



Draft Assessment Report (DAR)

- public version -

**Initial risk assessment provided by the rapporteur Member State
Germany for the existing active substance**

CALCIUM PHOSPHIDE

**of the third stage (part B) of the review programme
referred to in Article 8(2) of Council Directive 91/414/EEC**

Volume 3, Annex B, part 3, B.7

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Annex B

Calcium phosphide

B-7. Residue data

WARNING: This document forms part of an EC evaluation data package and should not be used in isolation. Registration must not be granted on the basis of this document.

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B.7 Residue data

Studies in regard to residue data must always be performed unless it can be justified that no residues will remain on plants or plant products which are used as food or feed.

The main fields of application of metal phosphides (aluminium phosphide, calcium phosphide, magnesium phosphide) - as a source of phosphine gas for purposes of fumigation - are the uses

- for the control of moles and rabbits and other small non-rodent species in animal dens and burrows in all types of agricultural crops, forestry, vegetable and fruit growing, grassland and ornamental growing,
- as an rodenticide for fumigation of burrows to control rodents in the field (agricultural areas, non-cropland, non-domestic areas), and
- as an insecticide in storage protection in enclosed spaces or transportation facilities (indoor fumigation of raw agricultural commodities, processed food commodities, animal feeds, and non-food commodities). These metal phosphides are effective fumigants against all kinds of storage pests (moths, beetles, etc.) including all stages of development (insects and pre-adult stages: eggs, larvae and pupae).

Contact between metal phosphides and moisture in the soil or atmosphere produces the active substance phosphine (hydrogen phosphide).

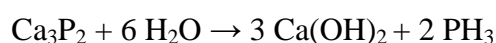
Outdoor use of calcium phosphide

In the case of outdoor use of calcium phosphide the submission of residue data or the performance of adequate tests is in principle not necessary, for the following reasons:

Calcium phosphide, as constituent of products for fumigation in form of e.g. granules in underground tunnel systems of non-rodent and rodent species, is not intended for direct application to growing crops. The application of the products directly in underground tunnel systems (burrows) of rodents, rabbits and moles excludes the direct contact with the plants, therefore, no residues in plants are to be expected.

Unlike conventional crop protection products, which must be applied over relatively large crop areas, the calcium phosphide containing fumigants are predominantly applied to discrete sites (no widespread area application). Even if calcium phosphide containing fumigants are spilled, the phosphide will not be taken up by plants. Due to the hydrolytic instability calcium phosphide will not be washed out. Calcium phosphide use will not impact ground water and surface water resources.

Due to the rapid decomposition (hydrolysis) of calcium phosphide in contact with moisture of the soil or the atmosphere already in the neutral pH-range the calcium phosphide in underground tunnel systems degrades to produce phosphine and calcium hydroxide:



The decomposition of calcium phosphide producing phosphine occurs according to soil humidity, soil type, pH value, temperature and consideration of the applied quantity as a function of time.

Calcium hydroxide is not toxic to plants, and will not be taken up if laying in the tunnel systems.

Phosphine is expected either partly to be volatilised (partition to the atmosphere due to its volatility; phosphine is diluted in air and oxidised to phosphoric acid), or re-adsorbed onto soil. But for the most part the evolved phosphine gas will spread and remain in the burrows with some local emission into soil, due to the reason that phosphine is heavier than air and the vertical spreading rate is very low. But the special kind of application excludes a wide spreading of phosphine in soil and the half-life of phosphine in soil is very short. The phosphine gas is finally transformed into phosphorus compounds (phosphates: natural soil constituents and plant nutrients) with a very short half-life of approximately 6 hours in soil, so that no accumulation needs to be considered. The only imaginable way for plant uptake of phosphine should therefore be through the roots in a short period. But this possibility will be extremely low. As a consequence, residues of concern are not to be expected.

Phytotoxic effects during or after the use of calcium phosphide in underground tunnel systems have never been observed and reported and it can be therefore concluded that the use of calcium phosphides causes no risk for growing plants, hence tests are not considered to be required.

In conclusion it can be stated, residues of calcium phosphide or phosphine are not expected in plants due to uptake from soil treated for the control of (burrowing) rodents and non-rodent species. Calcium phosphide is not considered to generate any residues of practical significance in the field. Therefore, submission of residue data for this active substance is not considered to be required.

Indoor use of calcium phosphide

The indoor use of the calcium phosphide containing product „Polytanol“ as a fumigant for insect control in storage protection is not intended.

For these reasons the submitted references Martens-Menzel, R. (1998; RIP2005-111), Martens-Menzel, R. (2000; RIP2005-112), Noack, S. (1984; RIP2002-312), Noack, S. (1983; RIP2002-313), Noack, S. and Reichmuth, C. (1981; RIP2005-115), Noack, S and Reichmuth, C. (1982; RIP97-50061), Grantzau, E. (1996; RIP2005-117), WHO Task Group on Phosphine and Selected Metal Phosphides (1988; RIP2006-207), Koch, E. (1981; RIP2005-121), Köhler, U. (1999; RIP2005-122), Köhler, U. (2000; RIP2005-123), Köhler, U. (2004; RIP2005-143), Grantzau, E. (2004; RIP2005-144), Köhler, U. (2004; RIP2005-1331) and Köhler, U. (2004; RIP2005-150) with regard to residues of other metal phosphides in plants, food, feed, as well as in stored commodities of plant origin etc. are not relevant for the evaluation in this draft assessment report.

B.7.1 Metabolism, distribution and expression of residues in plants (Annex IIA 6.1; Annex IIIA 8.1)

The submission of data or the performance of tests on metabolism, distribution and expression of residues in plants of the active substance calcium phosphide is not considered to be required, since no residues of this phosphide or phosphine are to be expected in plants, due to the reasons given in chapter B.7 above.

Besides, any metabolism of phosphine in plants will be dominated by oxidation to phosphorus oxides of no concern, as well as by volatilisation and expiration from plants. Thus, the nature of the molecule phosphine does not allow to trace back the metabolism of the radiolabelled compound in plants.

Therefore, no metabolism studies are required or submitted in plants.

Nevertheless, data on residues in plants were searched for in the public domain. The following reference was identified in a literature search to contain information on phosphine with respect to its use as fumigant in the field:

Hilton and Mee (1972; RIP2006-206) studied the interaction of radiolabelled phosphine, [$^{32}\text{P}\text{H}_3$], with the sugarcane plant, soil, water and rodent bait material. It was demonstrated that phosphine was taken up by sugarcane from a nutrient solution. However, application of [$^{32}\text{P}\text{H}_3$] to the roots via nutrient solution and to the leaves is not relevant to the use pattern in rodent burrows and therefore has not been considered.

Ethanolic [$^{32}\text{P}\text{H}_3$] solution (50 mL) was applied to several 1 square foot areas ($1 \text{ f}^2 = 0.09290304 \text{ m}^2$) of soil at the base of sugarcane plants. After 14 days, radioactive residues in the soil and various parts of the plant were measured. The measurements were made in both fresh and ashed samples. A summary of the results is presented in Table B.7.1-1.

The results showed that there was almost no uptake of [^{32}P] from the soil by the plant. Residues were not identified, however they were characterised as non-volatile and for the most part water-soluble, probably the oxyacids hypophosphorus, phosphorus or phosphoric, depending on the oxidation state. In the presence of inorganic constituents, especially in moist soil, insoluble, relatively inert, non-volatile compounds were formed which were likely to be insoluble metal salts of the phosphorus oxyacids.

Table B.7.1-1: Residues of [^{32}P] 14 days after application of [$^{32}\text{P}\text{H}_3$] beneath sugarcane plants

Plant part	Recovery (cpm/g) ¹	
	Fresh	Ashed
Meristem	0	0
Leaves - 3 feet above ground	0	8
Leaves - 1 foot above ground	5	55
Stalk	100	10
Soil (surface layer only)	20994	30902

¹ Corrected for background

These residues of phosphine do not occur in plants though uptake from soil treated for the control of burrowing rodents. Considering the relatively rapid adsorption of phosphine onto soil and its subsequent conversion to non-mobile phosphate, this result is not unexpected (compare chapter B.7).

B.7.2 Metabolism, distribution and expression of residues in livestock (Annex IIA 6.2; Annex IIIA 8.1)

Any uptake of phosphine and residual calcium phosphide by domestic animals following the proper use of calcium phosphide containing fumigants in the field is not presumably.

Therefore, the submission of data or the performance of a test on metabolism, distribution and expression of residues in domestic animals is not considered to be required for calcium phosphide, since no significant residues of calcium phosphide and phosphine in plants and feed of plant origin are to be expected, due to the reasons given in chapter B.7 above.

B.7.2.1 Lactating ruminants (goat or cow)

No data available. Not required for the reasons given above.

B.7.2.2 Laying hens (poultry)

No data available. Not required for the reasons given above.

B.7.2.3 Pigs

No data available. Not required for the reasons given above.

B.7.3 Definition of the residue (Annex IIA 6.7; Annex IIIA 8.6)

B.7.3.1 Residue definition in plant matrices

The definition of a residue in plants is not considered to be required, since no residues of calcium phosphide in food or foodstuff of plant origin are to be expected, due to the reasons given in chapter B.7 above.

However, for formal reasons, concerning the definition of residues in the environment, the following is proposed:

Residue analytical methods for calcium phosphide are principally identical to those for phosphine. Any calcium phosphide released to soil or water environment may be expected to be associated with phosphine formation due to its inherent susceptibility to hydrolysis in aquatic media or in contact with soil moisture.

Consequently, it is only logical to propose to regulate calcium phosphide residues in plants, if any, as the sum of the parent compound and any phosphine present, defined as the amount of phosphine that may be released upon analysis.

B.7.3.2 Residue definition in animal matrices

The submission of data on the definition of the residues in food of animal origin of calcium phosphide is not considered to be required, since no residues of calcium phosphide in plants or feed are to be expected, due to the reasons given in chapter B.7 above, and therefore any uptake by domestic animals is not anticipated.

B.7.4 Use pattern

Calcium phosphide is used for pest control of a wide range of rodent species (mice, voles and rats) and other small mammals in all type of agricultural crops, vegetable and fruit growing, grassland and ornamental growing which are to be protected from the damage by rodents and non-rodents. Calcium phosphide is placed in tunnels or burrows of target pests. Calcium phosphide produces the toxic phosphine gas with moisture in the soil and atmosphere. With respect to different national regulations control of some species by fumigation methods may not be permitted in some territories.

The product “Polytanol” was chosen as the representative formulation to support the inclusion of calcium phosphide in Annex I of Council Directive 91/414/EEC. “Polytanol” is a plant protection product (fumigant) for the control of rodents (*Arvicola terrestris*) and other mammalian pests such as moles (*Talpa europaea*) in grassland, agriculture, horticulture, fruitculture (orchards), and ornamental cultures as well as in domestic and amateur gardening.

“Polytanol” contains 18 % calcium phosphide and is applied in form of ready for-use granular formulation. The useful recommended mode of application is a rate of 8 g (21 pieces of granule) to 10 g pro run / tunnel of target animals. Depending on the context of infestation, this is considered to correspond to a maximum field application rate of 8-10 kg/ha (1.44-1.8 kg as/ha).

“Polytanol” should be placed directly into the holes of voles, and only into holes which are occupied by rodents. The application is covered, with the aid of ancillary tools (e.g. applicator, drop tube or drop gun) if required, at any time of year. After application the holes must be closed with earth. 2-4 days after application, a visual inspection should be take place, and if necessary (rodent activity), a repetition of the application. That means, only holes reopened by voles after human closure on the previous days shall be treated. The calcium phosphide containing formulation “Polytanol” is not used as fumigant for the control of insects in stored commodities indoor.

Metal phosphides containing formulations are currently registered in Northern and Southern European countries and Annex I listing is also envisaged for uses in Northern and Southern Europe.

B.7.5 Identification of critical GAPs

Table B.7.5-1: Identification of critical GAPs – Calcium phosphide (CFW - POLYTANOL)

Crop and/or situation (a)	Member State or Country	Product Name	F, G or I (b)	Pests or Group of pests controlled (c)	Formulation		Application				Application rate per treatment g as/100 m ² min max	Exposure/re-entry period (days) (l)	With-holding period (days) (m)	Remarks (n)
					Type (d-f)	Conc. of as (i)	Method kind (f-h)	Growth stage & season (j)	Number min max (k)	Interval between applications (min)				
Outdoor control of rodent and non-rodent species in underground burrows in grassland, agriculture, horticulture, fruitculture, and ornamental cultures	Northern Europe	Polytanol	F	Vole, mole	GE	180 g/kg in 2.6 g granules	covered application with ancillary tools, e.g. drop gun, drop tube	all stages	if required	without waiting time	min. 8 kg product/ha (1440 g as/ha); 8 g (21 pieces granule) pro run / tunnel (0.84 g PH ₃ / run) max. 10 kg product/ha (1800 g as/ha); 10 g (26 pieces granule) pro run / tunnel (1.06 g PH ₃ / run)	n.a.	n.a.	

- Remarks:
- (a) For crops, the EU and Codex classifications (both) should be used; where relevant, the use situation should be described (e.g. fumigation of a structure)
 - (b) Outdoor or field use (F), glasshouse application (G) or indoor application (I)
 - (c) e.g. biting and sucking insects, soil borne insects, foliar fungi, weeds
 - (d) e.g. wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
 - (e) GCPF Codes - GIFAP Technical Monograph No. 2, 1989
 - (f) All abbreviations must be explained
 - (g) Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench

- (h) Kind, e.g. overall, broadcast, aerial spraying, row, individual plant, between the plants - type of equipment used must be indicated
- (i) g/kg or g/L
- (j) Growth stage at last treatment (BBCH Monograph, growth stages of plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant information on season at time of application
- (k) The minimum and maximum number of applications possible under practical conditions of use must be provided
- (l) Duration of exposure / re-entry period
- (m) Withholding period after exposure before commodity may be released for further processing or consumption
- (n) Remarks may include: Extent of use/ economic importance/restrictions

B.7.6 Residues resulting from supervised trials (Annex IIA 6.3; Annex IIIA 8.2)

B.7.6.1 Residues in target crops

The submission of data or the performance of residue trials for calcium phosphide is not considered to be required, since no residues of calcium phosphide and phosphine in plants are to be expected, due to the reasons given in chapter B.7 above.

Nevertheless, data on residues in plants were searched for in the public domain (see below).

In the study by Martens-Menzel, R. et al. (1994; RIP2005-119) phosphine, developed from calcium phosphide and aluminium phosphide, were measured at several locations in the soil as a function of the fumigating period by gas chromatography and phosphorus sensitive detector. The vegetables were harvested and the phosphine residues herein were determined after purging with diluted sulfuric acid under vacuum. The residues were given in relation to the duration until the harvest. In the carrots harvested and investigated phosphine residues were not detectable even in repeating of fumigations. In the radishes the phosphine content was 0.37 µg/g (after 2 -3 h), 0.24 µg/g (after 24 h), and after 3 days smaller as 0.001 µg/g.

Martens-Menzel, R. et al. (1995; RIP2005-120) studied the fumigations with phosphine. Tests like those for the control of voles were performed in the field, using patches with radishes and carrots. The gas was developed from preparations of calcium phosphide (“Polytanol”) and aluminium phosphide (“Detia-Wühlmauskiller”). The fumigations took place in three kinds of soil with relative high amounts of sand, clay, and humic substances, respectively. The phosphides were placed in artificial cavities, similar in dimensions and shape to those constructed by voles. The phosphine concentrations were measured at several locations in the soil as a function of the fumigating period by gas chromatography and phosphorus sensitive detector. The vegetables were harvested and the phosphine residues herein were determined after purging with diluted sulfuric acid under vacuum. The residues were given in relation to the duration until the harvest.

After a period of three days, the residues of phosphine are lower than the maximum allowable concentrations, given by WHO/FAO and in the German Rückstands-Höchstmengengerordnung (0.1 mg/kg in cereals, 0.01 mg/kg in other plant foods). With regard to the agricultural methods, it is not necessary to propose a waiting period.

B.7.6.2 Storage stability

Not required, for reasons given in chapter B.7 above.

B.7.7 Effects of industrial processing and/or household preparation (Annex IIA 6.5; Annex IIIA 8.4)

The submission of data or the performance of tests on effects of industrial processing and/or household preparation of calcium phosphide is not considered to be required, since no residues of calcium phosphide or phosphine in food or foodstuff of plant origin are to be expected, due to the reasons given in chapter B.7 above.

B.7.7.1 Effects on nature and level of residue

Not required for reasons given above.

B.7.7.2 Effects on the magnitude of residues

Not required for reasons given above.

B.7.8 Livestock feeding studies (Annex IIA 6.4; Annex IIIA 8.3)

The submission of data or the performance of livestock feeding studies for calcium phosphide is not considered to be required, since no residues of phosphine and calcium phosphide are to be expected in plant commodities used as animal feed, due to the reasons given in chapter B.7 above. Therefore, any uptake by ruminants (lactating goats or cows), poultry (laying hens) or pigs is not anticipated.

B.7.8.1 Ruminants

Not required for reasons given above.

B.7.8.2 Poultry

Not required for reasons given above.

B.7.8.3 Pigs

Not required for reasons given above.

B.7.8.4 Calculation of dietary burden

Not required for reasons given above.

B.7.9 Residues in succeeding or rotational crops (Annex IIA 6.6; Annex IIIA 8.5)

The submission of data or the performance of tests on residues in succeeding crops is not considered to be required for reasons given in chapter B.7 above.

Furthermore, in the study by Hilton and Mee (1972; RIP2006-206), it was demonstrated that although phosphine was taken up by sugarcane from a nutrient solution, very little was taken up when a solution of phosphine was directly applied to soil. Considering the relatively rapid adsorption of phosphine onto soil and its subsequent conversion to non-mobile phosphate, it is reasonable to conclude, that phosphine residues will not be bioavailable to succeeding crops. Consequently no further studies are required.

B.7.10 Proposed pre-harvest intervals for envisaged uses, or withholding periods, in the case of post-harvest uses (Annex IIA 6.8; Annex IIIA 8.7)

B.7.10.1 Proposed pre-harvest intervals (PHIs)

The proposal of pre-harvest intervals for envisaged uses, or withholding periods or storage periods, in case of post-harvest uses of calcium phosphide is not considered to be required, since no residues of calcium phosphide and phosphine in plants and food or feed stuff of plant origin are to be expected, due to the reasons given in chapter B.7 above.

B.7.10.2 Withholding period for animal feeding-stuffs

Not required for reasons given above.

B.7.10.3 Waiting period between last application and sowing or planting of the crops to be protected

Not required for reasons given above. The product „Polytanol“ may be used at any time of year.

B.7.10.4 Waiting period between application and handling treated product

A waiting period between application and handling treated product is not required for reasons given above.

B.7.10.5 Waiting period between last application and sowing or planting of succeeding crops

Not required for reasons given above.

B.7.11 Community MRLs and MRLs in EU Member States (Annex IIIA 12.2)

The proposal of maximum residue levels (MRLs) for the use of calcium phosphide as a fumigant in underground tunnel systems is not considered to be required, since no residues of calcium phosphide and phosphine in plants are to be expected due to the reasons given in chapter B.7 above.

B.7.12 Proposed EU MRLs and justification for the acceptability of those residues (Annex IIA 6.7; Annex IIIA 8.6)

B.7.12.1 Products of plant matrices

Proposed EU MRLs

The proposal of MRLs is not considered to be required, since no residues of calcium phosphide in plants or food of plant origin following the use of calcium phosphide containing products (e.g. “Polytanol”) are to be expected, due to the reasons given in chapter B.7 above.

Compliance with existing MRLs:

For calcium phosphide no MRLs are available hence no compliance can be stated. Due to the reasons given in chapter B.7 above, MRLs were not defined in the past either.

B.7.12.2 Products of animal origin

The proposal of MRLs is not considered to be required, since no residues in plants or feed of plant origin are to be expected, due to the reasons given in chapter B.7. above. Therefore, any uptake by domestical animals is not anticipated.

B.7.12.2.1 Cattle products

Not relevant for reasons given above.

B.7.12.2.2 Chicken products

Not relevant for reasons given above.

B.7.12.2.3 Pig products

Not relevant for reasons given above.

B.7.12.3 Acceptability of MRLs in acute and chronic dietary risk assessment

Not applicable. No new MRLs are proposed.

B.7.13 Proposed EU Import tolerances and justification for the acceptability of those residues

EU import tolerances have not been proposed yet.

No import tolerances are proposed, since no residues of calcium phosphide in plants, food or feed of plant origin are to be expected from the proper use of calcium phosphide containing fumigants, due to the reasons given in chapter B.7 above.

B.7.14 Basis for differences, if any, in conclusion reached having regard to established or proposed Codex MRLs

Not relevant. (Since there are no established or proposed MRLs or CAC MRLs and since data have not yet been submitted to the JMPR for consideration by it, the matter of differences in conclusions reached, does not arise.)

B.7.15 Estimates of potential and actual dietary exposure through diet and other means (Annex IIA 6.9; Annex IIIA 8.8)

The estimation of the potential and actual exposure through diet and other means of calcium phosphide following the proper use of the calcium phosphide containing fumigants are not considered to be required, since no residues of calcium phosphide and phosphine in plants, food or feed of plant or animal origin are to be expected, due to the reasons given in chapter B.7 above.

B.7.15.1 Long-term dietary risk assessment

Not required for reasons given above.

B.7.15.2 Short-term dietary risk assessment

Not required for reasons given above.

B.7.15.3 Exposure via water

Due to the type of compound and the mode of application as well as based on its degradation and sorption behaviour in soil it can be concluded that calcium phosphide or phosphine will not be transferred to groundwater (or surface water) resources in concentrations $\geq 0.1 \mu\text{g/L}$.

Even when assuming a concentration of 0.1 µg/L calcium phosphide/phosphine in drinking water (corresponding to the drinking water limit value for active substances) and a consumption of 2 L water/day (as recommended by WHO in 1994), the theoretical daily intake of calcium phosphide/phosphine would not exceed 0.2 µg/person, corresponding to 0.003 µg/kg bw (body weight: 60 kg). This is well below the ADI of 0.011 mg phosphine/kg bw/day. Thus, no risk is expected for consumers arising from the intake of calcium phosphide/phosphine *via* drinking water.

B.7.15.4 Exposure via air

Due to its low vapour pressure ($< 1.0 \times 10^{-5}$ hPa), calcium phosphide is considered to have a very low potential for volatilisation / deposition, and airborne transport. In contrast, due to the rapid hydrolysis of calcium phosphide in contact with moisture of the soil or the atmosphere the degradation product phosphine is high volatile (vapour pressure 34600 hPa, 20 °C). However, phosphine is decomposed rapidly in air. Therefore, no risk is expected for people arising from the exposure *via* air.

B.7.16 Summary and evaluation of residue behaviour (Annex IIA 6.10; Annex IIIA 8.9)

Calcium phosphide can be used as a constituent of fumigants for an effective control of rodent and non-rodent species in the field. A summary and an evaluation of residue data for the active substance calcium phosphide is not required. If calcium phosphide containing products, e.g. “Polytanol”, applied in accordance with the intended uses no significant residues are expected in plants, due to the reasons given in chapter B.7 above.

B.7.16.1 Metabolism in plants

Not required for reasons given above.

B.7.16.2 Metabolism in livestock

Not required for reasons given above.

B.7.16.3 Residues in plants

Not required for reasons given above.

B.7.16.4 Storage stability

Not required for reasons given above.

B.7.16.5 Processing studies

Not required for reasons given above.

B.7.16.6 Rotational crop studies

Not required for reasons given above.

B.7.16.7 Livestock feeding studies

Not required for reasons given above.

B.7.16.8 MRL proposal

Not required for reasons given above.

B.7.16.9 Dietary risk assessment**B.7.16.9.1 Long-term dietary risk assessment**

Not required for reasons given above.

B.7.16.9.2 Short-term dietary risk assessment

Not required for reasons given above.

Conclusion: If calcium phosphide containing products (fumigants), e.g. “Polytanol” are applied according to the recommendations for uses (outdoor control of rodent and non-rodent species) no significant residues are expected in plants as well as food or feed of plant origin.

B.7.17 References relied on

Annex point/ reference number	Author(s)	Year	Title source (where different from company) report no. GLP or GEP status (where relevant), published or not BVL registration number	Data protection claimed Y/N	Owner ¹
AIIA-6.0; AIIA-8.0	Martens- Menzel, R.	2000	Report of Examination 98/2 (Storage Stability of Polytanol Pellets). GLP, unpublished RIP2005-112	Y	CFW

¹ Only notifier listed

Annex point/ reference number	Author(s)	Year	Title source (where different from company) report no. GLP or GEP status (where relevant), published or not BVL registration number	Data protection claimed Y/N	Owner ¹
AIIA-6.0; AIIIA-8.0	Martens- Menzel, R.	1998	Report of Examination 98/1 (Storage Stability of Polytanol Pellets). GLP, unpublished RIP2005-111	Y	CFW
AIIA-6.1	Hilton, H.W., Mee, J.M.L.	1972	Studies with radioactive phosphine 32P in sugarcane. J. Agric. Food Chem, Vol. 20, No. 2, pp 334-336 Unknown not GLP, published RIP2006-206	N	-
AIIA-6.1	Noack, S.	1984	Decomposition of phosphine in treated foods as related to storage temperature and aeration. Zeitschrift für Lebensmittel-Untersuchung und Forschung, 178, 1984, 31-37 178,31-37 not GLP, published RIP2002-312	N	-
AIIA-6.1; AIIA-6.2; AIIA-6.3	Noack, S., Reichmuth, Ch.	1982	Bestimmung von Schwellwerten für die Schädigung von tierischen und pflanzlichen Organismen durch Phosphorwasserstoff und Methylbromid. II Untersuchungen an Brunnenkresse (Nasturtium officinale) und Kopfsalat (Lactuca sativa capitata). not GLP, unpublished RIP97-50061	N	CFW
AIIA-6.1; AIIA-6.2	Noack, S., Reichmuth, C.	1981	Bestimmung von Schwellenwerten für die Schädigung von tierischen und pflanzlichen Organismen durch Phosphorwasserstoff und Methylbromid 1. Untersuchungen an Drosophila melanogaster. Anz. Schädlingkunde, 54, 1981, 23-27 not GLP, published RIP2005-115	N	-
AIIA-6.1	Noack, S.	1983	Relationship of phosphine residues after fumigation to concentration, time of exposure and length of storage. Zeitschrift für Lebensmittel-Untersuchung und Forschung, 177, 1983, 87-93 177,87-93 not GLP, published RIP2002-313	N	-

Annex point/ reference number	Author(s)	Year	Title source (where different from company) report no. GLP or GEP status (where relevant), published or not BVL registration number	Data protection claimed Y/N	Owner ¹
AIIA-6.1	WHO Task group on Phosphine and Selected Metal Phosphides	1988	International programme on chemical safety (IPCS), Environmental health criteria 73 - Phosphine and selected metal phosphides. International Programme on Chemical Safety (IPCS) Unknown not GLP, published RIP2006-207	N	-
AIIA-6.3; AIIIA-8.5	Grantzau, E.	1996	Untersuchungen mit aufbereiteten Phosphatproben (Dicalciumphosphat). Translation: Studies with phosphate sample preparations (dicalcium phosphate). not GLP, published RIP2005-117	N	-
AIIA-6.3; AIIA-6.4; AIIA-6.5; AIIA-6.7; AIIA-6.8; AIIIA-8.4; AIIIA-8.5; AIIIA-8.7	Martens-Menzel, R. et al.	1995	Prüfung des Verbleibs von Phosphorwasserstoffrückständen in Gemüsekulturen nach Anwendung von Rodentiziden. Translation: Phosphine residues in vegetables after soil fumigation for rodent control. Nachrichtenbl. Deut. Pflanzenschutzd., 47, 1995, 315-320 not GLP, published RIP2005-120	N	-
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AIIA-6.10; AIIIA-8.9	Köhler, U.	2000	Summary and evaluation of residue data. not GLP, unpublished RIP2005-123	N	CFW

Annex point/ reference number	Author(s)	Year	Title source (where different from company) report no. GLP or GEP status (where relevant), published or not BVL registration number	Data protection claimed Y/N	Owner ¹
AIIIA-8.1	Köhler, U.	2004	Supplementary studies on metabolism, distribution and expression of residues in plants or livestock. not GLP, unpublished RIP2005-143	N	CFW
AIIIA-8.4	WHO	1988	Environmental Health Criteria 73-Phosphine and selected metal phosphides. Chemical Safety, 62 not GLP, published RIP2005-118	N	-
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AIIIA-8.6	Köhler, U.	2004	Proposed residue definition and proposed maximum residue levels (MRLs). not GLP, unpublished RIP2005-1331	N	CFW
AIIIA-8.9	Köhler, U.	2004	Summary and evaluation of residue data. not GLP, unpublished RIP2005-150	N	CFW

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