

Stofdocument deel A

CAS-nr: 20859-73-8

Aluminiumfosfide

AIP

VN-nr: 1397

Gevi: X462

Synoniemen: - (Engels: aluminum phosphide)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarden	VRW (mg/m³)	NA	NA	NA	NA	NA	NA
Alarmeringsgrenswaarden	AGW (mg/m³)	29	9,6	4,8	2,4	1,2	0,60
Levensbedreigende	LBW (mg/m³)	52	17	8,7	4,3	2,2	1,1
Datum vaststelling: 24-09-2009		1 mg/m ³ = 0,414 ppm; 1 ppm = 2,41mg/m ³					
Explosiegrens: geen data Kans op explosie door vorming van fosfine met vocht uit de lucht.			Geur: geen informatie LOA: niet afgeleid				
Fysisch-chemische eigenschappen						Overige informatie	
Uiterlijk: donkergrijze of donkergele kristallen Brand: Niet brandbaar. Echter, kan spontaan ontbranden door vorming van fosfine met vocht uit lucht.		Molecuulmassa: 58,0 g/mol Zuurgraad: geen data LogKow: geen data Wateroplosbaarheid: reactie		Publieke grenswaarde: niet afgeleid MAK: niet afgeleid TLV-TWA: niet afgeleid			
Relatieve dichtheid van verzadigd damp-lucht mengsel: geen data		Verzadigde dampdruk: geen data					
Toxicologische eigenschappen							
Effecten bij inhalatoire blootstelling (gebaseerd op vrijkomen fosfine) <u>Onder AGW:</u> irritatie aan ogen, huid, neus en luchtwegen, hoofdpijn, misselijkheid, braken, zwakte, paresthesie, duizeligheid, tremor <u>AGW → LBW:</u> benauwdheid, longoedeem, bewustzijnsdaling, hartritmestoornissen, nier- en leverfunctiestoornissen <u>Boven LBW:</u> 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 <ul style="list-style-type: none"> Aluminiumfosfide kan bij contact met vocht uit de lucht of luchtwegen omgezet worden in fosfine. De toxiciteit van aluminiumfosfide wordt bepaald door de vorming van fosfine. 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. Dit kan pas na enkele uren optreden en wordt versterkt door lichamelijke inspanning. Kinderen zijn mogelijk gevoeliger voor toxiciteit door fosfine. 			
Effecten bij blootstelling aan vaste stof <u>Huidcontact:</u> roodheid <u>Oogcontact:</u> roodheid, pijn				Carcinogeniteit IARC classificatie: niet geëvalueerd CRP: niet afgeleid			
Beknopte medische informatie							
Ontsmetting damp <u>algemeen:</u> frisse lucht, rust, halfzittende houding en direct spoedeisende medische hulp inzetten. <u>ogen:</u> spoelen met water (evt. contactlenzen verwijderen).							
Ontsmetting vaste stof <u>huid:</u> verontreinigde kleding uittrekken, afspoelen met water. <u>ogen:</u> spoelen met water (evt. contactlenzen verwijderen). <u>inslikken:</u> mond laten spoelen (uitspugen!), rust, GEEN mond-op-mondbeademing, actieve kool (carbomix) toedienen, en direct spoedeisende medische hulp inzetten.							
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

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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 2008

Dutch Intervention Values (mg/m³)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
VRW	NR	NR	NR	NR	NR	NR	(insufficient data)
AGW	29	9.6	4.8	2.4	1.2	0.60	Irritation nasal mucosa rats (phosphine)
LBW	52	17	8.7	4.3	2.2	1.1	Lethality rats (phosphine)

Derivation of the Dutch Intervention Values

VRW: No data are available for aluminum phosphide. As toxicity of aluminum phosphide is due to phosphine, which is formed due to reaction of aluminum phosphide with moisture, data on phosphine could be used to derive intervention values. However, no appropriate data were available for derivation of VRW values for phosphine. Therefore VRW values are not recommended. This does not imply that exposure below AGW is without adverse effects.

AGW: Since no appropriate data exist for aluminum phosphide, AGW values for phosphine will be used (on ppm-basis) to derive AGW values for aluminum phosphide. The use of phosphine as a surrogate for aluminum phosphide was deemed appropriate since it is believed that the reaction product, phosphine, is responsible for the adverse effects. Because one mole of phosphine is produced for every mole of aluminum phosphide, no molar adjustment factor was needed.

Derivation of AGW values for phosphine

The phosphine AGW values were based on red mucoid nasal discharge in rats exposed to 10 ppm (14 mg/m³) phosphine for 6 hours, corresponding to 24.1 mg/m³ aluminum phosphide. Since this endpoint is less severe than effects defined by AGW, the resulting values should be protective.

The default uncertainty factor of 3 was applied to account for interspecies 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. Time scaling was performed using the equation $C^n \times t = k$, and an n-value of 1 (derived from rat lethality data of 1- to 6-hours for phosphine).

LBW: Since no appropriate data exist for aluminum phosphide, LBW values for phosphine will be used (on ppm-basis) to derive LBW values for aluminum phosphide. The use of phosphine as a surrogate for aluminum phosphide was deemed appropriate since it is believed that the reaction product, phosphine, is responsible for the adverse effects. Because one mole of phosphine is produced for every mole of aluminum phosphide, no molar adjustment factor was needed.

Derivation of LBW values for phosphine

The highest concentration yielding no deaths in rats (18 ppm = 25 mg/m³) for 6 hours was used as point of departure for the calculation of the LBW values, corresponding to 43.38 mg/m³ aluminum phosphide. The default uncertainty factor of 3 for interspecies 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 chemical specific n-value of 1 (derived from rat lethality data of 1- to 6-hours for phosphine). These values are considered protective since workers were repeatedly exposed for "brief" periods of time to phosphine concentrations up to 35 ppm (49 mg/m³) with no life-threatening effects and workers exposed to >50 ppm (>70 mg/m³) for 2-5 minutes experienced only odour.

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

When aluminum phosphide reacts with moisture, phosphine gas will be formed. Phosphine is considered to induce acute toxic effects following oral and inhalation exposure. Children are thought to be more vulnerable 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 found.

H300: Fatal if swallowed; H311: Toxic in contact with skin; H330: Fatal if inhaled

Carcinogenicity and derivation of the CRP value

IARC classification: not evaluated.

No carcinogenic risk potency (CRP) was derived.

No data concerning carcinogenicity of aluminum phosphide are available.

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: no information.

Pure phosphine is odourless at concentrations up to 200 ppm. Technical-grade phosphine has a garlic-like odour (may be due to impurities).

For phosphine, no LOA was derived due to lack of reliable data. Ruth (1986) reported an odour range of 0.028-3.6 mg/m³ for phosphine.

Other standards and guidelines (1h values in mg/m³, unless otherwise indicated)

VRW level	AEGL-1	ERPG-1		IDLH: not derived
NR	NR	not derived		
AGW level	AEGL-2	ERPG-2		
4.8	4.7	not derived		
LBW level	AEGL-3	ERPG-3		
8.7	8.5	not derived		