
sec-Hexyl acetate

(CAS No: 108-84-9)

Health-based Reassessment of Administrative
Occupational Exposure Limits

Committee on Updating of Occupational Exposure Limits,
a committee of the Health Council of the Netherlands

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1 Introduction

The present document contains the assessment of the health hazard of *sec*-hexyl acetate by the Committee on Updating of Occupational Exposure Limits, a committee of the Health Council of the Netherlands. The first draft of this document was prepared by AAE Wibowo, Ph.D. (Coronel Institute of the Academic Medical Centre, Amsterdam, the Netherlands).

The evaluation of the toxicity of *sec*-hexyl acetate has been based on the review the American Conference of Governmental Occupational Hygienists (ACGIH) (ACG96). Where relevant, the original publications were reviewed and evaluated as will be indicated in the text. In addition, literature was retrieved from the data bases Medline, Chemical Abstracts, Embase (starting from 1966, 1970 and 1988, respectively), and HSEline, NIOSHTIC, Cisdoc, and Mhidas (backwards from 1997) and Poltox (Toxline, Cambr Sc Abstr, FSTA) (backwards from 1994), using the following key words: hexyl acetate, methylamyl acetate, methylpentyl acetate, and 108-84-9. The final search was carried out in December 1997.

In July 2000, the President of the Health Council released a draft of the document for public review. The committee received no comments.

An additional literature search in May 2002 did not result in information changing the committee's conclusions.

2 Identity

name	:	<i>sec</i> -hexyl acetate
synonyms	:	acetic acid, 1,3-dimethylbutyl ester; 1,3-dimethylbutyl acetate; methyl amyl acetate; methylisobutylcarbinol acetate; 4-methyl-2-pentanol acetate; methylisoamyl acetate
molecular formula	:	C ₈ H ₁₆ O ₂
molecular structure	:	CH ₃ -CO-O-CH(CH ₃)-CH ₂ -CH(CH ₃) ₂
CAS number	:	108-84-9

3 Physical and chemical properties

molecular weight	:	144.2
boiling point	:	146.3°C
flash point	:	43°C (open cup); 45°C (closed cup)
freezing point	:	-64°C
vapour pressure	:	0.4 kPa
solubility in water	:	insoluble
odour threshold	:	not applicable
log P _{octanol/water}	:	2.68 (estimated)
conversion factors (20°C, 101.3 kPa)	:	1 mg/m ³ = 0.17 ppm 1 ppm = 6.0 mg/m ³

Data from ACG96, <http://esc.syrres.com>.

sec-Hexyl acetate is a colourless liquid with a mild, pleasant fruity odour (ACG96). The odour threshold of *sec*-hexyl acetate was reported to be 0.012 mg/m³ (0.002 ppm) (Rut86).

4 Uses

sec-Hexyl acetate is used as a lacquer solvent and in fragrances (ACG96). The compound occurs naturally in apples and their leaves.

5 Biotransformation and kinetics

The committee did not find human or experimental animal data on biotransformation and kinetics of *sec*-hexyl acetate.

6 Effects and mechanism of action

Human data

Exposure to a concentration of *sec*-hexyl acetate of 600 mg/m³ (100 ppm) for 15 minutes caused eye and upper respiratory tract irritation in the majority of 12 human volunteers of both sexes. Several of the subjects also complained of an unpleasant odour and taste at that level (Sil46).

The committee did not find other human data on effects of exposure to *sec*-hexyl acetate.

Animal data

Following application of 0.01 mL of undiluted ester to the uncovered clipped belly of 5 albino rabbits, *sec*-hexyl acetate scored an injury grade of 1 (i.e., giving rise to 'no reaction whatever') on a scale from 1 to 10 (Smy54; see also Smy49).

The committee did not find data from studies on skin sensitisation in experimental animals.

When instilled into the eyes of rabbits, *sec*-hexyl acetate scored an injury grade of 2 on a scale of 1 to 10, which was defined as producing an injury of 1.0 to 5.0 points (out of a maximum of 20) 18 to 24 hours after instillation of 0.5 mL of undiluted test substance (Smy54; see also Car46).

Rats could tolerate exposure to a concentrated, probably saturated level* of *sec*-hexyl acetate without mortality occurring for a maximum of 2 hours while exposure for 4 hours to 24,000 mg/m³ (4000 ppm) caused mortality in 2/6 rats (observation time: 14 days) (Smy54).

The dermal LD₅₀ in rabbits was >20 mL/kg bw (i.e., >ca. 18 g/kg bw). The oral LD₅₀ in rats was 6160 mg/kg bw (observation times: 14 days) (Smy54).

The committee did not find data from studies on repeated-dose toxicity including carcinogenicity and reproduction toxicity or on mutagenicity and genotoxicity.

7 Existing guidelines

The current occupational exposure limit (MAC) of *sec*-hexyl acetate in the Netherlands is 300 mg/m³ (50 ppm), 8-hour TWA.

Existing occupational exposure limits for *sec*-hexyl acetate in some European countries and in the USA are summarised in the annex.

8 Assessment of health hazard

Human volunteers experienced exposure to 600 mg/m³ (100 ppm) for 15 minutes as irritating to eyes and respiratory tract.

* Theoretically, the concentration in saturated vapour can amount to 4000 ppm (calculated from: vapour pressure in Pa/10⁵ Pa) x 10⁶ ppm.

In experimental animals, liquid *sec*-hexyl acetate was not and only slightly irritating to the skin and eyes of rabbits, respectively. Two out of 6 rats died following a 4-hour exposure to 24,000 mg/m³ (4000 ppm). The dermal (in rabbits) and oral (in rats) LD₅₀ values were >18,000 and 6160 mg/kg bw, respectively.

The committee did not find data from studies on repeated-dose toxicity including carcinogenicity and reproduction toxicity or on mutagenicity and genotoxicity.

The committee considers the toxicological database on *sec*-hexyl acetate too poor to justify recommendation of a health-based occupational exposure limit.

Furthermore, the committee considers a factor of 2 between the present MAC-value and the concentration at which human volunteers experienced eye and upper respiratory tract irritation as very small. Therefore, the committee concludes that the present MAC-value for *sec*-hexyl acetate of 300 mg/m³ (50 ppm), 8-hour TWA, may be too high.

References

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Annex

Occupational exposure limits for *sec*-hexyl acetate compounds in various countries

country -organisation	occupational exposure limit		time-weighted average	type of exposure limit	nota ^a	reference ^b
	ppm	mg/m ³				
the Netherlands - Ministry of Social Affairs and Employment	50	300	8 h	administrative		SZW02
Germany - AGS	50	300	8 h			TRG00
- DFG MAK-Kommission	- ^c	-	8 h 15 min 30 min	MAK		DFG02
Great Britain - HSE	50 100	299 599	8 h	OES		HSE02
Sweden	-	-	8 h			Arb00b
Denmark	50	300	8 h			Arb00a
USA - ACGIH	50	-	8 h	TLV		ACG02b
- OSHA	50	300	8 h	PEL		ACG02a
- NIOSH	50	300	10 h	REL		ACG02a
European Union - SCOEL	-	-				CEC00

^a S = skin notation; this means that skin absorption may contribute considerably to body burden; sens = substance can cause sensitisation.

^b Reference to the most recent official publication of occupational exposure limits.

^c Listed among compounds for which studies on effects in man or experimental animals have yielded insufficient information for the establishment of MAK values.