

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 gezondheidkundige 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, hexachlooraфтаleen, methaanthiol, methylcyclohexanol, methylisopropylketon, mica, natriumhydroxide, octachlooraфтаleen, silaan, tetrachlooraфтаleen, 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.

Gezondheidsraad

Health Council of the Netherlands

Onderwerp : Herevaluatie uit het buitenland overgenomen grenswaarden
Ons kenmerk : U
Pagina : 2
Datum : 14 december 2000

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

Tetrachloronaphthalene

(CAS Reg. nr: 1335-88-2)

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/016, The Hague, 14 December 2000

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1 Introduction

The present document contains the assessment of the health hazard of tetrachloronaphthalene 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 December 1997, respectively, and using the following key words: tetrachloronaphthalene, 1335-88-2, Halowax, Nibren, naphthalene or tetrachloro- (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	:	tetrachloronaphthalene
synonyms	:	-
CAS reg nr	:	1335-88-2
molecular formula	:	C ₁₀ H ₄ Cl ₄
structural formula	:	

Data from How92.

The technical product Halowax can often erroneously be found under the same CAS reg nr as the original mixture. The theoretical chlorination degree of the technical product is 53.3%, generally, the actual degree is 53.5%. Halowax 1001 (CAS reg nr 58718-67-5) has a chlorination degree of 50%; Halowax 1099 (CAS reg nr 39450-05-5) has a chlorination degree of 52%; Halowax 1013 (CAS reg nr 12616-35-2) has a chlorination degree of 56%.

3 Physical and chemical properties

molecular weight	:	265.96
melting point:	:	depending on the isomer: 120 - 198°C unspecified: 182°C; 115 - 200°C
boiling point	:	312 - 360°C
flash point	:	210°C (open cup)
vapour pressure	:	20°C: <<1Pa
solubility in water	:	insoluble
log P _{oct/water}	:	depending on the isomer: 5.75 - 6.38
conversion factors (20°C, 101.3 kPa)	:	not applicable

Data from ACG91, Ban91, Dre79, Lew92, NIA98, Opp85, Opp87.

The product is a mixture of isomers. It consists of colourless to light yellow crystals with a typical odour, decomposes upon heating or combustion, forming corrosive and toxic fumes, e.g. phosgene and hydrochloric acid, and reacts vigorously with oxidants (NIA98).

4 Uses

Tetrachloronaphthalene is used in electrical insulating materials, as a component of resins or polymers for coating or impregnating textiles, wood, and paper, and as an additive in cutting oils and lubricants (ACG91).

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

5 Biotransformation and kinetics

When rats were given a single oral dose of 1 g of tetrachloronaphthalene, 45% was recovered in the urine in the next four days. The compound was partly metabolized into sulphate (4%), mercapturic acid (3%), and glucuronic acid (38%). The rest of the dose was not accounted for. Further analysis of the metabolites was not performed (Cor58).

After a single intra peritoneal injection of 100 mg/kg body weight of Nibren D130 (chlorination degree 50 - 60%) into rats the activity of several drug-metabolizing enzymes was increased: the aryl hydrocarbon hydroxylase activity was increased 4.4-fold in the liver, and 7.1-fold in the kidneys; the ethoxycoumarin deethylase activity was increased 12-fold in the liver and 24-fold in the kidneys; the UDP-glucuronyltransferase was increased 3.6-fold in the liver. The enzyme activities in the small intestines were not increased (Aho82). A similar study with Halowax 1099 (chlorination degree 52%) using the same dosing regimen, also showed the induction of several drug-metabolizing enzymes in rat liver (Aho80).

6 Effects and mechanism of action

Human data

Halowax 1001 (tri- and tetrachloronaphthalenes) was tested on the skin of ears of 3 volunteers in a 50% mineral oil suspension for 30 days. No acne or any other skin effect was observed (She57).

Halowax-induced hepatic dysfunctioning was described in wire cable workers, assemblers and labourers, including the description of nine deaths due to occupational Halowax exposure (study from 1944, cited in ACG91).

Animal data

A very old study reports that after exposure to 1 mg/m³ of tetrachloronaphthalene for 16 hours/day, for 6 weeks, rats only showed damage of the liver. No further data are available (Dri37).

After feeding 10 rats daily with 500 mg of a mixture of tetra- and pentachloronaphthalene, all animals fell ill and either died or were sacrificed

by the 63rd day. The livers showed fatty infiltration and fatty degeneration (Ben38).

Two of three calves developed mild symptoms associated with hyperkeratosis after receiving 7.4 or 12.1 mg/lb via the feed for 10 days (respectively 16 and 27 mg/kg body weight as a total dose, given in small portions in 10 - 13 days). Both calves showed some lacrimation, slight nasal discharge and some depression that persisted for several days. The dosing was repeated during the 23rd to 30th day. Slight symptoms that lasted several days again appeared. At the end of 150 days of observation there were no symptoms of hyperkeratosis or any other effects (Bel53).

1,2,3,4-Tetrachloronaphthalene was intra peritoneal injected into immature male rats (n=4) on day 1 and day 3 at a dose of 150 µmol/kg bw (39.9 mg/kg). A control group (n=10) was injected with corn oil. On day 6 no effects were found on the relative liver weight and the activity of several liver enzymes (Cam83).

Mutagenicity and genotoxicity

1,2,3,4-Tetrachloronaphthalene was negative in the Ames assay, using *Salmonella typhimurium* strains TA98, TA100, TA1535, and TA1537, with and without rat and hamster liver metabolic activation (Haw83).

No data on carcinogenicity or reproduction toxicity of tetrachloronaphthalene have been found.

7 Existing guidelines

The current administrative occupational exposure limit (MAC) for tetrachloronaphthalene in the Netherlands is 2 mg/m³, 8 h TWA.

Existing occupational exposure limits for tetrachloronaphthalene 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 tetrachloronaphthalene. Limited data in humans indicate that the compound is not acnegenic after dermal application (She57). It did induce hyperkeratosis, some lacrimation, slight nasal discharge and some depression in calves after oral administration

(Bel53). Hepatic dysfunctioning has been reported after occupational exposure to Halowax (ACG91).

In an inhalation study in rats liver effects were observed after exposure to 1 mg/m³ tetrachloronaphthalene during 6 weeks (Dri37).

The activity of several enzymes was increased in liver and kidneys of rats, after intra peritoneal injection of the technical product (Aho80, Aho82).

The target organs for toxicity are probably the liver and/or the kidneys.

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.

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

Given the effects found in the inhalation study in rats, the committee concludes that the present MAC-value for tetrachloronaphthalene of 2 mg/m³, as an 8 h time weighted average, is too high.

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016-9 Tetrachloronaphthalene

Annex

Occupational exposure standards for tetrachloronaphthalene 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	-	2	8 h	administrative	S	SZW00
Germany						
- AGS		2 ^c	8 h	administrative		TRG00
- DFG MAK-Kom	-	- ^d				DFG99
Great Britain						
- HSE	-	2	8 h	OES		HSE99
	-	4	15 min	STEL		
Sweden	-	^e				NBO96
Denmark	-	2	8 h		S	Arb96
USA						
- ACGIH	-	2	8 h	TLV		ACG00
- OSHA	-	2	8 h	PEL	S	
- NIOSH	-	2	10 h	REL	S	
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/m³ 8 h TWA and a STEL (10 min) of 0.6 mg/m³ with a skin notation. However, the CAS reg nr assigned to this mixture is the same as that for trichloronaphthalene