Biocidal Products Committee (BPC)

Opinion on the application for approval of the active substance:

Esbiothrin

Product type: 18

ECHA/BPC/260/2020

Adopted

16 June 2020

Opinion of the Biocidal Products Committee

on the application for approval of the active substance Esbiothrin for product type 18

In accordance with Article 89(1) of Regulation (EU) No 528/2012 of the European Parliament and of the Council 22 May 2012 concerning the making available on the market and use of biocidal products (BPR), the Biocidal Products Committee (BPC) has adopted this opinion on the non-approval in product type 18 of the following active substance:

Common name:	**Esbiothrin**
Chemical name:	**(RS)-3-allyl-2-methyl-4-oxocyclopent-2-enyl-(1R,3R)-2,2-dimethyl-3-(2-methylprop-1-enyl)-cyclopropanecarboxylate**
EC No.:	**not available**
CAS No.:	**260359-57-7**
Existing active substance	

This document presents the opinion adopted by the BPC, having regard to the conclusions of the evaluating Competent Authority. The assessment report, as a supporting document to the opinion, contains the detailed grounds for the opinion.

Process for the adoption of BPC opinions

Following the submission of an application by Sumitomo Chemical (UK) Plc, United Kingdom, on 26 April 2006 and by Endura S.p.A, Italy, on 27 April 2006, the evaluating Competent Authority Germany submitted an assessment report and the conclusions of its evaluation to ECHA on 11 January 2017. In order to review the assessment report and the conclusions of the evaluating Competent Authority, the Agency organised consultations via the BPC (BPC-35) and its Working Groups (WG III 2017 and WG V 2018). Revisions agreed upon were presented and the assessment report and the conclusions were amended accordingly.

Information on the fulfilment of the conditions for considering the active substance as a candidate for substitution was made publicly available at *https://echa.europa.eu/en/potential-candidates-for-substitution-previous-consultations/-/substance-rev/15710/term* on 10 February 2017, in accordance with the requirements of Article 10(3) of Regulation (EU) No 528/2012. Interested third parties were invited to submit relevant information by 10 April 2017.

Adoption of the BPC opinion

Rapporteur: Germany

The BPC opinion on the non-approval of the active substance esbiothrin in product type 18 was adopted on 16 June 2020.

The BPC opinion takes into account the comments of interested third parties provided in accordance with Article 10(3) of BPR.

The BPC opinion was adopted by consensus.The opinion is published on the ECHA webpage at: http://echa.europa.eu/regulations/biocidal-products-regulation/approval-of-active-substances/bpc-opinions-on-active-substance-approval.

Detailed BPC opinion and background

1. Overall conclusion

The overall conclusion of the BPC is that the active substance esbiothrin in product type 18 may not be approved. The detailed grounds for the overall conclusion are described in the assessment report.

2. BPC Opinion

2.1. BPC Conclusions of the evaluation

a) Presentation of the active substance including the classification and labelling of the active substance

This evaluation covers the use of esbiothrin in product type 18. Esbiothrin belongs to the group of synthetic pyrethroids and is a mixture of two stereoisomers [1R, trans; R] and [1R, trans; S] in the ratio: 1:3. Both of these stereoisomers have a biocidal activity. Six further stereoisomers of the substance are minor isomers with concentrations below 10%. Specifications for the reference source are established based on the data submitted by Endura S.p.A. Italy. The applicant Sumitomo Chemical (UK) Plc did not submit the required 5-batch analysis.

The physico-chemical properties of the active substance and biocidal product have been evaluated and are deemed acceptable for the appropriate use, storage and transportation of the active substance and biocidal product.

Validated analytical methods are available for the active substance as manufactured and for the relevant and significant impurities. Both applicants provided a validated analytical method for the quantification of residues of esbiothrin (sum of isomers) in air. An analytical method for the quantification of esbiothrin (sum of isomers) in blood is available.

Validated analytical methods for esbiothrin (sum of isomers) are missing for soil, drinking water and surface water.

If the Committee for Risk Assessment (RAC) confirms the proposed classification of esbiothrin as Acute Tox. 3 (H301), a confirmatory method in blood and a validated method (including confirmatory method) in tissues will be required.

Esbiothrin has a harmonized classification according Regulation (EC) No 1272/2008. However, the eCA submitted a revised CLH proposal to ECHA on 16 January 2017.

Classification according to the CLP Regulation	
Hazard Class and Category Codes	Acute Tox. 4*, H302 Acute Tox. 4*, H332 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Labelling	
Pictogram codes	GHS09 GHS07
Signal Word	Warning
Hazard Statement Codes	H302 (Harmful if swallowed)

	H332 (Harmful if inhaled) H410 (Very toxic to aquatic organisms with long lasting effects)
Specific Concentration limits, M-Factors	-

The proposed classification and labelling for esbiothrin according to Regulation (EC) No 1272/2008 (CLP Regulation) is:

Proposed Classification according to the CLP Regulation	
Hazard Class and Category Codes	Acute Tox. 3, H301 Acute Tox. 4, H332 Repr. 2, H361d STOT SE 1, H370 STOT RE 2 dermal, H373 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Labelling	
Pictogram codes	GHS06 GHS08 GHS09
Signal Word	Danger
Hazard Statement Codes	H301 (Toxic if swallowed) H332 (Harmful if inhaled) H361d (Suspected of damaging the unborn child) H370 (Causes damage to the nervous system after oral and inhalation exposure.) H373 (May cause damage to the skin through prolonged or repeated exposure) H410 (Very toxic to aquatic organisms with long lasting effects)
Specific Concentration limits, M-Factors	M = 100 (acute and chronic)

b) Intended use, target species and effectiveness

Esbiothrin is used as a household insecticide for non-professional indoor use for the control of mosquitoes including Culex, Aedes and other small biting flies in domestic living areas (excluding kitchens).

The active substance will be formulated for use by the general public as either vapour releasing impregnated mats or vaporiser liquid all used in combination with an electric heating unit. These systems are designed to be used during the hours of peak mosquito activity, generally evenings and overnight.

Esbiothrin is a pyrethroid insecticide. It acts on the sodium channel in the nerve membranes of the invertebrate nervous system causing pronounced repetitive activity and a prolongation of the transient increase in sodium permeability of the nerve membranes. This results in continual nerve impulse transmission leading to tremors and death.

The data on esbiothrin and the representative biocidal products have demonstrated sufficient efficacy against the target species.

Resistance against pyrethroids can occur in relevant pest species. Cross-resistance of pest species to other pyrethroids is to be anticipated due to a common mode of action. Furthermore, instances of cross-resistance (or multiple resistance) between pyrethroids and organochlorine insecticides have been reported.

c) Overall conclusion of the evaluation including need for risk management measures

Human health

According to Regulation (EC) No 1272/2008 (CLP Regulation) esbiothrin has a harmonized classification for Acute Tox. 4* (H302, harmful if swallowed and H332, harmful if inhaled). Based on the available data and information used for the assessment of human health in context of Regulation (EU) 528/2012 and Regulation (EC) 1272/2008 esbiothrin is now considered as being toxic if swallowed (Acute Tox. 3). Furthermore, it is considered to cause damage to the skin through prolonged or repeated exposure (STOT-RE 2) and to the nervous system after oral and inhalation exposure (STOT-SE 1). Esbiothrin is considered suspected of damaging the unborn child (Repr. 2). The previous classification for harmful if inhaled (Acute Tox. 4) was confirmed by the eCA.

Mutagenicity of photometabolites:

Mutagenicity in bacteria was observed following light exposure to substances of the allethrin series. This mutagenic finding is attributed to the formation of reactive photometabolites. Based on this finding the photometabolites epoxide and allethronyl glyoxylate monohydrate are considered as mutagenic. Based on the mutagenicity of photometabolites and the TTC (Threshold of Toxicological Concern) approach applying a value of 2.5×10^{-6} mg/kg bw/day for the risk assessment of the photometabolites.

Furthermore, it is concluded that esbiothrin is converted in real-life exposure conditions by sunlight to these genotoxic photodegradation products in a yield of approximately 0.5 % (50 % exposure and 1 % formation rate). It is considered that the available data do not show that glass shields inhibit the photodegradation and that no further refinement is applicable.

The table below summarises the exposure scenarios assessed.

Summary table: human health scenarios			
Scenario	**Primary or secondary exposure and description of scenario**	**Exposed group**	**Conclusion**
Application	Primary systemic exposure to esbiothrin	Non-professional users	Acceptable
Application	Primary local exposure to esbiothrin	Non-professional users	Not acceptable without additional risk mitigation measures (e.g. single packaged mats)
Application / Post application	Secondary systemic exposure to esbiothrin	General public (adults and toddlers)	Acceptable. Combined primary and secondary exposure may lead to the exceedance of the AEL for adults triggering the need for additional risk mitigation measures (e.g. single packaged mats).
Application / Post application	Secondary systemic exposure to the photometabolites.	General public (adults and toddlers)	Not acceptable

In particular, for exposure to genotoxic photodegradation products a non-acceptable human health risk was identified even after refinement of the exposure assessment. Further options for reduction taken into consideration (reduction factor for closed windows decreasing the fraction of UV light; total exclusion of sun light and UV light) are considered not realistic for non-professional users.

Esbiothrin is an insecticide used for the control of mosquitoes and other small biting flies in domestic living areas excluding kitchens. It is not expected that residues in food or feeding stuffs will occur in relevant amounts for the applied uses of the representative products.

Environment

Esbiothrin has been shown to be not readily biodegradable and is not susceptible to hydrolysis in the pH-range from 4 to 7. At pH 9, esbiothrin showed hydrolytic degradation with a half-life of 12.2 days. Esbiothrin undergoes photodegradation in aqueous media and is susceptible to photodegradation in air (the half-life is estimated to be 1.733 h). Esbiothrin is a persistent substance regarding the results of degradation studies in water/sediment

systems (DT50 143.7 days at 12°C). In soil, the active substance is not persistent by definition (DT50 < 120 days). Several major metabolites were formed in the environmental compartments. The active substance indicates a potential for bioaccumulation in the aquatic compartment, but the B criterion is not fulfilled. Based on aquatic studies with fish, daphnia and algae (short-term and one long-term) it can be concluded that the substance is very toxic to fish and invertebrates. Esbiothrin is classified as very toxic to aquatic life and can cause long lasting effects.

The table below summarises the exposure scenarios assessed.

Summary table: environment scenarios		
Scenario	**Description of scenario including environmental compartments**	**Conclusion**
Diffusor (cellulose paper mat and liquid vaporiser)	Releases from private households to the sewer system occur due to wet cleaning. Simultaneous emissions of several households within one sewage treatment plant (STP) catchment are cumulated in the STP representing the main receiving environmental compartment. Surface water and sediment are exposed through STP discharge into the receiving watercourse, whereas soil and groundwater are exposed via sludge application to agricultural land or grassland. Finally, the bioconcentration and bioaccumulation in the aquatic and terrestrial food chain have been assessed.	Acceptable

Formulated as a diffusor used inside private houses, unacceptable risks have not been identified for the environment.

Overall conclusion

Although unacceptable risks have not been identified for the environment, risks for human health due to secondary exposure to the generated photometabolites are considered as not acceptable and cannot be mitigated. Overall, no safe use could be identified.

2.2. Exclusion, substitution and POP criteria

2.2.1. Exclusion and substitution criteria

The table below summarises the relevant information with respect to the assessment of exclusion and substitution criteria:

Property		Conclusions	
CMR properties	Carcinogenicity (C)	No classification required	Esbiothrin does not fulfil criterion (a), (b) and (c) of Article 5(1)
	Mutagenicity (M)	No classification required	
	Toxic for reproduction (R)	Repr. 2	
PBT and vPvB properties	Persistent (P) or very Persistent (vP)	Esbiothrin: P dl-ALON and d-t-CRA: not P d-c-CRA: P t-COOH-CA: vP ωt-COOH-d-t-allethrin: potentially P	Esbiothrin does not fulfil criterion (e) of Article 5(1) but fulfils criterion (d) of Article 10(1)
	Bioaccumulative (B) or very Bioaccumulative (vB)	Esbiothrin: not B or vB d-c-CRA, d-t-CRA, t-COOH-CA, dl-ALON and ωt-COOH-d-t-allethrin: not B	
	Toxic (T)	Esbiothrin: T d-c/t-CRA, t-COOH-CA, dl-ALON and ωt-COOH-d-t-allethrin: not T	
Endocrine disrupting properties	Section A of Regulation (EU) 2017/2100: ED properties with respect to humans	An assessment of the endocrine disrupting properties according to Regulation (EU) 2017/2100 was not conducted as non-approval is proposed. Consequently, no conclusion can be drawn whether esbiothrin fulfils criterion (d) of Article 5(1) with respect to humans or criterion (e) of Article 10(1) with respect to non-target organisms.	
	Section B of Regulation (EU) 2017/2100: ED properties with respect to non-target organisms		
	Article 57(f) and 59(1) of REACH		
	Intended mode of action that consists of controlling target organisms via their endocrine		

	system(s).	
Respiratory sensitisation properties	No classification required (no data available)[1]. Esbiothrin does not fulfil criterion (b) of Article 10(1).	
Concerns linked to critical effects other than those related to endocrine disrupting properties	Esbiothrin does not fulfil criterion (e) of Article 10(1).	
Proportion of non-active isomers or impurities	Esbiothrin does not fulfil criterion (f) of Article 10(1)	

The exclusion and substitution criteria were assessed in line with the "Note on the principles for taking decisions on the approval of active substances under the BPR"[2], "Further guidance on the application of the substitution criteria set out under article 10(1) of the BPR"[3] and "Implementation of scientific criteria to determine the endocrine –disrupting properties of active substances currently under assessment[4]" agreed at the 54th, 58th and 77th meeting respectively, of the representatives of Member States Competent Authorities for the implementation of Regulation 528/2012 concerning the making available on the market and use of biocidal products. This implies that the assessment of the exclusion criteria is based on Article 5(1) and the assessment of substitution criteria is based on Article 10(1)(a, b, d, e and f).

Consequently, the following is concluded:

Esbiothrin does not meet the exclusion criteria laid down in Article 5 of Regulation (EU) No 528/2012.

Esbiothrin does meet the conditions laid down in Article 10 of Regulation (EU) No 528/2012, and is therefore considered as a candidate for substitution. Esbiothrin fulfils criterion (d) of Article 10(1) being persistent and toxic.

The endocrine disruptor properties have not been assessed as defined in Regulation (EU) No 2017/2100 and it is therefore not possible to finally conclude on the exclusion criteria related to Article 5(1)(d) and 10(1)(a), and on whether esbiothrin shall be considered a candidate for substitution related to Article 10(1)(e). This is in line with paragraph 16 of the "Implementation of scientific criteria to determine the endocrine-disrupting properties of active substances currently under assessment"[4].

2.2.2. POP criteria

Esbiothrin is classified as persistent, but does not fulfil the B criterion and has no potential for long-range transport. Therefore, the substance does not meet the POP criteria according to the Stockholm Convention on persistent organic pollutions (POPs).

[1] According to Regulation (EU) 528/2012 respiratory sensitisation is no part of the core data set.
[2] See document: Note on the principles for taking decisions on the approval of active substances under the BPR (available from https://circabc.europa.eu/d/a/workspace/SpacesStore/c41b4ad4-356c-4852-9512-62e72cc919df/CA-March14-Doc.4.1%20-%20Final%20-%20Principles%20for%20substance%20approval.doc).
[3] See document: Further guidance on the application of the substitution criteria set out under article 10(1) of the BPR (available from https://circabc.europa.eu/d/a/workspace/SpacesStore/dbac71e3-cd70-4ed7-bd40-fc1cb92cfe1c/CA-Nov14-Doc.4.4%20-%20Final%20-%20Further%20guidance%20on%20Art10(1).doc.
[4] See document: Implementation of scientific criteria to determine the endocrine –disrupting properties of active substances currently under assessment (https://circabc.europa.eu/sd/a/48320db7-fc33-4a91-beec-3d93044190cc/CA-March18-Doc.7.3a-final-%20EDs-%20active%20substances%20under%20assessment.docx).

2.2.3. Identification of potential alternatives substances or technologies, including the results of the public consultation for potential candidates for substitution

Results of the public consultation:

One non-confidential and one confidential contribution was received. The non-confidential contribution was submitted by one of the applicants stating there are no alternatives available on the market. This applicant justified their statement claiming that there were no biocidal products authorised under the BPR containing photolabile active substances that are not themselves candidates for substitution. Furthermore, the company argued that, in the interest of minimising the occurrence of pesticide resistance, exclusion and substitution of active substances should be avoided. According to their opinion, this applies to the number of chemical groups of active substances and to the number of active substances within a chemical group. According to the company, this is of particular relevance in applications where rotation of insecticides with different modes of action is required. In addition, the company referred to the World Health Organization (WHO) saying that “one sixth of the illness and disability suffered worldwide is due to vector-borne diseases, with more than half the world’s population currently estimated to be at risk of these diseases.” The company concluded that substitution of biocides without adequate replacement may profoundly harm children and adults in addition to causing substantial financial and physical stress to the public health care system.

The confidential comment did not contain any statement with regard to the availability of alternatives.

Potential alternative active substances:

For PT 18, 45 active substances have already been approved.

Conclusion:

Based on the available information and especially considering the high amount of active substances already approved or still under evaluation for PT 18, it is concluded that esbiothrin is not an essential active substance for the uses foreseen.

2.3. BPC opinion on the application for approval of the active substance esbiothrin in product type 18

In view of the conclusions of the evaluation, it is proposed that esbiothrin shall not be approved. The criteria laid down in point (b)(iii) of Article 19(1) of Regulation (EU) 528/2012 are not met.

The active substance does not fulfil the criteria according to Article 28(2) to enable inclusion in Annex I of Regulation (EU) 528/2012. Esbiothrin is proposed to be classified as Acute Tox. 3 (H301), Repr. 2 (H361d), STOT SE 1 (H370), STOT RE 2 (H373) and Aquatic Acute 1 (H400). Furthermore, it fulfils the criteria for being persistent and toxic.

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