Committee for Risk Assessment

RAC

Opinion

proposing harmonised classification and labelling
at EU level of

Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide

EC Number: 423-340-5
CAS Number: 162881-26-7

CLH-O-0000001412-86-152/F

Adopted

9 June 2017

9 June 2017

CLH-O-0000001412-86-152/F

OPINION OF THE COMMITTEE FOR RISK ASSESSMENT ON A DOSSIER PROPOSING HARMONISED CLASSIFICATION AND LABELLING AT EU LEVEL

In accordance with Article 37 (4) of Regulation (EC) No 1272/2008, the Classification, Labelling and Packaging (CLP) Regulation, the Committee for Risk Assessment (RAC) has adopted an opinion on the proposal for harmonised classification and labelling (CLH) of:

Chemical name: **Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide**

EC Number: **423-340-5**

CAS Number: **162881-26-7**

The proposal was submitted by **Germany** and received by RAC on **5 July 2016.**

In this opinion, all classification and labelling elements are given in accordance with the CLP Regulation.

PROCESS FOR ADOPTION OF THE OPINION

Germany has submitted a CLH dossier containing a proposal together with the justification and background information documented in a CLH report. The CLH report was made publicly available in accordance with the requirements of the CLP Regulation at ***http://echa.europa.eu/harmonised-classification-and-labelling-consultation/*** on **16 August 2016**. Concerned parties and Member State Competent Authorities (MSCA) were invited to submit comments and contributions by **30 September 2016**.

ADOPTION OF THE OPINION OF RAC

Rapporteur, appointed by RAC: **Boguslaw Baranski**

Co-Rapporteur, appointed by RAC: **Riitta Leinonen**

The opinion takes into account the comments provided by MSCAs and concerned parties in accordance with Article 37(4) of the CLP Regulation and the comments received are compiled in Annex 2.

The RAC opinion on the proposed harmonised classification and labelling was adopted on **9 June 2017** by **consensus**.

Classification and labelling in accordance with the CLP Regulation (Regulation (EC) 1272/2008)

	Index No	International Chemical Identification	EC No	CAS No	Classification		Labelling			Specific Conc. Limits, M-factors	Notes
					Hazard Class and Category Code(s)	Hazard statement Code(s)	Pictogram, Signal Word Code(s)	Hazard statement Code(s)	Suppl. Hazard statement Code(s)		
Current Annex VI entry	015-189-00-5	Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide	423-340-5	162881-26-7	Skin Sens. 1 Aquatic Chronic 4	H317 H413	GHS07 Wng	H317 H413			
Dossier submitters proposal	015-189-00-5	Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide	423-340-5	162881-26-7	**Modify** Skin Sens. 1A **Remove** Aquatic Chronic 4	**Retain** H317 **Remove** H413	**Retain** GHS07 Wng	**Retain** H317 **Remove** H413			
RAC opinion	015-189-00-5	Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide	423-340-5	162881-26-7	**Modify** Skin Sens. 1A **Retain** Aquatic Chronic 4	**Retain** H317 H413	**Retain** GHS07 Wng	**Retain** H317 H413			
Resulting Annex VI entry if agreed by COM	015-189-00-5	Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide	423-340-5	162881-26-7	Skin Sens. 1A Aquatic Chronic 4	H317 H413	GHS07 Wng	H317 H413			

GROUNDS FOR ADOPTION OF THE OPINION

HUMAN HEALTH HAZARD EVALUATION

RAC evaluation of skin sensitisation

Summary of the Dossier Submitter's proposal

The Dossier Submitter (DS) proposed to classify phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide as a skin sensitiser in category 1A (Skin Sens. 1A; H317) based on results of two Guinea Pig Maximisation Tests (GPMT) performed according to OECD TG 406 and GLP.

The GPMT sensitisation study (CIBA-GEIGY 1996c) was performed under normal light conditions as required by OECD TG 406. However, it was noted by the DS that phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide is a photoinitiator. Upon irradiation, the phosphorus - acyl carbon bond of the molecule is homolytically cleaved into radicals which initiate the polymerisation of monomeric or oligomeric polymer precursors for various applications.

The intradermal induction (CIBA-GEIGY 1996c) was performed using a 0.5% solution of phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide (purity > 95%) in peanut oil. The epidermal topical induction was performed with 50% using vaseline as vehicle. For the topical challenge application, a 10% formulation in vaseline was used. Eighteen out of 20 animals (90%) treated with the test substance showed a clear skin sensitisation response after challenge at the 24 h reading. At the 48 h reading there were still 16/20 animals with positive skin reactions corresponding to a sensitisation rate of 80%. In addition, scaling skin reactions were recorded for eight males and seven females at the 48 h reading. No skin reactions were recorded for control animals. No information was reported in the study protocol whether and to what extent the substance had undergone a light-induced degradation prior to or during application on skin. However, the treatment of the skin was performed with occlusive wrapping so at least partial light protection during treatment was provided. In conclusion, the maximal skin sensitisation rate after intradermal induction with a concentration of 0.5% phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide was 90%.

In the second study (Huntingdon Life Sciences Ltd., 1997), the test formulations were prepared under safelight and the formulation containers were wrapped in aluminium foil because solutions of the substance are sensitive to light of the UV and the near-visible violet light range. Aluminium foil was also incorporated in the dressings to minimise photo-induced degradation of the test material. Compared to the GPMT study performed by CIBA-GEIGY (1996c) the higher concentrations for induction and challenge, different vehicles and another strain of guinea pig were used.

Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide (purity of 98.4%) was used for intradermal induction as a 1.0% solution in 5.0% acetone in Alembicol D. 24 h before topical induction with 70% solution of phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide in acetone the skin area for topical application was pre-treated with 10% sodium lauryl sulfate (SLS) in petrolatum. The 70% solution of test substance was taken as non-irritating, although the extent and results of skin irritation were not provided in the study description. Test substance concentrations of 70% and 35% in acetone were used for the challenge topical application using occlusive dressing for 48 h,

instead of 24 h as required in technical guidance OECD TG 406. Readings were performed 24, 48 and 72 h after challenge.

After 24 h of skin contact with a challenge concentration of 70% in acetone none of the test substance treated animals (0/10) showed positive reactions. Reading of the challenge reaction after 48 and 72 h revealed a clear positive skin sensitisation response in 5/10 (50%) animals. Additionally, one animal treated with the test substance showed an inconclusive response. For this animal, the skin of the challenge site showed thickening, dryness and sloughing of the epidermis at the 72 h reading, which were assessed as signs of skin sensitisation (delayed contract hypersensitivity). Taken all data together, 6/10 (60%) animals showed a positive skin sensitisation reaction and 4/10 (40%) animals showed a clear negative skin sensitisation response after challenging with 70% of the test substance. After challenge with a concentration of 35% in acetone a clear positive skin sensitisation response was noted in 2/10 animals at the 24 h reading, 3/10 animals at 48 h and 2/10 animals at 72 h. In addition, an inconclusive response was seen in two further treated animals at the reading after 72 h. The skin of the challenge application site showed the same findings, i.e. thickening, dryness and sloughing of the epidermis, which were noted in one animal after challenge with 70% in acetone. Accordingly, these skin reactions were also assessed as signs of skin sensitisation. Taken all measurement time points together, 6/10 (60%) animals were found with positive reactions. In conclusion, the skin sensitisation rate after intradermal induction with a concentration of 1.0% phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide was 60%.

Table 1: Individual animal results from study Huntingdon Life Sciences Ltd. (1997)

Animal No.	E (Erythema) O (Oedema)	70% challenge 24 h	70% challenge 48 h	70% challenge 72 h	35% challenge 24 h	35% challenge 48 h	35% challenge 72 h
1	E	0	1	1	1	1	1
	O	0	1	0	0	1	0
2	E	0	0	0	1	0	0
	O	0	0	0	0	0	0
3	E	0	0	0	0	0	0
	O	0	0	0	0	0	0
4	E	0	1	1	0	0	0
	O	0	1*	0	0	0	0
5	E	0	0	0	0	0	0
	O	0	0	0	0	0	0
6	E	0	0	1*	0	1	1
	O	0	0	0	0	1	1*
7	E	0	1	1	0	1	1*
	O	0	0	0	0	1*	0
8	E	0	1	1	0	0	1*
	O	0	1	0	0	0	0
9	E	0	1	1	0	0	1*
	O	0	1*	1	0	0	0
10	E	0	0	0	0	0	0
	O	0	0	0	0	0	0
no. of animals with positive reaction		0/10	5/10	6/10*	2/10	3/10	5/10*

*Dryness and sloughing of the epidermis or dryness and sloughing and thickening of the epidermis; interpreted as positive results according to Schlede and Eppler (1995).

The Generic Concentration Limit (GCL) for Skin Sens. 1A is 0.1% w/w. As the results of two GPMT tests (≥ 60% responding at intradermal induction concentrations > 0.1% to ≤ 1.0%) indicated a strong potency class according to the criteria (section 3.4.2.2.5. of the Guidance on the Application of the CLP Criteria, Version 4.1 June 2015), no SCL was proposed by the DS.

Comments received during public consultation

Three Member State Competent Authorities (MSCA) commented during the public consultation. One of them supported the proposed classification (Skin Sens. 1A; H317), but two supported the current harmonised classification Skin Sens. 1; H317 without sub-categorisation.

As noted by one MSCA supporting sub-categorisation, it cannot be excluded that workers are exposed to the light-activated form of phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide, therefore the assessment of sensitising properties in the CIBA-GEIGY study (1996c) is appropriate. Therefore, the MSCA agreed with the proposal to sub-categorise phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide in category 1A.

Another MSCA questioned the validity and reliability of the study conducted under normal light conditions (CIBA-GEIGY, 1996) due to lack of information on the possible light-induced degradation of the substance.

Assessment and comparison with the classification criteria

Currently, phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide is classified as skin sensitiser category 1 and is listed in Annex VI to CLP. The results of two studies submitted by the DS demonstrate that it is a potent skin sensitizer.

Taking into account that in practise people might be exposed to phenyl bis(2,4,6-trimethylbenzoyl)-phosphine also under normal light conditions, RAC considers that the results of the study CIBA-GEIGY (1996c), performed under normal daylight and showing strong skin sensitising properties of the substance or its potential metabolites formed by daylight irradiation, should be considered for classification. In this study, phenyl bis(2,4,6-trimethylbenzoyl)-phosphine sensitised 90% of animals in the GPMT at intradermal induction concentration of 0.5% that meets the criteria of subcategory Skin Sens. 1A: ≥ 60% responding at > 0.1% to ≤ 1% intradermal induction dose. In principle the criteria for subcategory Skin Sens. 1A are also met in a second study (Huntingdon Life Sciences Ltd., 1997) (where the samples of the test substance were protected against daylight with aluminium foil), in which 60% of animals showed positive skin reaction in the GMPT after intradermal induction with the test substance at a concentration of 1.0%. RAC considers that an atypical skin response under a form of thickening, dryness and sloughing of the epidermis at the 72 h in one guinea pig, not seen in any control animals challenged and assessed the same way, can be treated as a skin reaction due to skin sensitisation taking into account clear typical skin sensitisation responses in so many quinea pigs in two studies.

The available results from animal testing with phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide are considered sufficient for a refined evaluation allowing the sub-categorisation. Having in mind the results of both studies RAC is of the opinion that phenyl bis(2,4,6-trimethylbenzoyl)–phosphine warrants sub-categorisation of its sensitising properties to sub-category **Skin Sens. 1A with H317: May cause an allergic skin reaction**.

ENVIRONMENTAL HAZARD EVALUATION

RAC evaluation of aquatic hazards (acute and chronic)

Summary of the Dossier Submitter's proposal

Phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide is a photoinitiator and is currently listed in Annex VI to CLP with Aquatic Chronic 4 - H413 classification. The DS proposed to remove this aquatic hazard classification based on a bioaccumulation study in which the results show that the bioconcentration factor for this substance is less than 5. According to the DS, this test had previously been considered by the ECHA Member State Committee to be adequate for REACH purposes despite some methodological shortcomings. According to the DS, the substance is not rapidly degradable and there is no acute or chronic toxicity in the water solubility range.

Degradation

A hydrolysis study was not technically feasible due to the low water solubility of the substance. The substance does not contain any labile functional groups and it can be assumed to be resistant to hydrolysis.

No information is available on photolysis although the substance is mentioned to be photosensitive in relation to the aquatic toxicity studies.

There are two ready biodegradation studies available. The OECD TG 301B test (CO2 Evolution Test) showed 1% degradation after 29 days. The test material was added as ultrasound-treated suspensions. In the OECD TG 301C test (Modified MITI Test (I)), no biodegradation was observed after 28 days. The DS concluded that the substance is not readily biodegradable.

Bioaccumulation

The Log Pow of 5.8 at 22°C and pH of 8.3 would suggest that the substance has a high potential to bioaccumulate. In a non-GLP study equivalent to the OECD TG 305C Guideline, the test fish *Cyprinus carpio* were continuously exposed to a concentration of 1 µg/L test material. The solubility of the test substance in water was 2 µg/L. The mean recovery rate of the test substance was 94.8 ± 0.2%. The concentration of the test substance was maintained at a nominal test concentration using a continuous flow through system. To prepare the final concentration, a stock solution in hydrogenated castor oil (HCO-80) was prepared for further dilution. The mean bodyweight of the carp was 20.8 ± 1.2 g and the mean length 9.0 ± 0.3 cm. The volume of the glass aquarium was 100 L and the flow rate amounted to 300 mL per minute. The pH value was 7.0 to 7.5, and the dissolved oxygen amounted to 7.0 to 7.4. 18 fish belonged to a treated group (2 groups), and 6 fish to the control group. The test temperature was 24.3 ± 0.5°C. A group of 3 fish were sampled using a hand net from the treated and the control groups. The fish was weighed and the entire body length was measured. Two fish were analysed via HPLC for each group. The single remaining fish was frozen for storage. The analyses of fish were performed on day 7, 14, 21, and 28. After an exposure period of 4 weeks a BCF below 5 was determined and it was concluded that the compound has a low potential for bioaccumulation.

Aquatic toxicity

Data on acute aquatic toxicity are available for three trophic levels (fish, invertebrates and algae). Furthermore, data on long-term toxicity towards *Daphnia magna* and algae are available

although long-term toxicity data for fish are not available. The water solubility of the substance is < 100 µg/L in the water solubility test (EU Method A.6). During the acute daphnia study, the water solubility is 0.8 µg/L (1.1 µg/L corrected for the recovery). The same test medium is used for acute studies in fish, daphnids and the long-term study on daphnids.

Table 2. Aquatic toxicity studies available for bis(2,4,6-trimethylbenzoyl)-phosphine oxide

Method	Species		Results	Remarks
OECD TG 203, GLP, semistatic, daily renewal	*Danio rerio*	light protection	96 h LC_{50} > 90 µg/L (mean measured)	No toxicity within the range of solubility (1.1 µg/L)
unknown guideline within the scope of the BCF test, static	*Oryzias latipes*	no light adjustment, hydrogenated castor oil used as dispersant and dichloromethane as solvent[1]	48 h, LC_{50} 84µg/L (measured)	Effect concentration clearly exceeds solubility
OECD TG 202, GLP, static	*Daphnia magna*	light protection	48 h EC_{50} > 1175 µg/L (mean measured)	No toxicity within the range of solubility (1.1 µg/L)
OECD TG 201, GLP, static, limit test	*Scenedesmus subsbicatus*	test arrangement to take into account photodegradation	72 h EC_{50} > 260 µg/L NOEC ≥ 72h 260 µg/L (initial measured)	No toxicity within the range of solubility
OECD TG 211, GLP, semistatic	*Daphnia magna*	light protection, DMF solvent	21 d NOEC (reproduction): ≥ 8.1 µg/L (mean measured	No toxicity within the range of solubility (1.1 µg/L)

The acute toxicity test with *Danio rerio* was conducted as a semi-static test with a daily test medium renewal. Both the preparation of the stock solutions and the test media as well as the test itself were conducted under light protection conditions due to the photosensitivity of the test compound. Also, due to the very low water solubility of the test substance, a supersaturated stock suspension with a nominal concentration of 100 mg/L was stirred and filtered. The undiluted filtrate with the maximum concentration of dissolved respectively very fine dispersed test substance was used as the highest test medium. Additionally, several dilutions of this filtrate and a control were tested in parallel. The concentrations found in the freshly prepared filtrate of the supersaturated stock suspension on sampling days 0 and 3 was 170 and 67 µg test substance/L, respectively. During a period of 24 h the test substance concentration in the test medium decreased to a value of 29 µg/L. The water solubility of the test substance in the test medium namely 0.8 µg/L (1.1 µg/L corrected for the recovery) was determined in the acute *Daphnia magna* study, which used exactly the same test medium as the fish study. The 96 h fish NOEC was determined to be at least 90 µg test substance/L and the LC_{50} is clearly higher than 90 µg/L (arithmetic mean). This value could not be quantified because the test substance has no toxic effect up to the concentration of 90 µg/L and thus far above the solubility limit of the test substance in the test water used.

[1] REACH registration dossier

An additional fish study was conducted with *Oryzias latipes* being exposed to the test substance which was brought into solution with hydrogenated castor oil. The fish were exposed for 48 h. The LC_{50} was determined to be 84 µg/L. Due to the limited exposure time and the use of the vehicle, the study is regarded as invalid. Nevertheless, the LC_{50} value is above the water solubility.

In a study using *Daphnia magna*, no acute toxicity could be recorded within the range of solubility in the test medium. The test was conducted as a static test. Both the preparation of the stock solutions and the test media and the test itself were conducted under light protection. Due to the very low water solubility of the test substance, a supersaturated stock suspension with a nominal concentration of 100 mg/L was made and handled accordingly to the *Danio rerio* test above. The mean measured test concentrations found in the undiluted filtrate of the supersaturated stock suspension and in the test dilutions up to the dilution of 1:100 were determined to be 1175 µg/L and 99, 15, 4.4 and 3.1 µg/L, respectively. During the test period of 48 h, a decrease of test substance concentration in the test medium was determined. This decrease might be due to precipitation of the test substance resulting from the low water solubility. The water solubility of the compound in the test medium was determined to be 0.8 µg/L (1.1 µg/L corrected for the recovery). The 48h EC_{50} was higher than 1175 µg/L (arithmetic mean, undiluted filtrate) and the 48 h NOEC was 3.1 µg/L. All test substance concentrations showing an effect on the mobility of the daphnids were clearly above the solubility limit of the test substance in the test medium.

In a long-term study using *Daphnia magna*, no toxic effects on the survival rates and reproduction rates of the daphnids up to the solubility limit of the test item in the test medium were recorded. The test was conducted as a semi-static test with a total of 8 test medium renewals. Both the preparation steps of the test media and the test itself were performed under reduced light conditions. Due to the low solubility and the instability of the test item in water, the solubility limit of the test item could not be quantified in the filtrates, however, all test item concentrations measured were below 5 µg/L. The water solubility of the test compound of 0.8 µg/L (1.1 µg/L corrected for the recovery) was determined in the acute Daphnia study (same test medium). The test item was dosed into test water by use of an organic solvent (N,N-dimethylformamide = DMF). The following concentrations were tested: 0.20, 0.63, 2.0, 6.3, and 20 µg/L. A solvent control and a control with test medium were run in parallel. The measured test item concentrations in the analysed test medium of nominally 20 µg/L varied in the range of 68 to 79% of the nominal value at the start of the test medium renewal periods. The variation could be due to inhomogeneous distribution of the test item, since the nominal concentration of 20 µg/L was above the solubility limit of the test item in test water. The test substance concentration was below the limit of quantification of the analytical method at the end of the test medium renewal periods of 48 and 72 h. In the control, the solvent control, and at all test concentrations, the survival rate of the test animals at the end of the test was at least 90 % or higher. Thus, the survival rate of *Daphnia magna* after 21 days was not reduced up to and including the highest nominal test concentration of 20 µg/L (8.1 µg/L mean measured). No significant toxic effect of the test item on the mean reproduction rate was determined up to and including the highest test concentration of 20 µg/L (8.1 µg/L arithmetic mean measured). No visible abnormalities were observed in the test animals. Taking into account the survival rates and the reproduction rates of the test animals, the 21-day NOEC was at least 8.1 µg/L (arithmetic mean measured). This value might even be higher but concentrations above 20 µg/L have not been tested, since this concentration is already clearly exceeding the water solubility limit of the compound in the test medium.

In a study using *Scenedesmus subspicatus*, no inhibitory effect on the growth of *Scenedesmus subspicatus* could be detected within the range of solubility in the test medium. The test was conducted as a limit test. A supersaturated stock suspension of the test substance with a nominal concentration of 100 mg/L was continuously stirred at room temperature in the dark over 2 h. The stock suspension was filtered. Only the undiluted filtrate with the maximum concentration of dissolved respectively very fine dispersed test substance was used as the test medium. Additionally, a control was tested in parallel. Due to the photosensitivity of the test compound and the fact that an algae study cannot be performed under light protection, the test included two experimental parts. In the first part of the test, the filtrate of the stock suspension was incubated before the start of the test for 24 h and illuminated at about 9200 Lux as in the definitive test. Due to the photosensitivity of the compound the parent compound reacts to degradation products. This filtrate was used as one test concentration. In the second part of the test, the filtrate of the stock suspension was freshly prepared just before the start of the test. The analytically determined test substance concentration in the freshly prepared test medium (the undiluted filtrate of the supersaturated stock suspension) amounted to 260 µg/L at the start of the test. In this test medium, incubated under the test conditions during the test period (but without algae), the measured concentrations of the compound decreased continuously to 12 µg/L at the end of the test. In the filtrate illuminated for 24 h before the start of the test, 18 µg/L parent compound were found. This decrease could be due to degradation of the compound as a consequence of the intense irradiation of the samples. Neither the parent compound nor its degradation products had any inhibitory effect on the growth of *Scenedesmus subspicatus* during the exposure period of 72 h up to the concentration of 260 µg/L.

Neither the acute toxicity studies in fish, daphnids and algae nor the chronic toxicity study in daphnids showed effects in the range of the water solubility of the compound. The acute studies were exclusively conducted with filtrates from supersaturated suspensions of the compound in the test medium. Due to the very low water solubility, the test solutions for the chronic study in daphnids were prepared with DMF whereupon the solubility was determined in advance to ensure that the study was conducted up to the solubility limit in the test medium. Furthermore, in the acute daphnia study, the water solubility of the compound was determined in the test medium to be 0.8 µg/L (1.1 µg/L corrected for the recovery). This test medium was used in both the acute studies in fish and daphnids and in the chronic study in daphnids. Therefore, it can be clearly stated that these studies were conducted up to the saturation limit of the compound. In the algae study, a different test medium was used but a supersaturated solution was prepared to ensure testing up to the solubility limit of the compound.

Comments received during public consultation

There were comments received from four MS and one Industry organisation concerning the environmental hazards during the public consultation (PC). Industry supported removing the Aquatic Chronic 4 - H413 classification. Two MS did not support the removal of classification. One MS felt that the available experimental bioaccumulation data is not adequate for declassification based on the study deficiencies (e.g. not according to GLP, non-standard guideline, only 1 test concentration, use of castor oil as vehicle and less fish than standard test guideline). They also noted that a chronic fish toxicity study is not available and the most sensitive species is not known.

The other MS wanted more information on the BCF test. In their opinion, it was not clear if steady state was reached after 28 days. It was also unclear whether the concentrations were measured during the study. It was not clear whether the mean concentrations were high enough during the uptake phase. They also wondered about the use of castor oil. It was also recognised that a substance with low water solubility and high Log K_{OW} is difficult to assess.

One MS supported the removal of classification.

The DS referred to the Member State Committee (MSC) agreement on "*no need to request for repeating the bioaccumulation test in fish*". No long-term fish toxicity test was requested by the MSC. Regarding the BCF study, the DS explained that as no substance was analytically detectable, steady-state could not be reached. The mean recovery rate of 94.8% is in their view the recovery of the analytical method. They are not aware of any disadvantages of the castor oil as dispersant.

Assessment and comparison with the classification criteria

The substance is not rapidly degradable based on the results of two ready biodegradability tests (OECD TG 301B, OECD TG 301C) where 1% or 0% degradation was observed after 29 and 28 days, respectively.

The Log Pow of 5.8 would suggest that the substance has a high potential to bioaccumulate. The DS presented study results showing the BCF value below 5. The BCF study is from 1974 and it is not known which version of the OECD TG 305 Guideline is referred to when stating that the test is equivalent and similar to the OECD Guideline. The substance has a high solubility in lipids (13 900 mg/kg at 37°C). Despite the difference in temperatures used in the studies, if it is assumed that the water solubility is around 0.001 mg/L, the lipid-water partition coefficient is about 1.4×10^7, which implies a high capacity for transfer from the dissolved phase into fatty tissues. So, unless uptake is hindered (no evidence on this point is provided) or metabolism is rapid (which is not suggested by the degradation information), it seems possible for fish to accumulate significant amounts, especially over long time periods.
RAC is also of the opinion that the BCF study provided does not contain enough information to assess its reliability for classification purposes. Only two fish were analysed via HPLC for each group as opposed to four fish required in OECD TG 305 (1996). Also, the analyses of fish did not follow the guidelines; they were performed on day 7, 14, 21, and 28 even though the guideline requires at least five occasions during the uptake phase and at least four occasions during the depuration phase. There is no information available on the analytical detection limit of the test substance in either water or fish tissues. There is no information on the growth rate of the fish during the test period. Only one nominal concentration of 0.001 mg/L was tested. The measured values after week 1 and week 2 are 0.001 mg/L and after weeks 3 and 4 they are 0.00101 mg/L.[1] It is mentioned in relation to aquatic toxicity tests that the substance is photosensitive. It is unclear whether the BCF study was performed with or without light adjustment.

There are acute toxicity test results for all three trophic levels; two tests for fish, one for algae and one for Daphnia. There are long-term data available on algae and Daphnia. The substance is photosensitive. All toxicity tests were performed under light protection except for the one fish test in the bioaccumulation test. This study is, however, poorly described.

The algae test was performed in two phases. In part one of the test, filtrate of the stock suspension with dissolved and very finely dispersed test substance was incubated for 24 h with an illumination of about 9200 Lux to let the photoreaction happen (aged filtrate). This filtrate was used as one test concentration in the second part of the test along with the freshly prepared filtrate (fresh filtrate). The concentration of the test substance in fresh filtrate was 260 µg/L at the start of the test and 12 µg/L at the end of the test. In the aged filtrate only 18 µg/L of the parent compound was found. This decrease could be due to degradation of the compound as a consequence of the intense irradiation. No inhibitory effects on the growth of *Scenedesmus subsbicatus* were seen when using aged filtrate up to the concentration of 260 µg/L. Unfortunately there is no information available on the degradation products or the rate of the

[1] REACH Registration file

photoreaction in water. Consequently, there is no information on the toxicity of the substance to fish and Daphnia in the medium exposed to normal light conditions.

RAC is of the opinion that in the aquatic toxicity tests performed with fish, Daphnia and algae under light protection there is no toxicity within the range of solubility. This is also the case for algae in test medium exposed to light. Chronic test data for fish is lacking. The information on photodegradation should be available to reach a conclusion on the aquatic toxicity of the substance.

Comparison to the CLP criteria

According to Table 4.1.0 of the CLP Regulation, the criteria for Aquatic Chronic 4 are applicable, e.g. for substances that:

- are poorly soluble and no acute toxicity is recorded up to the water solubility and

- are not rapidly degradable and

- have an experimentally derived BCF ≥ 500 (or, if absent, a Log K_{ow} ≥ 4),

which will be classified in this category unless other scientific evidence exists showing classification to be unnecessary. Such evidence includes chronic toxicity NOECs > water solubility or > 1 mg/L, or other evidence of rapid degradation in the environment than the ones provided by any of the methods listed in section 4.1.2.9.5.

RAC agrees that phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide has no acute toxicity at concentrations up to the water solubility, when tested with light protection, to fish and Daphnia, and no acute toxicity to algae with or without light protection. No chronic toxicity is seen in Daphnia in the dark, and to algae with or without light protection. There is no information on chronic toxicity to fish. The substance is not rapidly degradable. RAC is of the opinion that the BCF study provided does not contain enough information to assess its reliability for classification purposes and the light conditions in the test are unknown. The Log Kow for the substance is 5.8 thus exceeding the classification criteria Log Kow ≥ 4.

Consequently, RAC does not support the DS proposal to remove the aquatic classification Aquatic Chronic 4 - H413.

ANNEXES:

Annex 1 The Background Document (BD) gives the detailed scientific grounds for the opinion. The BD is based on the CLH report prepared by the Dossier Submitter; the evaluation performed by RAC is contained in 'RAC boxes'.

Annex 2 Comments received on the CLH report, response to comments provided by the Dossier Submitter and RAC (excluding confidential information).