Gezondheidsraad **Voorzitter**
Health Council of the Netherlands

Aan de Staatssecretaris van Sociale Zaken en Werkgelegenheid

Onderwerp : Aanbieding adviezen herevaluatie bestuurlijke MAC-waarden
Uw kenmerk : ARBO/AMIL/97/00648
Ons kenmerk : U 2706/CB/MP/563-O3
Bijlagen : 18
Datum : 14 december 2000

Mijnheer de staatssecretaris,

Op verzoek van uw ambtsvoorganger bied ik u hierbij de eerste adviezen aan van een reeks over de gezondheidskundige basis van uit het buitenland overgenomen grenswaarden voor beroepsmatige blootstelling aan stoffen. Het verzoek om deze adviezen is in algemene zin vervat in brief nr ARBO/AMIL/97/00648 en in latere stadia door uw departement toegespitst op afzonderlijke stoffen. De adviezen zijn opgesteld door een daartoe door mij geformeerde internationale commissie van de Gezondheidsraad en beoordeeld door de Beraadsgroep Gezondheid en Omgeving.

De beoogde reeks van in het Engels gestelde adviezen zal losbladig worden gepubliceerd onder ons publicatienummer 2000/15OSH en, conform de aan de Gezondheidsraad voorgelegde toespitsingen van de adviesaanvraag, betrekking hebben op 168 stoffen. Het u thans aangeboden eerste pakket bestaat uit een Algemene Inleiding (publicatienummer 2000/15OSH/000) en uit de adviezen genummerd 2000/15OSH/001 tot en met 2000/15OSH/017, respectievelijk betrekking hebbend op:
cesiumhydroxide, cyclopentaan, diboraan, dimethoxymethaan, dipropylketon, fenylfosfine, germaniumtetrahydride, hexachloornaftaleen, methaanthiol, methylcyclohexanol, methylisopropylketon, mica, natriumhydroxide, octachloornaftaleen, silaan, tetrachloornaftaleen, en yttrium en yttriumverbindingen.

Bij afronding van de werkzaamheden van de hierboven bedoelde commissie ontvangt u een Nederlandstalige samenvatting van de in de gehele reeks van adviezen neergelegde bevindingen.

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Gezondheidsraad
Health Council of the Netherlands

Onderwerp : Herevaluatie uit het buitenland overgenomen grenswaarden
Ons kenmerk : U
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De u thans aangeboden adviezen heb ik vandaag ter informatie doen toekomen aan de Minister van Volksgezondheid, Welzijn en Sport en aan de Minister van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer.

Hoogachtend,

prof. dr JJ Sixma

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Octachloronaphthalene

(CAS Reg. nr: 2234-13-1)

Health-based Reassessment of Administrative Occupational Exposure Limits

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

No. 2000/15OSH/012, The Hague, 14 December 2000

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1 Introduction

The present document contains the assessment of the health hazard of octachloronaphthalene 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 mrs MA Maclaine Pont, M.Sc. (Wageningen University, the Netherlands).

Literature was retrieved from the data bases Medline, Toxline and Chemical Abstracts, covering the periods 1966 until March 1998, 1981 until October 1997 and 1937 until October 1997, respectively, and using the following key words: octachloronaphthalene, 2234-13-1, Halowax, Nibren, naphthalene or octachloro- (all isomers). Data considered to be critical were evaluated by reviewing the original publications. The final literature search has been carried out in March 1998, followed by an additional search in May 1999.

In February 1999, the President of the Health Council released a draft of the document for public review. Comments were received by the following individuals and organizations: dr P Wardenbach (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Dortmund, Germany). These comments were taken into account in deciding on the final version of the document.

2 Identity

name	:	octachloronaphthalene
synonyms	:	-
CAS reg nr	:	2234-13-1
molecular formula	:	$C_{10}Cl_8$
structural formula	:	

Data from How92.

The technical product Halowax 1051 can often erroneously be found under the same CAS reg nr as that for octachloronaphthalene. Halowax 1051 is a mixture of octa- and heptachloronaphthalenes (Asp84). The chlorination degree is approximately 70%. The theoretical chlorination degree of octachloronaphthalene is 70.3% (Aho80, Bel53).

3 Physical and chemical properties

molecular weight:	:	403.74
melting point:	:	185 - 200 °C
boiling point:	:	410°C
vapour pressure:	:	20°C: < 133 Pa
solubility in water:	:	insoluble
log $P_{oct/water}$:	:	calculated: 7.9 measured: 6.4 - 8.4
conversion factors: (20°C, 101.3 kPa)	:	not applicable

Data from ACG91, Ban91, Opp85, Opp87.

Octachloronaphthalene is a non-flammable, pale yellow, wax-like solid (ACG91).

4 Uses

Octachloronaphthalene has been utilized as a fireproof and waterproof additive in cable insulation and in other protective coating materials. Octachloronaphthalene has also found use as an additive to lubricants (ACG91).

The manufacturing of chlorinated naphthalenes (Halowax) has been discontinued in the USA since 1977 (Ben94).

5 Biotransformation and kinetics

When rabbits were given a single oral dose of 1000 mg octachloronaphthalene no increase in urinary metabolites was measured. The faeces and urine were not investigated for unmetabolized products (Cor58).

One day after a single intra peritoneal injection in mice of 1 mg per animal the highest concentration of octachloronaphthalene was found in the adipose tissue: 2.1% of the dose. Lower concentrations were found in the liver (1.9%), spleen (0.80%), and kidneys (0.32%). The concentration in adipose tissue increased gradually up to day 7. Several biological half-life times were calculated during the exponential elimination phase: 3.72 days for the adipose

tissue, 3.39 days for the testes, 2.25 days for the spleen, 2.20 for the kidneys and as the fastest: 1.51 days for the lungs (Ois83). The investigators did not recover 100% of the amount injected, probably a part remained at the site of injection.

After a single intra peritoneal injection of Halowax 1051 into rats the activity of several drug-metabolizing enzymes was increased: the arylhydrocarbon hydroxylase activity was increased 4.3-fold in the liver and 6.1-fold in the kidneys. The ethoxycoumarin deethylase activity was increased 9.6-fold in the liver and 53-fold in the kidneys. The UDP-glucuronosyltransferase activity was increased 4.5-fold in the liver. The enzyme activities in the small intestines were not increased (Aho82). An earlier study by the same authors gave comparable results (Aho80).

6 Effects and mechanism of action

Human data

Halowax 1051 was tested on the skin of the ear of 3 volunteers in a 50% mineral oil suspension for 30 days. No acne or any other skin effect was observed (She57).

Animal data

A quantity of 20 mg, applied 5 times per week for two weeks on the skin of hairless mice, did not induce gross or histological changes (Puh82).

Four calves received quantities of octachloronaphthalene in the range of 4.0 - 10.0 mg/lb (8.8 - 22 mg/kg body weight) as a total oral dose, given in small portions for 7 - 11 days. Only one calf developed hyperkeratosis (not the high dose animal); it was moribund in 21 days. The top dose animal and one low dose animal remained unaffected; the dosage was repeated from the 23rd to the 27th day without any symptoms; neither did these two calves show any symptoms during the 150-day period of observation. The fourth animal received 11 mg/kg, and developed symptoms like lacrimation, salivation and nasal discharge by the eighth day; the symptoms disappeared after approximately 50 days (Bel53).

The addition of 0.05% to 0.30% of octachloronaphthalene/heptachloronaphthalene (9:1) to the diet of rats (approximately 25 to 150 mg/kg body weight) greatly accelerated the loss of

vitamin A from the liver. There was no effect on the vitamin A or vitamin E concentration in the blood, nor did the vitamin E in the liver change significantly (Dea55).

Octachloronaphthalene was injected intra peritoneal into immature male rats at doses of 0 (n=5), 15 (n=4), 60 (n=4) 150 (n=8) and 600 µmol/kg (n=8) (6, 24, 60 and 242 mg/kg body weight respectively) on day 1 and day 3. On day 6 there was a decrease in relative liver weight ($p<0.05$) at the highest dose. At the other dose levels no effect on the relative liver weight was found. There was a dose-related increase in the activity of several liver enzymes ($p<0.01$ from 24 mg/kg upward) (Cam81).

No data on long-term exposure, carcinogenicity, genotoxicity, mutagenicity or reproduction toxicity of octachloronaphthalene were found.

7 Existing guidelines

The current administrative occupational exposure limit (MAC) for octachloronaphthalene in the Netherlands is 0.1 mg/m^3, 8 h TWA with a skin notation.

Existing occupational exposure limits for octachloronaphthalene in some European countries and in the USA are summarized in the annex.

8 Assessment of health hazard

Very few data are available on the toxicity of octachloronaphthalene. Limited data indicate that the compound is not acnegenic after dermal application on humans (She57) and on hairless mice (Puh82).

No carcinogenicity studies have been found, neither any case report or epidemiological study of cancer in humans exposed to this chemical.

No reproduction toxicity studies have been found.

Oral dosing of 25 mg/kg body weight depleted the vitamin A content of the liver of rats (Dea55). Two intraperitoneal injections of 242 mg/kg body weight decreased the relative liver weight of immature rats (Cam81). The target organ for toxicity is probably the liver.

Data on long-term exposure of animals have not been found.

The committee considers the toxicological data base on octachloronaphthalene too poor to recommend a health-based occupational exposure limit.

The committee concludes that there is insufficient information to comment on the level of the present MAC value.

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Cam81 Campbell MA, Bandeira S, Robertson L, *et al*. Octachloronaphthalene induction of hepatic microsomal aryl hydrocarbon hydroxylase activity in the immature male rat. Toxicology 1981; 22: 123-32.

Cor58 Cornish HH, Block WD. Metabolism of chlorinated naphthalenes. J Biol Chem 1958; 231: 583-8.

Dea55 Deadrick RE, Bieri JG, Cardenas RR jr. Effects of octachloronaphthalene on vitamin A metabolism in the rat. J Nutr 1955; 57: 287-95.

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Hun97 Hunter WJ, Aresini G, Haigh R, *et al*. Occupational exposure limits for chemicals in the European Union. Occup Environ Med 1997; 54: 217-22.

NBO96 National Board of Occupational Safety and Health. Occupational exposure limit values. Solna, Sweden: NBOSH, 1996: Ordinance AFS 1996/2.

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TRG00 TRGS 900 [Grenzwerte in der Luft am Arbeitsplatz; Technische Regeln für Gefahrstoffe]. German. B Arb Bl. 2000; 2.

Annex

Occupational exposure standards for octachloronaphthalene in various countries.

country -organisation	occupational exposure limit		time-weighted average	type of exposure limit	note[a]	lit ref[b]
	ppm	mg/m^3				
the Netherlands						
-Ministry	-	0.1	8 h	administrative	S	SZW00
Germany						
-AGS		0.1[c]	8 h	administrative		TRG00
-DFG MAK-Kom.	-	-[d]				DFG99
Great Britain						
-HSE	-	-				HSE99
Sweden	-	[e]				NBO96
Denmark	-	0.1	8 h		S	Arb96
USA						
-ACGIH	-	0.1	8 h	TLV	S	ACG00
	-	0.3	15 min	STEL		
-OSHA	-	0.1	8 h	PEL	S	
-NIOSH	-	0.1	10 h	REL	S	
	-	0.3	15 min	STEL		
European Union						
-SCOEL	-	-				Hun97

[a] S = skin notation; which means that skin absorption may contribute considerably to the body burden
sens = substance can cause sensitization

[b] Reference to the most recent official publication of occupational exposure limits

[c] The inhalable fraction of the aerosol

[d] Substance for which no MAK value can be established at present

[e] Sweden has a Level Limit Value for chlorinated naphthalenes of 0.2 mg/m^3 TWA 8 h and a STEL (10 min) of 0.6 mg/m^3 with a skin notation. However, the CAS reg number assigned to this mixture is the same as that for trichloronaphthalene.