Rijksinstituut voor Volksgezondheid en Milieu
Ministerie van Volksgezondheid, Welzijn en Sport

Stofdocument deel A

CAS-nr: 75-01-4 **Vinylchloride** **CH_2=CHCl** **VN-nr: 1086**
GEVI: 239

Synoniemen: chlooretheen, chloorethyleen (Engels: vinyl chloride)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarden	**VRW (mg/m^3)**	1.200	810	650	510	370	190
Alarmeringsgrenswaarden	**AGW (mg/m^3)**	7.400	4.200	3.000	2.100	2.100	2.100
Levensbedreigende waarden	**LBW (mg/m^3)**	31.000*	18.000*	13.000*	8.800	8.800	8.800
Datum vaststelling: 24-09-2009				1 mg/m^3 = 0,384 ppm; 1 ppm = 2,60 mg/m^3			

Explosiegrens: LEL = 3,6 vol% ≈ 94.000 mg/m^3
* berekende interventiewaarde hoger dan 10% LEL

Geur: typerende geur, zoet
LOA: niet afgeleid.

Fysisch-chemische eigenschappen

Uiterlijk: kleurloos onder druk tot vloeistof verdicht gas
Brand: zeer brandgevaarlijk

Relatieve dichtheid van verzadigd damp-lucht mengsel: 2,2

Molecuulmassa:	62,5 g/mol
Zuurgraad:	Geen data
LogKow:	Geen data
Wateroplosbaarheid:	0,3 g/100 ml (slecht)
Verzadigde dampdruk:	3400 mbar

Overige informatie

Publieke grenswaarde: niet afgeleid
MAK: niet afgeleid
TLV-TWA: 13 mg/m^3

Toxicologische eigenschappen

Effecten bij inhalatoire blootstelling

VRW → AGW: milde hoofdpijn

AGW → LBW: hoofdpijn, duizeligheid, misselijkheid, bewustzijnsdaling, longoedeem, leverschade

Boven LBW: coma, hartritmestoornissen, ademstilstand, sterfte

Toxiciteit bij eenmalige, inhalatoire blootstelling

- Vinylchloride heeft een depressieve werking op het centraal zenuwstelsel.
- Hoge concentratie kan de gevoeligheid van het hart voor adrenaline verhogen.
- Blootstelling aan vinylchloride kan leverschade veroorzaken.
- Vinylchloride is een genotoxisch carcinogeen

Effecten bij blootstelling aan vloeistof

Huidcontact: bij bevriezing: roodheid en pijn, blaren

Oogcontact: roodheid en pijn, bij bevriezing: ernstige brandwonden

Carcinogeniteit

IARC classificatie: 1
CRP: 910 mg/m^3

Beknopte medische informatie

Ontsmetting damp
algemeen: frisse lucht, rust en onmiddellijk arts raadplegen.

Ontsmetting vloeistof
huid: kleding uittrekken (NIET lostrekken), direct spoelen met veel water (minimaal 20 min.), dan pas eventueel aan de huid vastgevroren kleding verwijderen en verder spoelen,.
ogen: minimaal 15 min. spoelen met water (evt. contactlenzen verwijderen), dan naar oogarts brengen, blijven spoelen tijdens vervoer..
inslikken: n.v.t. (gas).

Specifieke behandeling en materialen:.

Neem contact op met het NVIC (tel: +31 (0)30 –274 8888) voor informatie met betrekking tot medisch handelen.

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

Stofdocument deel B

CAS-nr: 75-01-4 **Vinyl chloride** **CH_2=CHCl** **UN-nr: 1086**

Basis for the Dutch Intervention Values

VRW: AEGL value is adopted, 2hr value added.

AGW: AEGL value is adopted, 2hr value added.

LBW: AEGL value is adopted, 2hr value added.

Date: 24-09-2009 | AEGL document, interim 2008

Dutch Intervention Values (mg/m^3)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
VRW	1,200	810	650	510	370	190	Mild headache in humans
AGW	7,400	4,200	3,000	2,100	2,100	2,100	Threshold of neurotoxic effects in humans
LBW	31,000 *	18,000 *	13,000 *	8,800	8,800	8,800	Threshold of animal mortality, cardiac sensitization.

* value higher than 10% of LEL

Derivation of the Dutch Intervention Values

VRW: The endpoint "mild headache" can be regarded as a no effect level for notable discomfort (491 ppm (1,277 mg/m^3) for 3.5 h). Occurrence of headache has been reported in two subjects after acute exposure (the time of onset of headaches is not specified and is assumed to have occurred after 3.5 hours of exposure). Headaches observed in occupationally exposed persons at unknown exposure levels of vinyl chloride support the use of headache (the least severe effect) as a VRW type effect. An intraspecies factor of 3 is employed: it is assumed that the effects are due to vinyl chloride itself and not due to a metabolite, so only small interindividual differences are expected. Time scaling was performed using $C^n * t = k$ with the default n-values n=1 and n=3, as the mechanism for the induction of headache is not well understood. The extrapolation to 10 minutes from a 3.5 hour exposure is justified because exposure of human at 4,000 ppm (10,400 mg/m^3) for 5 minutes did not result in headache. However, the resulting VRW values may not provide a sufficient margin of safety to avoid mutational events or malignancies after short-term exposure to vinyl chloride (see CRP below)).

AGW: Dizziness, reeling, swimming head, nausea etc., which can be regarded as early signs of narcosis, have been reported in humans exposed to vinyl chloride in concentrations greater than or equal to 12,000 ppm (31,200 mg/m^3) for 5 min. The effects were only seen in 1 or 2 of 6 persons (one person was unsure of an effect) and do not yet impair the capability to escape, whereas, the effects observed at concentrations greater than or equal to 16,000 ppm (41,600 mg/m^3) (dizziness, nausea, headache, dulling of visual and auditory cues) might possibly impair escape. Therefore, 12,000 ppm (31,200 mg/m^3) is interpreted as the no effect level for impaired ability to escape and is used to derived the AGW values. By analogy to other anaesthetics the effects are assumed to be solely concentration dependent. Thus, after reaching steady state at about 2 hours of exposure, no increase in effect is expected. An intraspecies factor of 3 is applied. The other exposure duration-specific values were derived by time scaling according to the dose-response regression equation $C^n * t = k$, using a factor of n=2, based on experimental data. With this, time extrapolation was performed from 5 to 10, 30, 60 minutes and 2 hours, where the steady state concentration was calculated. However, the resulting AGW values may not provide a sufficient margin of safety to avoid mutational events or malignancies after short-term exposure to vinyl chloride (see CRP below).

LBW: Lethality data provide LBW values that are marginally higher than those derived based on cardiac sensitization. Thus, animal data on cardiac sensitization after exposure for 5 minutes were used to derive the LBW. Severe cardiac sensitization is a life threatening effect, but at 50,000 ppm (130,000 mg/m^3) no animals died in the reported study. Therefore, 50,000 ppm is used to derive LBW values. A total uncertainty factor of 3 is used to account for toxicodynamic differences among individuals. As the challenge with epinephrine and the doses of epinephrine used represent a conservative scenario, no interspecies uncertainty factor was used. As the unmetabolized vinyl chloride is responsible for the effect, no relevant differences in toxicokinetics are assumed. After reaching steady state at about 2 hours of exposure, no increase in effect is expected (see also AGW derivation). The other exposure duration-specific values were derived by time scaling according to the dose-response regression

equation $C^n * t = k$, using an n of 2, With this, time extrapolation was performed from 5 to 10, 30, 60 minutes and 2 hours, where the steady state concentration was calculated.

Additional toxicological information (including relevant results of a general literature search, if any)

Acute neurotoxicity by inhalation of high vinyl chloride concentrations is likely dependent upon vinyl chloride concentrations and independent of its metabolism. This assumption is supported by comparison of narcotic concentrations which are similar for the four species guinea pig, mouse, rabbit and rat. Acute toxicity/lethality is mainly accompanied by congestion of all internal organs, pulmonary edema, liver and kidney changes (up to necrosis). The mechanism of action is not elucidated; toxic effects are possibly mediated by reactive metabolites.
Acute exposure of experimental animals towards vinyl chloride results in narcotic effects, cardiac sensitization, and hepatotoxicity. Narcotic effects are characterized by a typical sequence of events from euphoria and dizziness, followed by drowsiness and loss of consciousness. Finally, animals die due to respiratory failure.

No reproductive toxicity or developmental toxicity studies with single exposure were identified. In repeated exposure studies always maternal effects were observed when fetal effects were found.

H350: May cause cancer

Carcinogenicity and derivation of the CRP value

IARC classification: 1 (carcinogenic to humans)

Derivation of the carcinogenic risk potency (CRP):

10^{-4} risk level after inhalation: $33 * 10^{-3}$ mg/m^3 [Maltoni et al., 1981, assumed 150 weeks exposure]

CRP, 24 hrs = 49 mg/m^3

CRP, 1 hr = 910 mg/m^3

Based on the cancer incidence as evident from a five-weeks animal study assuming that 5 weeks of exposure of an animal is equivalent to about 150 weeks exposure of humans, with linear transformation to a single 24 hour exposure without further correction for potential sensitive stages of tumor development. Exposures of less than 24 hours are derived using a PBPK model, because the model uses human parameters to transform the internal dose of a metabolite of vinyl chloride required for a tumor response (based on animal studies) to an external exposure concentration for humans. This way, the strict C x t protocol is not applied to exposure durations under 24 hours. Tumors observed were angiosarcomas and hepatomas. Note that the CRP is below the 10min-VRW of 1,200 mg/m^3.

Odour and derivation of the LOA value

Odour: sweet odour

No LOA was derived due to lack of reliable data. Odour thresholds were reported in the range from 10 to 25,000 ppm (26 to 65,000 mg/m^3).

***Other standards and guidelines** (1h values in mg/m^3, unless otherwise indicated)*

VRW level **650**	*AEGL-1* 650	*ERPG-1* 1,300		*IDLH:* not established
AGW level **3,000**	*AEGL-2* 3,100	*ERPG-2* 13,000		
LBW level **13,000**	*AEGL-3* 12,000	*ERPG-3* 52,000		