

## Stofdocument deel A

CAS-nr: 7803-51-2

**Fosfine**

PH<sub>3</sub>

VN-nr: 2199

GEVI: 263

**Synoniemen:** fosforwaterstof (Engels: phosphine)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarden	<b>VRW (mg/m<sup>3</sup>)</b>	NA	NA	NA	NA	NA	NA
Alarmeringsgrenswaarden	<b>AGW (mg/m<sup>3</sup>)</b>	17	5,6	2,8	1,4	0,71	0,35
Levensbedreigende waarden	<b>LBW (mg/m<sup>3</sup>)</b>	30	10	5,1	2,5	1,3	0,64

Datum vaststelling: 24-09-2009

1 mg/m<sup>3</sup> = 0,707 ppm; 1 ppm = 1,41 mg/m<sup>3</sup>

**Explosiegrens:** LEL = 1,8 vol% ≈ 25.000 mg/m<sup>3</sup>

**Geur:** Ui-, vis- of knoflook geur, puur: geurloos

**LOA:** niet afgeleid.

### Fysisch-chemische eigenschappen

<b>Uiterlijk:</b> Kleurloos gas	Molecuulmassa: 34,0 g/mol
<b>Brand:</b> zeer brandgevaarlijk, kan met lucht explosief zijn	Zuurgraad: geen data
	LogKow: geen data
	Wateroplosbaarheid: 26 g/100 ml (goed)
<b>Relatieve dichtheid:</b> geen data	Verzadigde dampdruk: 41900 mbar

### Overige informatie

Publieke grenswaarde:  
0,14 mg/m<sup>3</sup> (8 uur)  
MAK: 0,14 mg/m<sup>3</sup>  
TLV-TWA: 0,42 mg/m<sup>3</sup>

### Toxicologische eigenschappen

#### Effecten bij inhalatoire blootstelling aan damp

**Onder AGW:** irritatie aan ogen, huid, neus en luchtwegen, hoofdpijn, misselijkheid, braken, zwakte, paresthesie, duizeligheid, tremor

**AGW → LBW:** benauwdheid, longoedeem, bewustzijnsdaling, hartritme stoornissen, nier- en leverfunctiestoornissen

**Boven LBW:** convulsies, cardiovasculaire collaps, myocardinfarct, ademnood, coma, sterfte

LET OP: De afwezigheid van een VRW betekent niet dat blootstelling onder de AGW zonder effecten is.

#### Toxiciteit bij eenmalige, inhalatoire blootstelling

- Fosfine verstoort door effecten op de celademhaling de zuurstofopname en energievoorziening van de cel.
- Fosfine werkt irriterend op de ogen, huid en luchtwegen.
- Hoge blootstelling kan tot longoedeem leiden. De verschijnselen hiervan kunnen vertraagd optreden en versterkt worden door lichamelijke inspanning.
- Kinderen zijn mogelijk gevoeliger voor toxiciteit door fosfine.

#### Effecten bij blootstelling aan vloeistof

**Huidcontact:** roodheid

**Oogcontact:** roodheid, pijn

#### Carcinogeniteit

IARC classificatie: niet geclassificeerd

CRP: niet afgeleid

### Beknopte medische informatie

#### Ontsmetting gas

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

**ogen:** spoelen met water (evt. contactlenzen verwijderen).

#### Ontsmetting vloeistof

**huid:** aan de huid vastgevroren kleding NIET lostrekken, minimaal 20 min. spoelen met veel water of douchen en arts raadplegen.

**ogen:** bij bevroering: minimaal 15 min. spoelen met water (evt. contactlenzen verwijderen), dan naar oogarts brengen, blijven spoelen tijdens vervoer.

**inslikken:** niet van toepassing (gas).

**Specifieke behandeling en materialen:** geen.

Neem contact op met het NVIC (Tel: 030 - 274 8888) voor informatie met betrekking tot medisch handelen

## Stofdocument deel B

CAS-nr: 7803-51-2

# Phosphine

PH<sub>3</sub>

UN-nr: 2199

### Basis for the Dutch Intervention Values

**VRW:** Not recommended, in accordance with AEGL

**AGW:** AEGL value is adopted (except 10 min value for which time scaling was applied), 2h value added

**LBW:** AEGL value is adopted (except 10 min value for which time scaling was applied), 2h value added

Date: 24-09-2009

AEGL document: Final, 2007

### Dutch Intervention Values (mg/m<sup>3</sup>)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
<b>VRW</b>	NR	NR	NR	NR	NR	NR	(insufficient data)
<b>AGW</b>	17	5.6	2.8	1.4	0.71	0.35	Irritation nasal mucosa rats
<b>LBW</b>	30	10	5.1	2.5	1.3	0.64	Lethality in rats

### Derivation of the Dutch Intervention Values

**VRW:** No appropriate human or animal data are available for derivation of VRW for phosphine. Therefore VRW values are not recommended. This does not imply that exposure below AGW is without adverse effects.

**AGW:** AGW values were based on red mucoid nasal discharge in rats exposed to 10 ppm (14 mg/m<sup>3</sup>) phosphine for 6 hours. Since this endpoint is less severe than effects defined by AGW, the resulting values should be protective. An uncertainty factor of 3 was applied to account for interspecies variability since time to death lethality data from 45 minutes to 30 hours for rats, mice, rabbits, and guinea pigs suggest little species variability. An uncertainty factor of 10 was applied to account for intraspecies variability since the human data suggest that children may be more sensitive than adults when exposed to presumably similar phosphine concentrations. For example, in two reports, exposed children died, but exposed adults survived. For AEGL-values, time scaling was performed using the equation  $C^n \times t = k$ , and a n-value of 1 (derived from rat lethality data of 1- to 6-hours for phosphine). It was noted that the derivation of the value of n=1 is based on data derived from three different studies, which is not in line with the procedures of the Dutch expert panel on probits. However, using the data of a single study (Muthu et al., 1980) would result in n=0.544, leading to unrealistically high AGW-values. As an alternative, using the default values for n (n=1, n=3) would lead to unrealistically low AGW-values. Therefore, the n-value of 1, as used by AEGL, is adopted for derivation of AGW-values.

In contrast to the 10 minute AEGL-2 value that was set equal to the 30 minute AEGL-2 value, time scaling was also applied for the 10 minute AGW value.

**LBW:** The highest concentration yielding no deaths in rats (18 ppm = 25 mg/m<sup>3</sup>) for 6 hours was used as point of departure for the calculation of the LBW values. An interspecies uncertainty factor of 3 and an intraspecies factor of 10 were applied for reasons provided above. Time scaling was performed using the equation  $C^n \times t = k$  and a n-value of 1 was accepted (due to a lack of a better alternative, see above).

In contrast to the 10 minute AEGL-3 value that was set equal to the 30 minute AEGL-3 value, time scaling was also applied for the 10 minute LBW value.

These values are considered protective since workers were repeatedly exposed for "brief" periods of time to phosphine concentrations up to 35 ppm (49 mg/m<sup>3</sup>) with no life-threatening effects and workers exposed to >50 ppm (>70 mg/m<sup>3</sup>) for 2-5 minutes experienced only odor.

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

A very steep concentration-response curve is observed for phosphine toxicity. Children are thought to be more sensitive to phosphine exposure. Common clinical signs after exposure to phosphine are headache, vomiting, coughing, shortness of breath, paresthesia, weakness, tremors and jaundice. Pulmonary congestion, pleural effusion, and congestive heart failure may be observed upon post-mortem examination.

In vitro, phosphine reacts with cytochrome c and cytochrome c oxidase, thereby inhibiting mitochondrial oxygen uptake. In vitro studies have also shown that phosphine can react with the heme moiety of hemoglobin in the presence of oxygen. Cell death and loss of cell membrane integrity accounted for the increased liver enzymes, bronchiolytic effects, cloudy swelling of renal tubular epithelia, and hemorrhagic myocardial lesions.

No reproductive or developmental data were located in the literature.

H314: Causes severe skin burns and eye damage; H330: Fatal if inhaled.

#### **Carcinogenicity and derivation of the CRP value**

IARC classification: not classified.

No carcinogenic risk potency (CRP) was derived.

Fumigation workers exposed long-term to phosphine have a higher incidence of both stable and less stable chromosomal aberrations. Molecular analysis of these lesions suggests that the breakpoints are near proto-oncogenes involved in non-Hodgkin's lymphoma, possibly contributing to the increased incidence of lymphomas in pesticide workers.

#### **Odour and derivation of the LOA value**

Odour: pure phosphine is odourless at concentrations up to 283 mg/m<sup>3</sup> (200 ppm). Technical-grade phosphine has garlic-like odour (may be due to impurities).

No LOA was derived due to lack of reliable data. Ruth (1986) reported an odor range of 0.028-3.6 mg/m<sup>3</sup>.

#### **Other standards and guidelines (1h values in mg/m<sup>3</sup>, unless otherwise indicated)**

<b>VRW level</b> NR	<b>AEGL-1</b> NR	<b>ERPG-1</b> NR	<b>IDLH:</b> 71 mg/m <sup>3</sup> (10 minutes)
<b>AGW level</b> 2.8	<b>AEGL-2</b> 2.8	<b>ERPG-2</b> 0.71	
<b>LBW level</b> 5.1	<b>AEGL-3</b> 5.1	<b>ERPG-3</b> 7.1	