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

Stofdocument deel A

CAS-nr: 127-18-4 **VN-nr: 1897**

Perchloorethyleen

$CCl_2=CCl_2$

GEVI: 60

Synoniemen: tetrachloorethyleen, per, ethyleentetrachloride (Engels: tetrachloroethylene)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarde	**VRW (mg/m^3)**	240	240	240	240	240	240
Alarmeringsgrenswaarde	**AGW (mg/m^3)**	1.700	1.700	1.700	1.200	790	540
Levensbedreigende	**LBW (mg/m^3)**	35.000	19.000	13.000	8.600	5.800	3.900
Datum vaststelling: 24-09-2009				1 mg/m^3 = 0,145 ppm; 1 ppm = 6,90 mg/m^3			

Explosiegrens: LEL = n.v.t.

Geur: oplosmiddelachtige / etherische geur

LOA: niet afgeleid

Fysisch-chemische eigenschappen

Uiterlijk: kleurloze vloeistof

Brand: niet brandbaar

Relatieve dichtheid van verzadigd damp-lucht mengsel: 1,09

Molecuulmassa: 165,8 g/mol

Zuurgraad: geen data

LogKow: 3,4

Wateroplosbaarheid: Niet

Verzadigde dampdruk: 18,9 mbar

Overige informatie

Publieke grenswaarde: niet afgeleid

MAK: niet afgeleid

TLV-TWA: 172 mg/m^3

Vluchtig

Vloeistof wordt makkelijk door intacte huid opgenomen

Toxicologische eigenschappen

Effecten bij inhalatoire blootstelling

Onder VRW: geen effecten

VRW → AGW: irritatie ogen, huid en luchtwegen, hoesten, misselijkheid, hoofdpijn, duizeligheid, verminderde coördinatie

AGW → LBW: benauwdheid, misselijkheid, bewustzijnsdaling

Boven LBW: ademnood, verstoring van het hartritme, longoedeem, ademstilstand, coma, sterfte

Toxiciteit bij eenmalige, inhalatoire blootstelling

- Perchloorethyleen werkt irriterend op de ogen, huid en luchtwegen.
- Perchloorethyleen heeft een depressieve werking op het CZS en de ademhaling.
- Effecten op de lever en nier na blootstelling aan perchloorethyleen zijn beschreven.
- Blootstelling aan perchloorethyleen kan longoedeem veroorzaken. De verschijnselen hiervan kunnen vertraagd optreden en versterkt worden door lichamelijke inspanning.

Effecten bij blootstelling aan vloeistof

Huidcontact: irritatie, roodheid, pijn

Oogcontact: irritatie, roodheid, pijn, tranen

Carcinogeniteit

IARC classificatie: 2A

CRP: niet afgeleid

Beknopte medische informatie

Ontsmetting damp

algemeen: frisse lucht, rust en direct spoedeisende medische hulp inzetten.

Ontsmetting vloeistof

huid: verontreinigde kleding uittrekken, minimaal 20 min. spoelen met veel water of douchen, arts raadplegen.

ogen: minimaal 15 min. spoelen met water (evt. contactlenzen verwijderen), dan naar oogarts brengen.

inslikken: mond laten spoelen (uitspugen!), GEEN braken opwekken en direct spoedeisende medische hulp inzetten.

***Specifieke behandeling en materialen**: geen.*

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: 127-18-4 **Tetrachloroethylene** **CCl_2=CCl_2** **UN-nr: 1897**

Basis for the Dutch Intervention Values

VRW: AEGL value is adopted, 2h value added

AGW: Same point of departure as AEGL values, but different value for n

LBW: Different point of departure and different value for n than AEGL values

Date: 24-09-2009 | AEGL document: Interim, 2009

Dutch Intervention Values (mg/m^3)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
VRW	240	240	240	240	240	240	Mild eye irritation in humans
AGW	1,700	1,700	1,700	1,200	790	540	No-effect level for ataxia in rats
LBW	35,000	19,000	13,000	8,600	5,800	3,900	Calculated treshold (LC_{01}) for lethality in animals (mice).

Derivation of the Dutch Intervention Values

VRW: The VRW derivation is based on the exposure of 6 volunteers to 106 ppm (730 mg/m^3) for 1 hour. At this level, an apparent non-objectionable odour and eye irritation were noted, and one subject experienced a slight fullness in the head. An interspecies uncertainty factor was not applicable. An intraspecies uncertainty factor of 3 was applied because mucous membrane irritation is caused by a direct effect of the chemical and the response is not expected to vary greatly among individuals. Because irritation is considered a threshold effect which should not vary over time, the VRW value was not scaled across time, but the same value was applied to all times.

AGW: The AGW values are based upon the no-effect level for ataxia after first exposure in rats following exposure to 1,150 ppm (7,900 mg/m^3) tetrachloroethylene for 4 hours/day, 5 days/week for 2 weeks (the time period of 4 hours) was used for the derivation. Exposure to the next higher concentration of 2,300 ppm (16,000 mg/m^3) resulted in reversible ataxia. A total uncertainty factor of 10 is applied. An interspecies uncertainty factor of 3 is applied based on the similarity of effects manifested in rodents compared to humans produced by agents that are CNS depressants. An intraspecies uncertainty factor of 3 is applied based on total range of sensitivity (2-3 fold) between several different groups (newborns, pregnant women and the elderly) for anaesthetic gases. Many organic vapours, particularly those which are strongly lipophilic, produce an anaesthetic effect in exposed humans. On the basis of this knowledge, it is reasonable to assume that the same 2-3 fold difference in sensitivity among individuals would apply for tetrachloroethylene.
Time scaling was performed using the equation $C^n \times t = k$ and an n-value of 1.8 (based on probit analysis of rat mortality data). The 10- and 30-minute AGW values were set equal to the 1-hour value of 250 ppm (1,700 mg/m^3) because a human study demonstrated an exposure to 600 ppm (4,100 mg/m^3) for 10 minutes caused significant effects (eye and nose irritation, dizziness, tightness and numbing about the mouth, some loss of inhibitions, and motor coordination required great effort). After applying an uncertainty factor of 3 (for intraspecies variation), the AGW values based upon this study are consistent with the 1- hour AGW value of 250 ppm (1,700 mg/m^3).

LBW: In contrast to the AEGL, the LBW derivation is not based on one-third of the 4-hour mouse LC_{50} value of 5,200 ppm (36,000 mg/m^3), resulting in a point of departure of 1,733 ppm (12,000 mg/m^3), but on a probit analysis using DoseResp with rat lethality data. This study of Rowe *et al.* tested multiple concentrations and time points. Probit analysis yielded LC_{01} values for the 10-, 30min, 1-, 2-, 4- and 8hr exposure durations of 15390, 8231, 5546, 3736, 2517 and 1696 ppm (106,000, 57,000, 38,000, 26,000, 17,000, 12,000 mg/m^3) and an n-value of 1.8 for time scaling. An interspecies uncertainty factor of 1 was applied based on similar exposure effects in humans compared with animals, and pharmacokinetic data indicating an interspecies uncertainty factor for toxicokinetic differences of less than 1 when using rat data to derive exposure values for humans. An intraspecies uncertainty factor of 3 is applied based on the previously described argument that the sensitivity for volatile anaesthetics should not vary more than

a factor of 2-3-fold. Use of a total uncertainty factor of 10 (3x3) would be too low, because the LBW values are supported by a human study in which the effects noted were milder than those defined by the LBW definition. In this study, humans exposed to 934 ppm (6,400 mg/m^3) for 95 minutes experienced tightness of the frontal sinuses, increased hand perspiration, nostril irritation, congestion of Eustachian tubes, lassitude, slight mental fogginess, stinging eyes, exhilaration, and/or the tip of the nose and lips anesthetized. An animal study in which rats exposed to 2,300 ppm (16,000 mg/m^3) for 4 hours/day, 5 days/week for two weeks exhibited overt ataxia only following the first 4 hour exposure.

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

Tetrachloroethylene has low acute inhalation toxicity. The liver, kidneys, blood and central nervous system (CNS) are the target organs for systemic effects. In humans the initial uptake of tetrachloroethylene following inhalation is rapid, with rates levelling off after a few hours of exposure. The available data suggest that a high proportion is absorbed in humans, but actual percentages have not been reported. Based on the effects of various volatile anaesthetics maximal sensitivity is expected in newborns (particularly prematures), pregnant women, and the elderly. The total variation, however, is not more than 2-3 fold. The least sensitive are older infants, toddlers and children compared to normal adults.

A few epidemiological studies have reported reproductive or developmental abnormalities due to exposure to tetrachloroethylene in drinking water. The results of several studies consistently indicated that occupationally exposed women might suffer higher rates of spontaneous abortion. A retrospective time-to-pregnancy study among Finnish women indicated a reduced ability to reproduce among 20 women exposed to tetrachloroethylene (concentration was not clear) 1-4 days a week or daily by inhalation. The relevance of these effects after single exposures is uncertain.

From the available data, it may be concluded that skin absorption may contribute significantly to the systemic effects of tetrachloroethylene.

H351: Suspected of causing cancer.

Carcinogenicity and derivation of the CRP value

IARC classification: 2A (probably carcinogenic to humans)

No carcinogenic risk potency (CRP) was derived

IARC concluded that there is evidence for consistently positive associations between exposure to tetrachloroethylene and the risks for oesophageal and cervical cancer and non-Hodgkin lymphoma. These associations appear unlikely to be due to chance, although confounding factors cannot be excluded and the total numbers in the cohort studies combined are relatively small.

Odour and derivation of the LOA value

Odour: solvent like, ethereal

No LOA was derived due to the absence of consistent odour perception.

Odour threshold ranging from 2 - 71 ppm (14 – 490 mg/m^3)

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

VRW level **240**	*AEGL-1* 240	*ERPG-1* 690		*IDLH:* 1035 (30 minutes)
AGW level **1,700**	*AEGL-2* 1,600	*ERPG-2* 1,380		
LBW level **13,000**	*AEGL-3* 8,300	*ERPG-3* 6,900		