

Stofdocument deel A

CAS-nr: 1314-56-3

Fosforpentoxide

P₂O₅^a

VN-nr: 1807

GEVI: 80

Synoniemen: difosforpentaoxide, fosforzuuranhydride (Engels: Phosphorus pentoxide)

Interventiewaarden		10 min.	30 min.	1 uur	2 uur	4 uur	8 uur
Voorlichtingsrichtwaarden	VRW (mg/m³)	0,80	0,80	0,80	0,80	0,80	0,80
Alarmeringsgrenswaarden	AGW (mg/m³)	46	32	25	13	6,4	3,2
Levensbedreigende waarden	LBW (mg/m³)	220	150	120	59	30	15
Datum vaststelling: 31-10-2017		1 mg/m ³ = 0,169 ppm; 1 ppm = 5,907 mg/m ³					
Explosiegrens: niet afgeleid (bij vele reacties kans op brand en explosie)			Geur: lichte fosforgeur LOA: niet afgeleid				
Fysisch-chemische eigenschappen				Overige informatie			
Uiterlijk: wit, sterk hygroscopisch poeder, (nagenoeg) reukloos Brand: zelf niet brandbaar, maar bij vele reacties kans op brand en explosie		Molecuulmassa: 142,0 g/mol Zuurgraad: pH 1 (bij 0,5 g/100 ml) LogKow: Wateroplosbaarheid: reactie Verzadigde dampdruk: 1,3 mbar (bij 388°C)		Publieke grenswaarde: 1 mg/m ³ MAK: 2 mg/m ³ TLV-TWA: niet afgeleid			
Relatieve dichtheid van verzadigd damp-lucht mengsel: 2,3-3,0							
Toxicologische eigenschappen							
Effecten bij inhalatoire blootstelling <u>Onder VRW:</u> keelpijn en hoesten <u>VRW → AGW:</u> branderig gevoel achter het borstbeen <u>AGW → LBW:</u> kortademigheid <u>Boven LBW:</u> ademnood, larynx- en glottisoedeem (met risico op verstikking)				Toxiciteit bij eenmalige, inhalatoire blootstelling <ul style="list-style-type: none"> ▪ Blootstelling aan fosforpentoxide kan ernstige chemische brandwonden, longoedeem en chemische pneumonitis veroorzaken. De verschijnselen hiervan kunnen vertraagd optreden en versterkt worden door lichamelijke inspanning. ▪ De stof is bijtend en kan bijtende effecten op de slijmvliezen van ogen en/of hogere luchtwegen veroorzaken. ▪ In ernstige gevallen kans op verstikking door zwelling in de keel. 			
Effecten bij blootstelling aan vloeistof <u>Huidcontact:</u> bijtend, roodheid en pijn, blaren, ernstige brandwonden <u>Oogcontact:</u> bijtend, roodheid en pijn, slecht zien.				Carcinogeniteit IARC classificatie: niet geclassificeerd. CRP: niet afgeleid			
Beknopte medische informatie							
Ontsmetting damp <i>algemeen:</i> frisse lucht, rust, halfzittende houding, direct spoedeisende medische hulp inzetten Ontsmetting vloeistof <i>huid:</i> verontreinigde kleding uittrekken, minimaal 20 min. spoelen met veel water of douchen, zo nodig arts raadplegen. <i>ogen:</i> minimaal 15 min. spoelen met water (evt. contactlenzen verwijderen), dan naar oogarts brengen, blijven spoelen tijdens vervoer. <i>inslikken:</i> mond laten spoelen (uitspugen!), GEEN braken opwekken, 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							

^a Dit is de empirische formule; de formele formule is O₁₀P₄

Stofdocument deel B

CAS-nr: 1314-56-3

Phosphorus pentoxide

P₄O₁₀

UN-nr: 1807

Basis for the Dutch Intervention Values

VRW: Based on information as described in ERPG-document, different values are derived, other time-points added

AGW: Based on information as described in ERPG-document, different values are derived, other time-points added

LBW: Based on information as described in ERPG-document, different values are derived, other time-points added

Date: 31-10-2017

ERPG, 2015

Dutch Intervention Values (mg/m³)

	10 min	30 min	1 h	2 h	4 h	8 h	End point
VRW	0.80	0.80	0.80	0.80	0.80	0.80	Weight of evidence, threshold for irritation in un-acclimatized humans
AGW	46	32	25	13	6.4	3.2	Analogy with phosphoric acid: Threshold for irritation in animals
LBW	220	150	120	59	30	15	Analogy with phosphoric acid: Threshold for lethality in rats

Derivation of the Dutch Intervention Values

In the absence of toxicity data with phosphorus pentoxide, data are derived from animal studies with smoke of white or red phosphorous (P₄)_n. Smoke of white and red phosphorous consist of phosphoric acid in a mixture of poly phosphoric acid and ortho-phosphoric acid. One mole of red or white phosphorous can produce 4 moles of phosphoric acid (MW conversion factor 3.2). The values are calculated back to phosphorus pentoxide equivalents by dividing by 2 given that 1 molecule of phosphorus pentoxide is hydrolyzed to produce 2 molecules of phosphoric acid (MW conversion factor 1.38).

VRW: Anecdotal data in humans indicate that concentrations ranging from 3.6 to 11.3 mg phosphorus pentoxide/m³ cause irritation and coughing in unacclimatized workers but were tolerated. Concentrations of 100 mg phosphorus pentoxide/m³ were unbearable, except to acclimatized workers. Concentrations of 0.8 to 5.4 mg phosphorus pentoxide/m³ were noticeable but not uncomfortable. "Momentary" exposure to hydroaerosols of phosphoric acid expressed as 1.2, 5.2 and 8.0 mg phosphorus pentoxide/m³ produced irritation in 12 out of 15 healthy adults at the highest concentration, in 3 out of 15 in the middle concentration and no irritation was reported at the lowest concentration. A third study indicates that 131 workers exposed to a mixture of phosphoric acid, phosphorus pentoxide, fluorides and coal tar pitch volatiles in a refinery showed no effects in a 3 to 7-year follow-up longitudinal pulmonary function study where maximum levels of phosphorus pentoxide were 2.2 mg/m³. There is no single study that can serve as PoD for derivation of the VRW. However, based on a weight of evidence approach and the circumstantial data in humans a VRW of 0.8 mg/m³ is proposed. Time scaling was not applied because mild irritant effects generally do not vary greatly over time.

AGW: In the absence of suitable human data, the AGW is based on animal data. Acute inhalation toxicity studies show that 380 mg/m³ phosphorus pentoxide (or 525 mg phosphoric acid equivalents/m³) for 60 minutes causes unmistakable signs of irritation, pulmonary congestion, haemorrhages, and respiratory distress in rats. In mice, 110 mg/m³ phosphorus pentoxide (or 152 mg phosphoric acid equivalents/m³) for 60 minutes also causes unmistakable signs of irritation, congestion and difficulty in breathing. Concentrations of 450 mg/m³ red phosphorus (1422 mg phosphoric acid equivalents/m³, corresponding to 1030 mg phosphorus pentoxide/m³) in the rat and rabbit and 111 mg/m³ red phosphorus (351 mg phosphoric acid equivalents/m³, corresponding to 254.3 mg phosphorous pentoxide/m³) in the mouse did not produce respiratory tract damage after 1 hour exposure and a 14-day observation period. The concentration of 351 mg phosphoric acid equivalents/m³ (corresponding to 254.3 mg phosphorus pentoxide equivalents/m³) was used as PoD for the AGW. The default uncertainty factor of 10 (3x3) was considered sufficient to account for inter- and intraspecies differences. Time scaling was applied using the equation Cⁿ × t = k with the default values of n=1 and n=3 when extrapolating to longer and shorter time points, respectively. The resulting AGW-values are supported by human data: human workplace studies show that a

concentration of 100 mg/m³ phosphorus pentoxide was unbearable to un-acclimatised workers.

LBW: Several acute inhalation lethality studies are available with red phosphorous smoke in different laboratory animals and are summarised in the ERPG document. Datasets of two of the five rat lethality studies were considered most relevant. In one study rats were exposed to unformulated pure red phosphorus for 1 hour whole-body in a 10 m³ chamber at 1422, 2749, 5056 and 6731 mg/m³ (as phosphoric acid equivalents). Mortality data were 0/12, 2/10, 6/9, and 12/12, respectively. In the second study rats were exposed to red phosphorous some for one hour at concentrations of 6420, 4410, 4030 and 2727 or 4 hours to 1210 mg phosphoric acid equivalents/m³. Mortality rates were 9/10, 7/10 3/10, 2/10 and 2/10. The mortality data of these two studies resulted in two comparable 1-hour LC₀₁ values of 1754 mg/m³ and 1637 mg/m³ of phosphoric acid, respectively, and the lowest value was used as PoD. Therefore, the PoD used corresponds to 1186 mg phosphorus pentoxide equivalents/m³. The default uncertainty factor of 10 (3x3) was considered sufficient to account for inter- and intraspecies differences. Time scaling was applied using the equation $C^n \times t = k$ with the default values of n=1 and n=3 when extrapolating to longer and shorter time points, respectively.

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

Phosphorus pentoxide is a corrosive mineral acid that causes irritation and inflammation to the respiratory tract after inhalation and induces cellular toxicity most likely due to its activity as a reducing agent resulting in disruption of oxidative processes.

Phosphorus pentoxide is not reproductive toxic or developmental toxic in animals.

H314: Causes severe skin burns and eye damage.

Carcinogenicity and derivation of the CRP value

IARC classification: not classified
No carcinogenic risk potency (CRP) was derived

Odour and derivation of the LOA value

Odour: slight phosphorus-like odour
No LOA was derived due to lack of data.

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

VRW level 0.80	AEGL-1^c 9	ERPG-1^d 1		IDLH: -
AGW level 25	AEGL-2 50	ERPG-2 10		
LBW level 120	AEGL-3 110	ERPG-3 50		

^b Note that the ERPG and AEGL values as presented here (in mg/m³) are derived using the conversion factors of the ERPG or AEGL, respectively.

^c Values are proposed AEGL values for red phosphorous and calculated to phosphorus pentoxide equivalents

^d ERPG states values in ppm and mg/m³ that do not match. It is unclear which values should apply.