average concentration of 364 ppm (≈15 yr) and 67 non-exposed workers presented higher frequency of self-reported subjective symptoms of 'heavy feeling in head', 'nausea', and 'feeling faint' in exposed workers over the preceding six months • In a study of six male volunteers, increased reaction times were reported at 500 ppm. 		
Animal data:		
<ul style="list-style-type: none"> • No acute or repeated dose inhalation studies reporting relevant points of departure identified • LD₅₀: 2,000 mg/kg (rabbits, dermal) • LD₅₀: 5,800 mg/kg (rats, oral). 		
Elicits a much greater perceived irritation in naïve individuals compared to previously exposed persons with developed sensory habituation.		
No evidence of mutagenic effects in identified bacterial reverse mutation assays.		
Insufficient data available to assign a Skin, Sensitiser or carcinogenic notations.		

Source	Year set	Standard
DFG	1993	MAK: 500 ppm (1,200 mg/m³)
<p>MAK value recommended to reduce irritation potential in exposed workers.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> • In a study on humans, a NOEL was reported at 250 ppm and a LOEL was reported at 500 ppm for odour nuisance and mucosal irritation • A LOEL of 250 ppm provided for behavioural toxicological effects including delayed reaction times • Referred to a 'CEC Criteria Document' (European Communities Scientific Expert Group) recommended a threshold of 200 ppm; however supporting evidence was not robust • No demonstration of long-term toxic effects on significant behavioural functions • 500 ppm considered appropriate based on irritation and well-being effects reported at 1,000 ppm and weak, reversible reactions seen at 500 ppm. 		
SCOEL	1997	TWA: 500 ppm (1,210 mg/m³); STEL: 1,000 ppm (2,420 mg/m³)
<p>TWA and STEL recommended to reduce irritation and discomfort in exposed workers.</p> <p>Summary of additional data:</p> <ul style="list-style-type: none"> • No reported mucous membrane irritation on exposed volunteers (100 ppm; 6 h/d; 1 or 6 d) • Considered symptoms may occur at exposures of ≥1000 ppm and as symptoms are mild and tolerance develops, an uncertainty factor of 2 was applied to derive the TWA. 		
OARS/AIHA	NA	NA
No report		
HCOTN	Year	TWA: 500 ppm (1,210 mg/m³); STEL: 1,000 ppm (2,420 mg/m³)
No report		

Secondary source reports relied upon

Source	Year	Additional information
HSE	✓ 2005	<ul style="list-style-type: none"> • WEL: 500 ppm (1,210 mg/m³) and STEL of 1,500 ppm (3,620 mg/m³) • No information located on assessment.
NICNAS	✓ 2013	<ul style="list-style-type: none"> • LC₅₀: 32,000 ppm (rats; 4 h) • Mild neurobehavioural changes observed in female rats exposed to 4 h/d for 2 wk between 7,120-37,975 mg/m³.
US NIOSH	✓ 1994	<p>Volunteer study (1943)</p> <ul style="list-style-type: none"> • 300 ppm: slight irritation • 500 ppm: tolerated.

Carcinogenicity — non-threshold based genotoxic carcinogens

Is the chemical mutagenic?

No

Notations

Source	Notations
SWA	—
HCIS	—
NICNAS	—
EU Annex	NA
ECHA	NA
ACGIH	Carcinogenicity – A4
DFG	—
SCOEL	—
HCOTN	NA
IARC	NA
US NIOSH	—

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:
Dermal LD ₅₀ /Inhalation LD ₅₀ < 10:
<i>In vivo</i> dermal absorption rate > 10%:
Estimated dermal exposure at WES > 10%:
a skin notation is not warranted

IDLH

Is there a suitable IDLH value available?

Yes, based on LEL

Additional information

Molecular weight:	58.08
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 checked="" type="checkbox"/> ACGIH <input checked="" type="checkbox"/> DFG <input type="checkbox"/> 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](#) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2015) Acetone – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (1997) Recommendation from the Scientific Committee on Occupational Exposure Limits for Acetone. SCOEL/SUM/74.

National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (2013) Acetone. Human health tier II assessment – IMAP report.

UK Health and Safety Executive (HSE) (2005) Acetone – EH64: Summary criteria for occupational exposure limits.

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