Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products

RISK ASSESSMENT OF A BIOCIDAL PRODUCT FOR NATIONAL AUTHORISATION APPLICATIONS

(submitted by the evaluating Competent Authority)

Aroxol Antimoth Antiacari Spray

Product type 18

Transfluthrin and Piperonyl Butoxide

Case Number in R4BP: [BC-DM040510-54]

Evaluating Competent Authority: Greece

Date: May 2020
Re-submission: 28 August 2020

Applicant Version of Public PAR: 29 June 2021

Table of Contents

1 CONCLUSION

Conclusion for Physico-chemistry:

Aroxol Antimoth Antiacari Spray is an Aerosol dispenser insecticide (PT 18), containing nominal (pure) active ingredient of 0.1% w/w Transfluthrin and 0.1% w/w Piperonyl Butoxide.

Its physicochemical properties including the satisfactory operation of aerosol are considered acceptable and is classified as Aerosol Category 1 Mention Danger and H222/ H229 according to CLP criteria.

The product is stable for 2 weeks at 54°C and 24 months at ambient temperature in commercial packaging. The product (spray version) should not be stored at a temperature lower than 0°C and higher than 50°C.

An analytical method was provided for the determination of both active substances in the formulation.

Conclusion for Human Health:

The biocidal product is classified as Eye irritant Cat. 2 (H319), STOT SE Cat.3 (H336) and should carry the hazard phrase EUH066 "Repeated exposure may cause skin dryness or cracking", according to Regulation (EC) No. 1272/2008.

Regarding risk assessment, both the primary exposure of non-professional users during product application and the indirect secondary exposure of the general public following application of the biocidal product do not entail unacceptable risks for human health.

Conclusion for Environment:

According to the environmental risk assessment, the risk for all relevant environmental compartments is acceptable when the product is used according to label instructions.

Conclusion for Efficacy:

Several efficacy studies (laboratory and simulated use studies) were submitted by the applicant with Aroxol Anti-moth Anti-acari Spray containing transfluthrin 0.1% and PBO 0.1%, to support the intended uses of the product against the claimed target organisms.

Two bridging laboratory studies were also submitted supporting the equivalence of the old and new formulation [redacted], in terms of their efficacy against a representative target species, namely clothes moth (*Tineola bisselliella*).

Based on the results of the submitted efficacy studies, the product was effective when applied indoors, in domestic premises, by non-professionals as:

- Spray directly on clothing against adults, larvae and eggs of the clothes moth *Tineola bisselliella* (Intended use 1a) at 30 g product/m³ or 45 g product/wardrobe of 1.5 m^3 (50 seconds spray) from 30 cm distance, for 3 months after treatment.
- Spray on wardrobes walls/panels against adults of the cloth moth *Tineola bisselliella* (Intended use 1b) at 30 g product/m³ or 45 g product/wardrobe of 1.5 m^3 (50 seconds spray) from 30 cm distance, for 3 months after treatment.

- Spray onto carpets and moquettes to protect them against adults, larvae and eggs of the clothes moth *Tineola bisselliella* (Intended Use 2) at 8 g product/m² or 176 g product/carpet of 22 m². Vacuum or steam clean and then spray for about 9 seconds every square meter from a distance of 30 cm. Roll up the carpet/moquette and seal in plastic bags. The application is effective for up to 3 months.
- Spray directly on infested machine washable articles (blankets, quilts, pillows) to control ticks and mites (Intended use 3) at 4 g product/m² (4-5 seconds/m²) from 30 cm distance, for immediate effect.
- Spray directly on infested mattresses to control ticks and mites (Intended use 4) at 4 g product/m² (4-5 seconds/m²) from 30 cm distance, for immediate effect.
- Spray directly on infested carpets and moquettes to control ticks and mites (Intended use 5) at 4 g product/m² (4-5 seconds/m²) from 30 cm distance, for immediate effect, noting however that the product is not effective on infested thick woolen carpet against mites *(for more details please refer to the conclusion of efficacy of the product in 2.2.5.5).*

Conclusion on the ED properties of the biocidal product

Considering the available data, it was **not possible to conclude** whether the biocidal product Aroxol Antimoth Antiacari Spray is considered to have endocrine-disrupting properties. This is because no decision is made on the endocrine-disrupting properties of one co-formulant in the frames of REACH. Once the conclusion regarding the endocrine-disrupting properties of this co-formulant is available, the applicant must inform eCA/rMS, so that the conclusion is reflected in the conditions of product authorization.

2 ASSESSMENT REPORT

2.1 Summary of the product assessment

2.1.1 Administrative information

2.1.1.1 Identifier of the product

Identifier[1]	**Country (if relevant)**
Aroxol Antimoth Antiacari Spray AROXOL ΣΚΟΡΟΚΤΟΝΟ ΑΚΑΡΕΟΚΤΟΝΟ (to be sold by the company Eureka Hellas SA)	Greece (RefMS)
Aroxol Antimoth Antiacari Spray AROXOL ΣΚΟΡΟΚΤΟΝΟ ΑΚΑΡΕΟΚΤΟΝΟ (to be sold by the company Eureka LTD.)	Cyprus (MS concerned)
Aroxol Antimoth Antiacari Spray AROXOL SPRAY ANTIMOLII ŞI ANTIACARIENI LAVANDĂ (to be sold by the company Interstar Chim. S.A.)	Bulgaria (MS concerned)
Aroxol Antimoth Antiacari Spray AROXOL SPRAY ANTIMOLII ŞI ANTIACARIENI LAVANDĂ (to be sold by the company Interstar Chim. S.A.)	Romania (MS concerned)

2.1.1.2 Authorisation holder

Name and address of the authorisation holder	**Name**	Eureka Hellas SA
	Address	A‘ Industrial Area of Volos PO Box 1094 38500 Volos, Magnesia Prefectira Greece
Authorisation number		
Date of the authorisation		
Expiry date of the authorisation		

2.1.1.3 Manufacturer(s) of the product

Name of manufacturer	Eureka Hellas SA
Address of manufacturer	A‘ Industrial Area of Volos PO Box 1094 38500 Volos, Magnesia Prefectira Greece
Location of manufacturing sites	A‘ Industrial Area of Volos PO Box 1094 38500 Volos, Magnesia Prefectira Greece

[1] Please fill in here the identifying product name from R4BP.

2.1.1.4 Manufacturer(s) of the active substance(s)

It is confirmed that the respective address of the manufacturer of the active substance and the respective manufacturing plant for both active substances have been evaluated in the relevant dossiers (CARs) and no changes have been made.

Active substance	Transfluthrin
Name of manufacturer	Bayer SAS Environmental Science
Address of manufacturer	16 rue Jean-Marie Leclair CS 90106 69266 Lyon Cedex 09 France Bayer SAS Environmental Science is the Article 95 listed supplier of Transfluthrin for Product Type 18.
Location of manufacturing sites	Bayer Vapi Private Limited (Formerly Bilag Industries Pvt. Ltd.) Plot No.306/3 Phase II G.I.D.C. Vapi 396195 Gujarat India The address of the manufacturing plant for the active substance has been evaluated in the dossier for Transfluthrin PT18. The manufacturer of the active substance is the same.

Active substance	Piperonyl Butoxide
Name of manufacturer	Endura SpA
Address of manufacturer	Viale Pietramellara 5 40121 Bologna Italy ENDURA S.p.A. is the Article 95 listed supplier of Piperonyl Butoxide for Product Type 18.
Location of manufacturing sites	Via Baiona 107-111 48123 Ravenna Italy The address of the manufacturing plant for the active substance has been evaluated in the dossier for Piperonyl Butoxide PT18. The manufacturer of the active substance is the same. A statement on the postal code change of the manufacturing site is included in the IUCLID file.

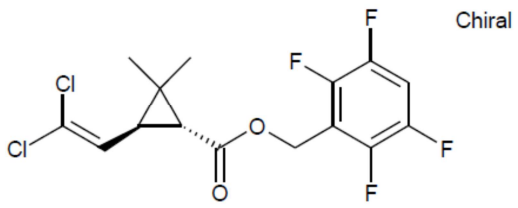
2.1.2 Product composition and formulation

NB: the full composition of the product according to Annex III Title 1 should be provided in the confidential annex.

Does the product have the same identity and composition as the product evaluated in connection with the approval for listing of the active substance(s) on the Union list of approved active substances under Regulation No. 528/2012?

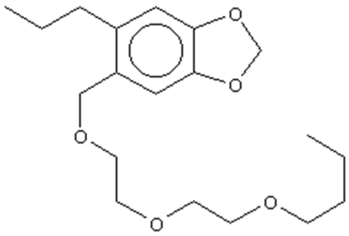
Yes ☐
No ☒

2.1.2.1 Identity of the active substances

Main constituent(s)	
ISO name	Transfluthrin
IUPAC or EC name	2,3,5,6-tetrafluorobenzyl (1R,3S)-3-(2,2-dichlorovinyl) -2,2-dimethylcyclopropanecarboxylate or 2,3,5,6-tetrafluorobenzyl (1R)-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate
EC number	405-060-5*
CAS number	118712-89-3 *
Index number in Annex VI of CLP	607-223-00-8 *
Minimum purity / content	96.5 % w/w
Molecular formula	$C_{15}H_{12}Cl_2F_4O_2$
Structural formula	
Molecular weight (g/mol)	371.2 g/mol

** The EU index no. and ELINCS no. refer to the 1R,trans and 1S,trans configurations, which is not in agreement with the definition of transfluthrin, which is exclusively the 1R,trans isomer. The CAS registry no. does refer to the correct isomer.*

Main constituent(s)	
ISO name	Piperonyl Butoxide
IUPAC or EC name	5-[2-(2-butoxyethoxy)ethoxymethyl]-6-propyl-1,3-benzodioxole
EC number	200-076-7
CAS number	51-03-6
Index number in Annex VI of CLP	Not included in Annex VI of CLP
Minimum purity / content	94.0 % w/w
Molecular formula	$C_{19}H_{30}O_5$

Structural formula	
Molecular weight (g/mol)	338.43 g/mol

2.1.2.2 Candidate(s) for substitution

Transfluthrin is not a candidate for substitution in accordance with Article 10 of BPR.
Piperonyl Butoxide is not a candidate for substitution in accordance with Article 10 of BPR.

2.1.2.3 Qualitative and quantitative information on the composition of the biocidal product[2]

Safety data sheets for the active substances are provided in the respective active substance data sets of the IUCLID file.

Common name	IUPAC name	Function	CAS number	EC number	Content (%)
Transfluthrin	2,3,5,6-tetrafluorobenzyl (1R,3S)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate or 2,3,5,6-tetrafluorobenzyl (1R)-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate	Active substance	118712-89-3	405-060-5	0.100 % w/w (pure) 0.104 % w/w (technical)
Piperonyl Butoxide	5-[2-(2-butoxyethoxy)ethoxymethyl]-6-propyl-1,3-benzodioxole	Active substance	51-03-6	200-076-7	0.100 % w/w (pure) 0.106 % w/w (technical)
		Non-active substance[3]			

[1] based on a minimum purity 96.5% for Transfluthrin
[2] based on a minimum purity 94% for Piperonyl Butoxide

Please see Confidential Annex for further details on non-active substances.

2.1.2.4 Information on technical equivalence

The source of the active substance Transfluthrin is identical to the active substance in respect of which the initial risk assessment was carried out.

The source of the active substance Piperonyl Butoxide is identical to the active substance in respect of which the initial risk assessment was carried out.

2.1.2.5 Information on the substance(s) of concern

Information on the substance(s) of concern: BUTANE PROPANE 80/20

IUPAC name or other accepted chemical name	Mixture of N-butane, isobutane, propane [redacted]
EC number	270-681-9
CAS number	68476-40-4
Classification and Labelling according to Regulation (EC) No 1272/2008:	Press. Gas Flam. Gas 1 H220: Extremely flammable gas H280: Contains gas under pressure; potentially explosive if heated.
Classification and Labelling according to the Directive 67/548/EEC	Not available
Relevant toxicological/ecotoxicological information	Not available
Other grounds for concern[4]	n/a

4 Please include PBT, vPvB, POP and ED properties, if relevant.

Information on the substance(s) of concern: ISOPROPYL ALCOHOL

IUPAC name or other accepted chemical name	ISOPROPYL ALCOHOL
EC number	200-661-7
CAS number	67-63-0
Classification and Labelling according to Regulation (EC) No 1272/2008:	- Flammable liquid category 2, H225, Highly flammable liquid and vapour - Eye irritation category 2, H319, causes serious eye irritation - Specific target organ toxicity – single exposure, category 3, H336, May cause drowsiness or dizziness - EUH066 Repeated exposure may cause skin dryness or cracking.
Classification and Labelling according to the Directive 67/548/EEC	Not available
Relevant toxicological/ecotoxicological information	Not available
Other grounds for concern[5]	n/a

2.1.2.6 Type of formulation

Aerosol dispensers (AE)

2.1.3 Hazard and precautionary statements[6]

Classification and labelling of the product according to the Regulation (EC) 1272/2008

Classification	
Hazard category	Flammable Aerosol Cat. 1, H222 Pressurized Container, H229 Eye Irritation Cat. 2, H319 STOT SE Cat. 3, H336 Aquatic Cat. 1, Acute, H400 Aquatic Cat. 1, Chronic, H410
Hazard statement	H222 Extremely flammable aerosol. H229 Pressurized container: May burst if heated. H319 Causes serious eye irritation. H336 May cause drowsiness or dizziness. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects.
Labelling	
Signal words	DANGER
Hazard statements	H222 Extremely flammable aerosol. H229 Pressurized container: May burst if heated. H319 Causes serious eye irritation. H336 May cause drowsiness or dizziness. H410 Very toxic to aquatic life with long lasting effects.
Precautionary statements	P101: If medical advice is needed, have product container or label at hand. P102 Keep out of reach of children. P103: Read carefully and follow all instructions. P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking. P211 Do not spray on an open flame or other ignition source. P251 Pressurized container: Do not pierce or burn, even after use. P260 Do not breathe spray. P262 Do not get in eyes or on skin. P271 Use only outdoors or in a well-ventilated area. P273 Avoid release to the environment. P410+412 Protect from sunlight. Do not expose to temperatures exceeding 50°C/ 122°F. P302+352 IF ON SKIN: Wash with plenty of soap and water. P301+310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337+P313 If eye irritation persists: Get medical advice/attention. P304+P340 IF INHALED: Remove victim to fresh air and keep at rest

6 For micro-organisms based products: indication on the need for the biocidal product to carry the biohazard sign specified in Annex II to Directive 2000/54/EC (Biological Agents at Work).

	in a position comfortable for breathing. P312 Call a POISON CENTER or doctor/physician if you feel unwell. P391 Collect spillage P501 Dispose of contents/container in accordance with all local, peripheral, national and international regulations. EUH066 Repeated exposure may cause skin dryness or cracking. EUH401 To avoid risks to human health and the environment, comply with the instructions for use.
Note	Special provisions: Contains: CAS No. 67-63-0 Isopropyl Alcohol
Pictogramm	GHS02 GHS09 GHS07 

2.1.4 Authorised use(s)

2.1.4.1 Use description[7]

The product is only intended to be used in domestic premises. This is clearly stated on the product label and in the SPC.

For washable articles, no wet cleaning or washing should take place after treatment and during the storage period.

The application rates for are expressed as the weight of the product applied per square meter of the treated surface (grams of product / m2) or in grams of product per cubic meter of the wardrobe volume and in addition in seconds per treated surface or wardrobe unit. Confirmatory data concerning the exact correlation between the duration of spraying (e.g. in seconds) and the discharge rate after storage will be provided as part of the shelf life study.

Table 1. Use # 1 – Clothes moth control in wardrobes

Product Type	PT18 - Insecticides, acaricides and products to control other arthropods (Pest control)
Where relevant, an exact description of the authorised use	Spraying in wardrobes on walls/panels or directly on clothing to protect clothes against clothes moth.
Target organism (including development stage)	Scientific name: *Tineola bisselliella* Common name: Clothes moth Development stage: Adults, larvae, eggs
Field of use	Indoor
Application method(s)	Spraying on the wardrobe walls/panels or directly on clothing to protect clothes against cloths moth. Application on the wardrobes walls/panels is effective against clothes moth adults. Application on clothing is effective against clothes moth adults, larvae, eggs. For a typical wardrobe of 1.5 m³, spray for 50 seconds in wardrobes on walls/panels or directly on clothing from a distance of about 30 cm, taking care not to damp the clothing. For larger wardrobes, prolong the spraying time appropriately.
Application rate(s) and frequency	30 g product/m³ or 45 g product/wardrobe of 1.5 m^3; Apply every 3 months, max. 2 times per year The application of the product on the clothes must take place after they have been washed and dried. If the wardrobe has to be cleaned, it must be cleaned prior to application. No wet cleaning or washing should take place after treatment and during the service life and storage period of 90 days. If it is planned to remove some of the clothes from the closet during the 3-month storage period, then the product should be applied on the closet's surface and not on the clothes.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300 (content: 250 or 300 mL)/400 mL, tinplate

[7] Copy this section as many times as necessary (one table per use, together with any instructions for use, risk mitigation measures and other directions for use that are use-specific. It has to be noted that in accordance with Document CA-May14-Doc.5.6 – Final, the SPC of a biocidal product presents the authorised uses as a number of pre-defined uses to which the product label shall have full correspondence.

Table 2. Use # 2 – Clothes moth control on carpets and moquettes

Product Type	PT18 - Insecticides, acaricides and products to control other arthropods (Pest control)
Where relevant, an exact description of the authorised use	Spraying onto carpets and moquettes to protect them against clothes moth.
Target organism (including development stage)	Scientific name: *Tineola bisselliella* Common name: Clothes moth Development stage: Adults, larvae, eggs
Field of use	Indoor
Application method(s)	Spraying onto carpets and moquettes to protect them against clothes moth.
Application rate(s) and frequency	8 g product/m² or 176 g product/carpet of 22 m²; Vacuum or steam clean and then spray for about 9 seconds every square meter from a distance of 30 cm. Roll up the carpet/moquette and seal in plastic bags. The application is effective for up to 3 months. Repeat application once per year.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300 (content: 250 or 300 mL)/400 mL, tinplate

Table 3. Use # 3 – Ticks and mites control on machine washable articles (blankets, quilts, pillows)

Product Type	PT18 - Insecticides, acaricides and products to control other arthropods (Pest control)
Where relevant, an exact description of the authorised use	Spraying on machine washable articles (blankets, quilts, pillows) to control ticks and mites.
Target organism (including development stage)	Scientific name: *Dermatophagoides pteronyssinus* Common name: House dust mite Development stage: mixed population Scientific name: *Ixodes ricinus* Common name: European sheep tick Development stage: Adults
Field of use	Indoor
Application method(s)	Spraying onto infested surfaces
Application rate(s) and frequency	4 g product/m² (blankets, quilts, pillows); For example: 17 g product/small blanket of 4.25m² and 23 g product/large blanket of 5.75m²; Wash infested fabrics at 60°C. When dry, spray for about 4-5 seconds every square meter from a distance of 30 cm. Spray onto one side of the blanket or quilt only. Repeat application once per year. No wet cleaning or washing should take place after treatment and during the storage period.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300 (content: 250 or 300 mL)/400 mL, tinplate

Table 4. Use # 4 – Ticks and mites control on mattresses

Product Type	PT18 - Insecticides, acaricides and products to control other arthropods (Pest control)
Where relevant, an exact description of the authorised use	Spraying onto mattresses to control ticks and mites.
Target organism (including development stage)	Scientific name: *Dermatophagoides pteronyssinus* Common name: House dust mite Development stage: mixed population Scientific name: *Ixodes ricinus* Common name: European sheep tick Development stage: Adults
Field of use	Indoor
Application method(s)	Spraying onto infested surfaces.
Application rate(s) and frequency	4 g product/m² or 20.08 g product/single size mattress of 5.02 m² or 31.84 g product/double size mattress of 7.96 m²; Vacuum or steam clean and then spray on infested mattress for 4-5 seconds every square meter (20 seconds per single size mattress or 29 seconds per double size mattress) from a distance of 30 cm. Leave the treated mattress in the room for at least 4 hours, then vacuum clean again before making the bed because dead mites are as allergenic as live mites. Repeat application once per year.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300 (content: 250 or 300 mL)/400 mL, tinplate

Table 5. Use # 5 – Ticks and mites control on carpets and moquettes

Product Type	PT18 - Insecticides, acaricides and products to control other arthropods (Pest control)
Where relevant, an exact description of the authorised use	Spraying on carpets and moquettes to control ticks and mites.
Target organism (including development stage)	Scientific name: *Dermatophagoides pteronyssinus* Common name: House dust mite Development stage: mixed population Scientific name: *Ixodes ricinus* Common name: European sheep tick Development stage: Adults
Field of use	Indoor use
Application method(s)	Spraying onto infested surfaces.
Application rate(s) and frequency	4 g product/m²; or 88 g product/carpet of 22 m²; Vacuum or steam clean and then spray on infested carpets or moquettes for about 4-5 seconds every square meter from a distance of 30 cm. Leave the treated piece in the room for one day, then vacuum clean again because dead mites are as allergenic as live mites. Repeat application once per year.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300 (content: 250 or 300 mL)/400 mL, tinplate

2.1.4.2 Use-specific instructions for use[8]

Application against clothes moths.

Wardrobes: Spray for 50 seconds from a distance of about 30 cm in wardrobes of 1.5 m^3 on walls/panels or directly on clothing in wardrobes before storing them, taking care not to damp the clothing. The application of the product on the clothes must take place after clothes have been washed and dried. If the wardrobe has to be cleaned, it must be cleaned prior to application. No **wet** cleaning or washing of any surfaces in the wardrobe or clothing must take place after treatment and during the storage period, of 90 days. Repeat application every 3 months, but no more than twice per year. Application on the wardrobes walls/panels is effective against clothes moth adults. Application on clothing is effective against clothes moth adults, larvae, eggs.

Carpets and moquettes: Vacuum or steam clean and then spray for about 9 seconds every square meter. Roll up the carpet/moquette and seal in plastic bags. The application is effective for up to 3 months. Repeat application once per year.

Application against ticks and house dust mites (repeat once a year)

Machine washable articles (blankets, quilts, and pillows): Wash infested fabrics at 60°C. When dry, spray for about 4-5 seconds every square meter. Blankets and quilts need to be sprayed only on one side. Do not wash fabrics after application.

Mattresses: Vacuum or steam clean and then spray onto all sides of the infested mattress for about 20 seconds (single size mattress) or 29 seconds (double size mattress). Leave the treated mattress in the room for at least 4 hours, then vacuum clean again before making the bed because dead mites are as allergenic as living mites.

Carpets and moquettes: Vacuum or steam clean and then spray infested carpets and moquettes for about 4-5 seconds every square meter. Leave the treated piece in the room for one day, then vacuum clean again because dead mites are as allergenic as living mites.–Do not wash the treated pieces after application. The product is not effective on infested thick woolen carpet against mites.

2.1.4.3 Use-specific risk mitigation measures

NO wet cleaning or washing of any surfaces in the wardrobe or clothing must take place after wardrobe treatment and during the storage period. After spraying the wardrobe is recommended to be kept closed.

2.1.4.4 Where specific to the use, the particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

See General directions for use

[8] Describe the necessary instructions for use like for example: period of time needed for the biocidal effect; the interval to be observed between applications of the biocidal product or between application and the next use of the product treated, or the next access by humans or animals to the area where the biocidal product has been used, including particulars concerning decontamination means and measures and duration of necessary ventilation of treated areas; particulars for adequate cleaning of equipment; particulars concerning precautionary measures during transport; precautions to be taken to avoid the development of resistance.

2.1.4.5 Where specific to the use, the instructions for safe disposal of the product and its packaging

See General directions for use

2.1.4.6 Where specific to the use, the conditions of storage and shelf-life of the product under normal conditions of storage

See General directions for use: Information is appropriate only under general directions for use and should not be repeated under specific and general directions for use.

2.1.5 General directions for use

2.1.5.1 Instructions for use[9]

- Always disperse the product uniformly.
- Do not damp fabrics.
- Read the instructions on the product.

Strategies for managing the development of resistance:

- Where possible, application treatments should be recommended to be combined with non-chemical measures
- Products should always be used in accordance with label recommendations
- Applications should always be made against the most susceptible stages in the pest life cycle
- Where an extended period of control is required, treatments should be alternated with products with different modes of action
- Levels of effectiveness should be monitored, and instances of reduced effectiveness should be investigated for possible evidence of resistance, noting that sanitary conditions and proximity of untreated refugia can contribute to the risk of re-infestation.
- In cases where label rates, correctly applied, fail to give the expected level of control and resistance is demonstrated, use of any product containing active substances with the same mode of action should cease.
- The users should inform if the treatment is ineffective and report straightforward to the authorization holder. The authorization holder should report any observed resistance incidents to the Competent Authorities (CA) or other appointed bodies involved in resistance management.

[9] Describe the necessary instructions for use like for example: period of time needed for the biocidal effect; the interval to be observed between applications of the biocidal product or between application and the next use of the product treated, or the next access by humans or animals to the area where the biocidal product has been used, including particulars concerning decontamination means and measures and duration of necessary ventilation of treated areas; particulars for adequate cleaning of equipment; particulars concerning precautionary measures during transport; precautions to be taken to avoid the development of resistance.

2.1.5.2 Risk mitigation measures

- Keep out of reach of children.
- Spray carefully pointing the nozzle away from your body from a distance of ca. 30 cm and only on surfaces and not in the air.
- Do not breathe the product spray.
- Do not contaminate food, drinking stuff or their containers, pharmaceuticals, cosmetics or fertilizers.
- During application remove people and animals from the room and cover fish tanks.
- Ventilate surroundings well after application.
- After usage or in case of contamination wash hand with water and soap.
- Do NOT wet clean or wash machine washable articles after treatment and during the storage period.

2.1.5.3 Particulars of likely direct or indirect effects, first aid instructions and emergency measures to protect the environment

Particulars of likely direct or indirect effects

- Contact with eyes: Irritating to eyes. There may be irritation and redness. The eyes may water profusely.
- Ingestion: High systemic doses may cause discomfort in the chest, bronchial hypersecretion, pulmonary oedema, tachycardia, low blood pressure, Palpitation, Vomiting, Diarrhoea, Abdominal pain, Nausea, Salivation, dizziness, blurred vision, headache, apathy, anorexia, somnolence, Coma, spasm, Convulsions, Tremors, ataxia, muscular fasciculation.
- Inhalation: Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
- Vapours may cause drowsiness and dizziness. Repeated exposure may cause skin dryness or cracking.
- May cause a transient itching and/or burning sensation in exposed human skin. Synthetic pyrethroids can produce paraesthesias. Typically, symptoms begin several hours after cutaneous exposure, peaks within 12 hours and resolves within about 24 hours. Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance.

First aid instructions

- Never give fluids or induce vomiting if patient is unconscious or having convulsions.
- Contact with skin: Wash with plenty of water and soap. Remove soiled clothes unless they are stuck to the skin.
- Contact with eyes: If eye contact occurs wash with water for at least 15 minutes and seek medical help.
- Ingestion: If the product is swallowed, seek medical advice showing the product's label. Do not induce vomiting. If vomiting occurs spontaneously place the head between the hips to avoid aspiration.
- Inhalation: Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
- Systemic treatment: Endotracheal intubation and gastric lavage, followed by administration of charcoal and sodium sulphate. Monitoring of respiratory and cardiac functions.
- Anti-convulsive therapy: Diazepam i.v. is the remedy of choice; barbiturates, e.g. phenobarbital and calcium gluconate, may also be used.
- There is no specific antidote.
- Contraindication: derivatives of adrenaline.
- Contraindication: atropine.
- Spontaneous recovery.

Accidental release measures

- If safe to do so, without overexposing anyone, try to stop the leak.
- Wear gloves, boots and body protection equipment if the product has to be gathered after dispersion on soil.
- Allow all volatiles to evaporate and keep clear from all ignition sources.
- Keep the area well ventilated.

Environmental precautions

- Prevent discharges into the environment (sewers, rivers, soils…).
- If water has been used to clean up avoid spillage in watercourses and sewerage system. If spillage occurs notify competent authorities.

- Collect the product with dry earth or sand using a shovel.
- Wash thoroughly with soap and water preventing the contaminated water from entering watercourses and sewers system.
- Place everything into a closed, labelled container compatible with the product.

2.1.5.4 Instructions for safe disposal of the product and its packaging

- Absorb small spills with dry materials such as sand and sweep up for disposal.
- Do not pierce or burn containers even if they are empty.
- Empty containers, unused product and other waste generated during the treatment are considered hazardous waste. Collect all waste material and place in closable, marked containers.
- Do not throw on unpaved floors, in watercourses, in the sink or in the drain
- Dispose of contents/container in accordance with local peripheral, national and international regulations.

2.1.5.5 Conditions of storage and shelf-life of the product under normal conditions of storage

- Shelf-life: Two years.
- Keep in a cool, dry area, avoid temperatures below 0°C and above 50°C, direct sunlight and any combustible material
- Store the containers in a vertical position and never horizontal.
- Keep in original packaging closed.
- Keep away from oxidizing material, acids and alkalis.
- Store indoors at ambient temperatures.
- Pressurized cans may explode if overheated and launched to a great distance.

Other information

Application codes

File I a: Main/Primary Target organisms to be controlled
Crawling target organisms:
Ixodes sp. – Hard ticks
Dermatophagoides pteronyssinus - House dust mites

Flying target organisms:
Tineola bisselliella - Clothes Moth

File I b: Target organisms to be controlled:
I.1.1.1 Ixodidae - Hard ticks
I.1.4.3. Pyroglyphidae - House dust mites
I.3.12.1 Tineidae - Moths

File II: Developmental stages of target organisms to be controlled:
II.1.1 Eggs
II.1.2 Larvae
II.1.3 Nymphs
II.1.4 Pupae
II.1.5 Imagines, Adults

File III: Function/Mode of action of AS/BP/ type of effect
III.1 Mode of exposure

III.1.3 contact

III.2 Type of effect (on individual pests)
III.2.1 Kill effect
III.2.2 Knock-Down Effect (not tested)

III.4. Duration of effect
III.4.1 Acute/short acting toxins

File IV: Field of use
IV.1 indoor use

IV.1.1. potential for contamination outdoors
IV.1.1.2 no
IV.1.2. potential for contamination of food
IV.1.2.2. no
IV 1. 3 To be used in /at:
IV 1.3.2 Households / private areas

File V: User category
V.1 non-professional user / consumer

File VI: Method of application
VI.1 Spraying
VI.1.1 Surface Spraying

File VII: Application aim
VII.2 Health protection
VII.3 Material protection

File VIII: Type of formulation
VIII.1 Aerosol

2.1.6 Packaging of the biocidal product

Type of packaging	Size/volume of the packaging	Material of the packaging	Type and material of closure(s)	Intended user (e.g. professional, non-professional)	Compatibility of the product with the proposed packaging materials (Yes/No)
Aerosol can	Size: Ø52 x 195 mm Total capacity: 405 mL Net liquid volume: 250 mL	Tinplate body, cone and dome, coated with gold lacquer	[redacted]	Non-professional	YES
Aerosol can	Size: Ø52 x 195 mm Total capacity: 405 mL Net liquid volume: 300 mL	Tinplate body, cone and dome, coated with gold lacquer	[redacted]	Non-professional	YES

Aerosol can	Size: Ø57 x 207 mm Total capacity: 520 mL Net liquid volume: 400 mL	Tinplate body, cone and dome, coated with gold lacquer	[redacted]	Non-professional	YES

The content of the cans can be calculated as presented in the following table:

Can size [mL]	**Filling volume [mL]**	[redacted]				
405.0	250.0					
405.0	300.0					
520.0	400.0					

Conclusion on the packaging of the biocidal product
Accelerated storage stability test at 54°C for 2 weeks and 24 months storage stability study at ambient temperature demonstrated compatibility with the package material Aerosol Can: tinplate body using epoxy phenolic resin-based coating, total capacity of 405 mL, net liquid volume 250 mL. All three commercial packages are aerosol cans using the same material. The only difference is the amount of the total capacity (405 to 520 mL) and the net liquid volume (250 to 400 mL). Therefore, the three proposed packagings are considered acceptable for commercial use.

2.1.7 Documentation

2.1.7.1 Data submitted in relation to product application

See Annex 3.1.

2.1.7.2 Access to documentation

Letters of access and supply are provided for the active substances Transfluthrin and Piperonyl Butoxide (relevant information is available on Section 13 of the active substance IUCLID data set on this active substance).

The Letters of Access cover all protected data listed in the Assessment Report as well as new data specified in the Letters of Access. Specifically, analytical methods for the compartments soil, water and air are included in these protected data and therefore covered by the Letters of Access.

2.2 Assessment of the biocidal product

2.2.1 Intended use(s) as applied for by the applicant

The product is only intended to be used in domestic premises. This is clearly stated on the product label and in the SPC.

For washable articles, no wet cleaning or washing should take place after treatment and during the storage period.

The application rates for are expressed as the weight of the product applied per square meter of the treated surface (grams of product / m2) or in grams of product per cubic meter of the wardrobe volume and in addition in seconds per treated surface or wardrobe unit. Confirmatory data concerning the exact correlation between the duration of spraying (e.g. in seconds) and the discharge rate after storage will be provided as part of the shelf life study.

Table 2. Use # 1 – Clothes moth control in wardrobes

Product Type	18
Where relevant, an exact description of the authorised use	Insecticide
Target organism (including development stage)	*Tineola bisselliella* (adults, larvae, eggs)
Field of use	Indoor use
Application method(s)	Spraying
Application rate(s) and frequency	30 g product/m³ or 45 g product/wardrobe; Apply every 3 months, max. 2 times per year The application of the product on the clothes must take place after they have been washed and dried. If the wardrobe has to be cleaned, it must be cleaned prior to application. No wet cleaning or washing of any surfaces in the wardrobe or clothing must take place after treatment and during the service life and storage period of 90 days. If it is planned to remove some of the clothes from the closet during the 3-month storage period, then the product should be applied on the closet's surface and not on the clothes. For a typical wardrobe of 1.5 m³, spray for 50 seconds in wardrobes on walls/panels or directly on clothing from a distance of about 30 cm, taking care not to damp the clothing. For larger wardrobes, prolong the spraying time appropriately. Application on the wardrobes walls/panels is effective against clothes moth adults. Application on clothing is effective against clothes moth adults, larvae, eggs.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300ml (186g) or 250ml (155g) or 400ml (248g), tinplate

Table 2. Use # 2 – Clothes moth control on carpets and moquettes

Product Type	18
Where relevant, an exact description of the authorised use	Insecticide
Target organism (including development stage)	*Tineola bisselliella* (adults, larvae, eggs)
Field of use	Indoor use
Application method(s)	Spraying
Application rate(s) and frequency	8 g product/m² or 176 g product/carpet of 22 m²; Vacuum or steam clean and then spray for about 9 seconds every square meter from a distance of 30 cm. Roll up the carpet/moquette and seal in plastic bags. The application is effective for up to 3 months. Repeat application once per year.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300ml (186g) or 250ml (155g) or 400ml (248g), tinplate

Table 3. Use # 3 – Ticks and mites control on machine washable articles (blankets, quilts, pillows)

Product Type	18
Where relevant, an exact description of the authorised use	Insecticide
Target organism (including development stage)	*Dermatophagoides pteronyssinus* (mixed population) *Ixodes ricinus* (adults)
Field of use	Indoor use
Application method(s)	Direct spraying onto infested surfaces.
Application rate(s) and frequency	4 g product/m² (blankets, quilts, pillows); For example: 17 g product/small blanket of 4.25m² and 23 g product/large blanket of 5.75m²; Wash infested fabrics at 60°C. When dry, spray for about 4-5 seconds every square meter from a distance of 30 cm. Spray onto one side of the blanket or quilt only. Repeat application once per year. No wet cleaning or washing should take place after treatment and during the storage period.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300ml (186g) or 250ml (155g) or 400ml (248g), tinplate

Table 4. Use # 4 – Ticks and mites control on mattresses

Product Type	18
Where relevant, an exact description of the authorised use	Insecticide
Target organism (including development stage)	*Dermatophagoides pteronyssinus* (mixed population) *Ixodes ricinus* (adults)
Field of use	Indoor use
Application method(s)	Direct spraying onto infested surfaces.
Application rate(s) and frequency	4 g product/m² or 18 g product/single size mattress of 4.54 m² or 26 g product/double size mattress of 6.44 m²; Vacuum or steam clean and then spray on infested mattress for 4-5 seconds every square meter (20 seconds per single size mattress or 29 seconds per double size mattress) from a distance of 30 cm. Leave the treated mattress in the room for at least 4 hours, then vacuum clean again before making the bed because dead mites are as allergenic as live mites. Repeat application once per year.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300ml (186g) or 250ml (155g) or 400ml (248g), tinplate

Table 5. Use # 5 – Ticks and mites control on carpets and moquettes

Product Type	18
Where relevant, an exact description of the authorised use	Insecticide
Target organism (including development stage)	*Dermatophagoides pteronyssinus* (mixed population) *Ixodes ricinus* (adults)

Field of use	Indoor use
Application method(s)	Direct spraying onto infested surfaces.
Application rate(s) and frequency	4 g product/m²; or 88 g product/carpet of 22 m²; Vacuum or steam clean and then spray infested carpets and moquettes for about 4-5 seconds every square meter from a distance of 30 cm. Leave the treated piece in the room for one day, then vacuum clean again because dead mites are as allergenic as live mites. Repeat application once per year. Do not wash the treated pieces after application. On thick woollen carpets, the product is effective only against ticks.
Category(ies) of users	Non-professionals
Pack sizes and packaging material	Aerosol can, 300ml (186g) or 250ml (155g) or 400ml (248g), tinplate

The application rates and frequencies are summarized in the following table:

Use scenario	**Application rate**	**Product per application**	**Application frequency**
Use #1	30 g/m³	112.5 g/ 2.5 wardrobes	2/a
Use #2	8 g/m²	176 g/22 m²	1/a
Use #3	4 g/m²	2 x 17 g/4.25 m² + 1 x 23 g/5.75 m² = 57 g	1/a
Use #4	4 g/m²	2 x 18 g/4.54 m² + 1 x 26 g/6.44 m² = 62.08 g	1/a
Use #5	4 g/m²	88 g/22 m²	1/a

2.2.2 Physical, chemical and technical properties

Aroxol Antimoth Antiacari Spray is an insecticide aerosol dispenser. The content of the dispenser without propellant is a colorless liquid with medium perfume odour. [redacted]

The product is stable during accelerated storage stability test for 2 weeks at 54 ºC and 24 months storage at ambient temperature, using commercial packaging for storage condition test.

The product is not expected to have explosive or oxidising properties, nor to be self-igniting. The product is a spray aerosol product classified according to ECHA Guidance on the Application of the CLP criteria as: 'Aerosol Category [redacted].

Property	**Guideline and Method**	***Purity of the test substance % (w/w) / Details on test item**	**Results**	**Reference**	**Acceptability**
Physical state at 20°C and 101.3 kPa	EPA OPPTS 830.6303 (Physical State); Visual inspection	Liquid phase without propellant [redacted]	liquid	[redacted] (2018a) GLP	**Acceptable**
Colour at 20°C and 101.3 kPa	equivalent or similar to EPA OPPTS 830.6302 (Color) Deviation: no colour systems/scales were used Visual inspection	Liquid phase without propellant [redacted]	clear, colorless [redacted]	[redacted] (2018a) GLP	**Acceptable**
Odour at 20°C and 101.3 kPa	EPA OPPTS 830.6304 (Odor) comparison to other characteristic odours	Liquid phase without propellant [redacted]	medium perfume odour [redacted]	[redacted] (2018a) GLP	**Acceptable**
Acidity / alkalinity	CIPAC MT 75 (Determination of pH Values) pH-meter	Liquid phase without propellant [redacted]	[redacted]	[redacted] (2018a) GLP	**Acceptable**
Relative density / bulk density	EU Method A.3 (Relative Density) (oscillating densitometer0	Liquid phase without propellant [redacted]	[redacted]	[redacted] (2018a) GLP	**Acceptable**
Storage stability test	CIPAC MT 46.3 (Storage	The aerosol cans	[redacted]	[redacted]	**Acceptable**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
– **accelerated storage**	Stability) accelerated testing (2 weeks at 54°C) The analytical method to determine the active substance content was validated and is reported in section 2.2.4. The methods for other individual parameters are described in the relevant sections.	were stored containing the product with propellant,	The test items were stored at 54°C +/- 2°C for 2 weeks.	(2018a) GLP	

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted]		

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted]		

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted]		
Storage stability test – **long term storage at ambient temperature**	CIPAC MT 46.3 (Storage Stability) 12, 24, 36 months at ambient testing. The final report after 36 months will be available in June 2021.	The aerosol cans are being stored containing the product with propellant.	Appearance: The test item consists of a clear colourless homogeneous liquid with medium perfume odour at start. It remained unchanged after 24 months storage at 20°C. Packaging stability: After 24 months at 20°C, all samples remained in sound conditions, sealed and without leakages, ballooning or panelling, dimensional stable. [redacted]	[redacted] (2020a) GLP	**Acceptable**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted] Active substance contents: No changes after storage for 24 months at 20°C. [redacted]		
Storage stability test – **low temperature stability test for liquids**	-	-	The low temperature storage does not need to be addressed according to Guidance on the Biocidal Products Regulation [redacted].		**Acceptable** **RefMS:** **To be added in the label: "protect from frost"**
Effects on content of the active substance and technical characteristics of the biocidal product - **light**	CIPAC MT 46.3 (Storage Stability) accelerated testing (2 weeks at 54°C) GLP	Not applicable	[redacted] the effect of light is not relevant.		**Acceptable**
Effects on content of the active substance and technical characteristics of the biocidal product – **temperature and humidity**	CIPAC MT 46.3 (Storage Stability) accelerated testing (2 weeks at 54°C)	The aerosol cans were stored containing the product with propellant, [redacted]	[redacted] the effect of humidity is not relevant.	[redacted] (2018a) GLP	**Acceptable**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
Effects on content of the active substance and technical characteristics of the biocidal product - **reactivity towards container material**	CIPAC MT 46.3 (Storage Stability) accelerated testing (2 weeks at 54°C)	The aerosol cans were stored containing the product with propellant, [redacted]	No appreciable changes in the packaging stability of the test item were observed (see Storage stability test – accelerated storage).	[redacted] (2018a) GLP	**Acceptable**
Effects on content of the active substance and technical characteristics of the biocidal product - **Discharge rate**	European Aerosol Federation (FEA) Standard 643. Deviation: higher accuracy was used, acclimatization time was longer	Product with propellant, [redacted]	[redacted] It can be extrapolated that during a spraying time of 4-5 seconds, 3,6-4,5 g of the biocidal product is released (application rate). [redacted]	[redacted] (2018a) GLP	**Acceptable**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted]		
Effects on content of the active substance and technical characteristics of the biocidal product - **Clogging and residue after use**	FAO/WHO: 8.11.45 Clogging of Aerosol dispensers Deviation: FAO/WHO method combined with determination of the residue after use visually inspected for clogging, weighing of can for determination of residue	Product with propellant, [redacted]	[redacted] No clogging of aerosol dispenser valves was observed [redacted] [redacted] • [redacted]	[redacted] (2018a) GLP	**Acceptable**
Effects on content of the active substance and technical	European Aerosol Federation Standard: (FEA) 604; (FEA) 606	Product with propellant, [redacted]	The pressure is tested in a water bath at 20°C and 50°C (acclimatized in a water bath for at least 30 minutes) with two test items at each test time., thus simulating real and worst case conditions and	[redacted] (2018a)	**Acceptable**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
characteristics of the biocidal product - **Pressure in finished aerosol packs**		[redacted]	covering the FAO requirement of 30°C. [redacted]	GLP	
Wettability			Data waiving. Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Suspensibility, spontaneity and dispersion stability			Data waiving. Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Wet sieve analysis and dry sieve test			Data waiving. Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Emulsifiability, re-emulsifiability and emulsion stability			Data waiving. Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Disintegration time			Data waiving. Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Particle size distribution, content of dust/fines, attrition, friability	CIPAC MT187 (using laser diffraction droplet size analysis) Deviation: mathematic evaluation model "mie theory" was used instead of "Fraunhofer model". (Malvern Instruments GmbH; Spraytec RTS 5006 with workstation (RT-sizer Version 5.51) and Spraytec STP5311 with software Spraytec version 3.30)	Product with propellant, [redacted]	**Particle size distribution** The determination of particle size distribution was conducted with three test items at start of the study and after 2 years of storage at ambient temperature. Five measurements were conducted per test item. [redacted]	[redacted] (2018a) GLP [redacted] (2020a) GLP	**Acceptable for aerosol**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted]		
Persistent foaming			Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
Flowability/Pourability/Dustability			Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Burning rate — smoke generators			Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Burning completeness — smoke generators			Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Composition of smoke — smoke generators			Not applicable to aerosols according to Guidance on the Biocidal Products Regulation.		**N/A**
Spraying pattern — aerosols	European Aerosol Federation (FEA) Standard 644. Deviation: without apparatus to keep distance and time for spraying Visual; measuring diameter with ruler	Product with propellant, [redacted]	The spray pattern of the test item was determined [redacted]	[redacted] (2018a) GLP	**Acceptable**
Physical compatibility			Not relevant. No co-application with other substances/products intended.		**N/A**
Chemical compatibility			Not relevant. No co-application with other substances/products intended.		**N/A**
Degree of dissolution and dilution stability			Not relevant. No co-application with other substances/products intended.		**N/A**
Surface tension	EU Method A.5 (Surface Tension) (ring method)	Liquid phase without propellant, [redacted]	[redacted] The surface tension of the neat formulation was determined [redacted].	[redacted] (2018a) [redacted] (2020a) GLP	**Acceptable**
Viscosity	CIPAC MT 192 OECD Test Guideline 114 (using rotational viscometer for dynamic viscocity measurement)	Liquid phase without propellant, [redacted]	[redacted]	[redacted] (2018a) [redacted] (2019a)	**Acceptable**

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted] The viscosity has been measured [redacted] [redacted] [redacted] [redacted]	GLP	

Property	Guideline and Method	*Purity of the test substance % (w/w) / Details on test item	Results	Reference	Acceptability
			[redacted]		

Conclusion on the physical, chemical and technical properties of the product
Physical-chemical properties:

The content of the dispenser without propellant is a colourless liquid with medium perfume odour. [redacted]

Aerosol spray characteristics:

The contents are ejected in a liquid state. [redacted]

Storage stability:

The product is stable for 2 weeks at 54°C (accelerated storage) and for a shelf life of two years (long term storage) when stored in its acceptable container: tinplate aerosol can.

No significant changes in the content of the active ingredient, weight variation and packaging were found after accelerated and 2 years storage stability tests.

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

Conditions of storage:

"Do not store over 50°C" and "Protect from frost" should be proposed on the label.

2.2.3 Physical hazards and respective characteristics

The propellant affects only the classification of the product as Aerosol, Category 1.

Property	Guideline and Method	Purity of the test substance (% w/w)	Results	Reference	Acceptability
Explosives	Expert statement based on the components of the BP	Not applicable	[redacted] The spray aerosol product does not possess any explosive properties and is not classified as explosive. [redacted]	[redacted] (2019b)	**Acceptable** Not explosive
Flammable gases			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**
Flammable aerosols	Expert statement based on the components of the BP	Not applicable	[redacted] Therefore, the spray aerosol product is classified as '**Aerosol, Category 1'**, Extremely Flammable Aerosol, H222; Pressurised container: May burst if heated, H229; the pictogram GHS02 is assigned and the signal word 'Danger', based on ECHA Guidance on the Application of the CLP criteria.	[redacted] (2019b)	**Acceptable** **Classified with hazard statements: Extremely Flammable Aerosol, H222; and Pressurised container: May burst if heated, H229; pictogram GHS02 and the signal word Danger is also assigned**
Oxidising gases	Expert statement based on the components of the BP	Not applicable	[redacted] Conclusion The spray aerosol product is not classified in the class of Oxidizing gases.	[redacted] (2019b)	**Acceptable**
Gases under pressure			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**
Flammable liquids			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**

Property	Guideline and Method	Purity of the test substance (% w/w)	Results	Reference	Acceptability
Flammable solids			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**
Self-reactive substances and mixtures	Expert statement based on the components of the BP	Not applicable	[redacted] Conclusion The product is not classified in the class of self-reactive substances and mixtures.	[redacted] (2019b)	**Acceptable**
Pyrophoric liquids	Expert statement based on the components of the BP	Not applicable	[redacted] Conclusion The product is not classified in the class of pyrophoric liquids.	[redacted] (2019b)	**Acceptable**
Pyrophoric solids			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**
Self-heating substances and mixtures	Expert statement based on the components of the BP	Not applicable	[redacted] Conclusion The product is not classified in the class of self-heating substances and mixtures.	[redacted] (2019b)	**Acceptable**
Substances and mixtures which in contact with water emit flammable gases	Expert statement based on the components of the BP	Not applicable	[redacted]	[redacted] (2019b)	**Acceptable**

Property	Guideline and Method	Purity of the test substance (% w/w)	Results	Reference	Acceptability
			Conclusion The product is not classified in the class of substances and mixtures which in contact with water emit flammable gases.		
Oxidising liquids	Expert statement based on the components of the BP	Not applicable	[redacted]. Conclusion The spray aerosol product is not classified in the class of Oxidizing liquids.	[redacted] (2019b)	**Acceptable**
Oxidising solids			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**
Organic peroxides			No organic peroxides in the BP		**Acceptable**
Corrosive to metals	UN Guideline Test Method C.1, Section 37.4	A combined Liquid phase from 5 test items Batch No. 02/07/2020	[redacted] Therefore, the product is not considered corrosive in the sense of the guideline.	[redacted] (2020b) GLP	**Acceptable**
Auto-ignition temperatures of products (liquids and gases)	Expert statement based on the components of the BP	Not applicable	[redacted] the auto-ignition temperature is not relevant for this spray aerosol product, [redacted].	[redacted] (2019b)	**Acceptable**
Relative self-ignition temperature for solids	Expert statement based on the components of the BP	Not applicable	Not applicable to liquid aerosols [redacted].	[redacted] (2019b)	**Acceptable**
Dust explosion hazard			Not applicable to aerosols (Guidance on the Application of the CLP Criteria, Version 5.0 – July 2017).		**N/A**

Conclusion on the physical hazards and respective characteristics of the product

The safety relevant physico-chemical properties of the biocidal product have been evaluated.

The product is not expected to have explosive or oxidising properties, nor to be self-igniting. The product is not corrosive to metals.

The product is a spray aerosol product classified according to ECHA Guidance on the Application of the CLP criteria Version 5.0 July 2017 as: '**Aerosol Category 1**', Extremely Flammable Aerosol, H222; Pressurised container: May burst if heated, H229; the pictogram GHS02 is assigned and the signal word 'Danger'.

2.2.4 Methods for detection and identification

Analytical methods for the analysis of the product as such including the active substance, impurities and residues						
Reference [redacted] (2018b).						
Analyte (active substance)	**Analytical method**	**Linearity**	**Precision**	**Recovery rate (%)**	**Specificity**	**Limit of quantification (LOQ)**
Transfluthrin[10]	gas chromatography with flame ionization detection (GC-FID)	detector response was linear y= 0.76554779x-0.00265983 (r^2= 1.00) within the range of 0.09816 - 0.2618 mg/mL 6 concentration levels	RSD 0.73 % (n=6) C=0,1% Acceptable according to modified Horwitz equation	Fortification levels: 70%, 100%, 130% Number of measurments: Overall 9 recoveries (3 per fortification level) Overall Range 101.3-102.7 Mean 101.7, 102.1, 101.7 (Overall Mean 101.8) RSD 0.3, 0.5, 0.1 (Overall RSD 0.4)	Specific, interference from other substances < 3% of total peak area	Not applicable
Piperonyl Butoxide[11]	gas chromatography with flame ionization detection (GC-FID)	detector response was linear y=0.920755554x-0.000339811 (r^2= 1.00) within the range of 0.09348 - 0.2493 mg/mL 6 concentration levels	RSD 0.75 % (n=6) C=0,1% Acceptable according to modified Horwitz equation	Fortification levels: 70%, 100%, 130% Number of measurments: Overall 9 recoveries (3 per fortification level) Overall Range 98.9-100 Mean 99.0, 99.5, 99.2 (Overall Mean 99.2) RSD 0.1, 0.4, 0.0 (Overall RSD 0.3)	Specific, interference from other substances < 3% of total peak area	Not applicable

The contents of the active substances in the test items were determined using gas chromatography with flame ionization detection according to Method MV182.
Validation parameters and acceptance criteria are in conformity with the requirements according to the European Commission document SANCO/3030/99 rev.4 11/07/2000.

[redacted]

10 According to the Assessment Report, no relevant impurities or additives are present in the active substance as manufactured.

11 According to the Assessment Report, in the WG III (May 2016) it was decided that a justification or storage stability data must be submitted to prove that relevant impurity methyl dihydrosafrole is not formed during storage in the formulation.
Since the relevant impurities (exept methyl dihydrosafrole) are not formed during storage, the WG members concluded that the methods for monitoring the relevant impurities in the biocidal product are not required under the BPR.

[redacted]

Conclusion on the methods for detection and identification of the product
The GC-FID analytical method was found to be valid [redacted] for the determination of transfluthrin and Piperonyl Butoxide, in Aroxol aerosol formulation. [redacted]

Analytical methods for monitoring									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Same as "Analytical methods for the analysis of the product as such including the active substance, impurities and residues".									

Analytical methods for soil									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Covered by information on the active substances: [redacted]									

[redacted]

Analytical methods for air									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Covered by information on the active substances: [redacted]									

Analytical methods for water									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Covered by information on the active substances: [redacted]									

[redacted]

Analytical methods for animal and human body fluids and tisues									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Covered by information on the active substances: [redacted]									

Analytical methods for monitoring of active substances and residues in food and feeding stuff									
Analyte (type of analyte e.g. active substance)	**Analytical method**	**Fortification range / Number of measurements**	**Linearity**	**Specificity**	**Recovery rate (%)**			**Limit of quantification (LOQ) or other limits**	**Reference**
					Range	Mean	RSD		
Exposure Not required since the biocidal product will not be used on any food or feed of plant or animal origin and since indirect exposure due to contaminated food is negligible.									

Conclusion on the methods for detection and identification of the product

Acceptable validated analytical methods are available for detection of transfluthrin and piperonyl butoxide in soil, air and water [redacted]

Analytical methods for the detection of transfluthrin and piperonyl butoxide in body fluids and tissues, and residues in food and feeding stuff or further data are not required.

2.2.5 Efficacy against target organisms

2.2.5.1 Function and field of use

Function

Main group 3: Pest control.

EU BPR Product type 18: Insecticides, acaricides and products to control other arthropods.

Aroxol Antimoth Antiacari Spray is a transfluthrin (0.1 % w/w) and a piperonyl butoxide (0.1 % w/w) based aerosol dispenser. The product is intended for use indoors in domestic premises.

Fields of use

The BP will be used indoors by non-professionals to control clothes moths in private houses. The overall use pattern is described in chapter 2.1.4

2.2.5.2 Organisms to be controlled and products, organisms or objects to be protected

The product is an insecticide for the control of eggs, larvae and adults of clothes moth (*Tineola bisselliella*) by applications indoor by non-professionals.

Organisms or objects to be protected are clothes (in wardrobes) or carpets against damage by moths.

2.2.5.3 Effects on target organisms, including unacceptable suffering

Aroxol Antimoth Antiacari Spray is intended to be used by non-professionals, indoors, in domestic premises. Aroxol Antimoth Antiacari Spray acts on harmful organisms by contact resulting in death.

2.2.5.4 Mode of action, including time delay

In insects, the active ingredient transfluthrin of the biocidal product shows acute neurotoxic action. It inhibits the sodium channels and causes a prolonged sodium influx during the phase of agitation. In consequence the influx produces a constant nerve discharge. This causes a strong and quick knock-down effect which in the end leads to the death of most of the target organism. The main route of entry of the volatile product is done by entering the tracheal system, circulation and subsequently absorptionby the body tissue.

The mode of action of Piperonyl Butoxide is complex. According to the literature, Piperonyl Butoxide stabilises the co-applied insecticide inside the insect body and potentiates more toxins to reach their target molecules. This results in an increased mortality of the target organism, and likewise, the same effect may be observed by using decreased amounts of insecticide, i.e. synergism. There is strong evidence from the literature, that Piperonyl Butoxide inhibits the oxidative and esterase-based metabolism (detoxification) of the co-applied insecticide. Therefore, Piperonyl Butoxide delays the degradation of co-applied insecticidal substances and thereby prolongs the potential action of the compounds. According to the literature Piperonyl Butoxide is usually applied at a dose that on its own is sublethal to the target species. When Piperonyl Butoxide is applied in combination with a

known toxicant, the performance of the latter is enhanced at a rate that becomes lethal when on its own would be sublethal. Nevertheless, Piperonyl Butoxide on its own can exhibit some toxic effects, and hence at sublethal doses is likely to exert some stress on the insect. According to the results of the submitted laboratory efficacy studies and a publication, Piperonyl Butoxide exerts innate lethal effect against houseflies, mosquitoes, cockroaches and house dust mites.

For more details, it is referred to the Assessment Reports of the active substances.

2.2.5.5 Efficacy data

An overview by the applicant on the laboratory and simulated use trials and their respective application rates in relation to the claim of the individual uses are presented in the following table:

Use #	Laboratory tests	Simulated use tests	Recommended application rate
Use #1a Clothes moth Treatment of clothes	[redacted]	[redacted]	30 g/m³ = 45 g/1.5 m³ wardrobe 15 g per experimental 0.5 m³ cabinet can be extrapolated to 45 g/1.5 m³ wardrobe.
Use #1b Clothes moth Treatment of surfaces	[redacted]	[redacted]	30 g/m³ = 45 g/1.5 m³wardrobe 15 g per experimental 0.5 m³ cabinet can be extrapolated to 45 g/1.5 m³ wardrobe.

Use #	Laboratory tests	Simulated use tests	Recommended application rate
Use #2 Clothes moths Treatment of carpets	[redacted]	[redacted]	8 g/m² of carpet
Use #3 #4 #5 Ticks and mites on various fabrics and carpet	[redacted]	[redacted]	4 g/m² of various fabrics
	[redacted]	[redacted]	4 g/m² of various fabrics

The individual laboratory and simulated use trials for Use #1 are presented in the following table:

Use #1 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
Insecticide (PT18), protecting fabrics against moths by killing moths	Use #1a: Spraying on clothes indoor, non-professionals	Aroxol Antimoth Antiacari Spray [redacted] **(old and new formulation)**	*Tineola bisselliella*, Clothes moths (Mixed sex adults, larvae, eggs) Laboratory strain	Laboratory test	[redacted]	[redacted]	[redacted] (2018a),

Use #1 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
Insecticide (PT18), protecting clothes against moths by killing moths	Use #1a: Spraying on clothes within wardrobes, indoor, non-professionals	Aroxol Antimoth Antiacari Spray [redacted] (old formulation)	*Tineola bisselliella*, Clothes moths (Mixed sex adults, larvae, eggs) Laboratory strain	Simulated use test	[redacted]	[redacted]	[redacted] (2016a),

Use #1 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
					[redacted]		
Insecticide (PT18), protecting clothes against moths by killing moths	Use #1b: Spraying on surfaces within wardrobes, indoor, non-professionals	Aroxol Antimoth Antiacari Spray [redacted] **(old and new formulation)**	*Tineola bisselliella*, Clothes moths (Mixed sex adults) Laboratory strain	Laboratory test	[redacted]	[redacted]	[redacted] (2018b), [redacted]

Use #1 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
					[redacted]		
Insecticide (PT18), protecting clothes against moths by killing moths	Use #1b: Spraying on surfaces within wardrobes, indoor, non-professionals	Aroxol Antimoth Antiacari Spray [redacted]	*Tineola bisselliella*, Clothes moths (Mixed sex adults) Laboratory strain	Simulated-use test	[redacted]	[redacted]	[redacted] (2016b),

The individual laboratory and simulated use trials for Use #2 are presented in the following table:

Use #2 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
Insecticide (PT18), protecting carpets against moths by killing moths	Use #2: Spraying on carpets, indoor, non-professionals	Aroxol Antimoth Antiacari Spray (new formulation)	*Tineola bisselliella*, Clothes moths (Mixed sex adults, larvae, eggs) Laboratory strain	Laboratory test	[redacted]	[redacted]	[redacted] (2018c),
Use #2 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**

Insecticide (PT18), protecting carpets against moths by killing moths	Use #2: Spraying on carpets, indoor, non-professionals	Aroxol Antimoth Antiacari Spray (new formulation)	*Tineola bisselliella*, Clothes moths (Mixed adults, larvae, eggs) Laboratory strain	Simulated-use test	[redacted]	[redacted]	[redacted] (2018d),

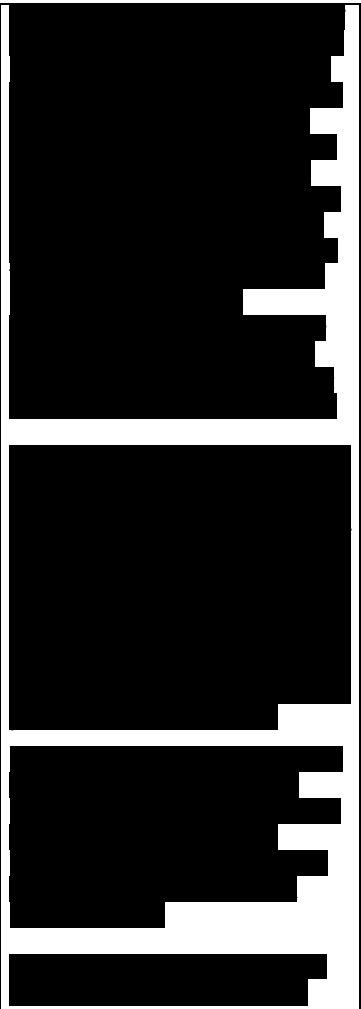
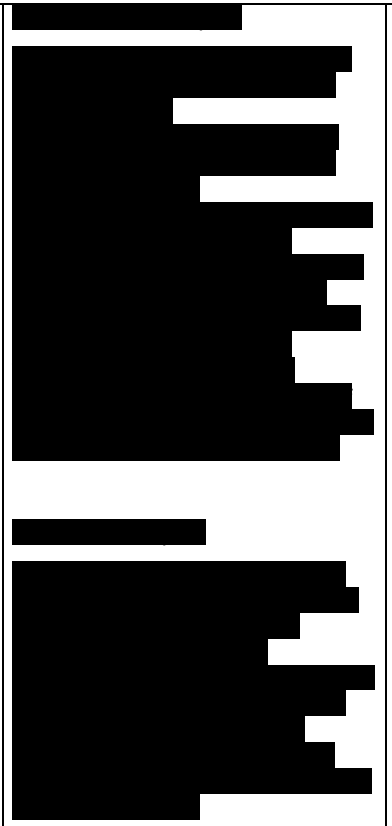
The individual laboratory and simulated use trials for Uses #3, #4 and #5 are presented in the following table:

Use #3 #4 #5 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**
Insecticide (PT18), protecting fabrics against ticks and mites by killing ticks and mites	Use #3,#4,#5: Spraying on fabrics, indoor, non-professionals	Aroxol Antimoth Antiacari Spray (old formulation)	*Ixodes ricinus,* European sheep tick, (adults, mixed sex) *Dermatophagoides pteronyssinus,* House dust mite (mixed population) Laboratory strains	Laboratory test	[redacted]	[redacted]	[redacted] (2016c),
Use #3 #4 #5 - Experimental data on the efficacy of the biocidal product against target organism(s)							
Function	**Field of use envisaged**	**Test substance**	**Test organism(s)**	**Test method**	**Test system / concentrations applied / exposure time**	**Test results: effects**	**Reference**

Insecticide (PT18), protecting fabrics against ticks and mites by killing ticks and mites	Use #3,#4,#5: Spraying on fabrics indoor, non-professionals	Aroxol Antimoth Antiacari Spray (New formulation)	*Ixodes ricinus,* European sheep tick, (adults, mixed sex) *Dermatophagoides pteronyssinus,* House dust mite (mixed population) Laboratory strains	Laboratory test	[redacted]	[redacted]	[redacted] (2018e),

Insecticide (PT18), protecting fabrics against ticks and mites by killing ticks and mites	Use #3,#4,#5: Spraying on infested surfaces/fabrics indoor, non-professionals	Aroxol Antimoth Antiacari Spray (New formulation)	*Ixodes ricinus,* European sheep tick, (adults, mixed sex) *Dermatophagoides pteronyssinus,* House dust mite (mixed population) Laboratory strains	Laboratory test	[redacted]	[redacted]	[redacted] (2020a),

Insecticide (PT18), protecting fabrics against ticks and mites by killing ticks and mites	Use #3,#4,#5: Spraying on infested surfaces/fabrics indoor, non-professionals	Aroxol Antimoth Antiacari Spray (New formulation)	*Ixodes ricinus,* European sheep tick, (adults, mixed sex) *Dermatophagoides pteronyssinus,* House dust mite (mixed population) Laboratory strains		[redacted]	[redacted]	[redacted] (2020b),

Conclusion on the efficacy of the product

Several efficacy studies (laboratory and simulated use studies) were submitted by the applicant with Aroxol Anti-moth Anti-acari Spray containing transfluthrin 0.1% and PBO 0.1%, to support the intended uses of the product against the claimed target organisms.

Two bridging laboratory studies were also submitted supporting the equivalence of the old and new formulation [redacted], in terms of their efficacy against a representative target species, namely clothes moth (*Tineola bisselliella*).

Based on the results of the submitted efficacy studies, the product was effective when applied indoors, in domestic premises, by non-professionals as:

- Spray directly on clothing against adults, larvae and eggs of the clothes moth *Tineola bisselliella* (Intended use 1a) at 30 g product/m³ or 45 g product/wardrobe of 1.5 m^3 (50 seconds spray) from 30 cm distance, for 3 months after treatment.
- Spray on wardrobes walls/panels against adults of the cloth moth *Tineola bisselliella* (Intended use 1b) at 30 g product/m³ or 45 g product/wardrobe of 1.5 m^3 (50 seconds spray) from 30 cm distance, for 3 months after treatment.
- Spray onto carpets and moquettes to protect them against adults, larvae and eggs of the clothes moth *Tineola bisselliella* (Intended Use 2) at 8 g product/m² or 76 g product/carpet of 22 m². Vacuum or steam clean and then spray for about 9 seconds every square meter from a distance of 30 cm. Roll up the carpet/moquette and seal in plastic bags. The application is effective for up to 3 months.
- Spray directly on infested machine washable articles (blankets, quilts, pillows) to control ticks and mites (Intended use 3) at 4 g product/m² (4-5 seconds/m²) from 30 cm distance, for immediate effect.
- Spray directly on infested mattresses to control ticks and mites (Intended use 4) at 4 g product/m² (4-5 seconds/m²) from 30 cm distance, for immediate effect.
- Spray directly on infested carpets and moquettes to control ticks and mites (Intended use 5) at 4 g product/m² (4-5 seconds/m²) from 30 cm distance, for immediate effect. The product is not effective on thick woolen carpet against mites.

In the intended use 5, a limitation for ineffectiveness of spray treatements onto infested thick woolen carpets against mites is proposed due to the low mortality (73%) recorded after treatment on thick woolen carpets infested with mites in 24 hours, according to the simulated use study by [redacted] 2020b. Nevertheless, acceptable efficacy level (91% mortality in 24 hours) was achieved after treatment of infested dense felt carpet surfaces ([redacted] 2020b), to support efficacy of the product when applied on infested carpets against mites.

2.2.5.6 Occurrence of resistance and resistance management

According to the applicant, no resistance to the two active substances is known.
However, generally, resistance is well known to be a potential problem and strategies to avoid resistance are normal practice.
The principles of strategies for managing the development of resistance are similar for Transfluthrin as they are for other synthetic pyrethroids:

- Where possible, application treatments should be recommended to be combined with non-chemical measures
- Products should always be used in accordance with label recommendations
- Applications should always be made against the most susceptible stages in the pest life cycle
- Where an extended period of control is required, treatments should be alternated with products with different modes of action
- Levels of effectiveness should be monitored, and instances of reduced effectiveness should be investigated for possible evidence of resistance, noting that sanitary conditions and proximity of untreated refugia can contribute to the risk of re-infestation.
- In cases where label rates, correctly applied, fail to give the expected level of control and resistance is demonstrated, use of any product containing active substances with the same mode of action should cease.
- The users should inform if the treatment is ineffective and report straightforward to the authorization holder. The authorization holder should report any observed resistance incidents to the Competent Authorities (CA) or other appointed bodies involved in resistance management.

2.2.5.7 Known limitations

According to the applicant, no limitations on efficacy are known and no observations on undesirable or unintended side effects have been made.

2.2.5.8 Evaluation of the label claims

According to the submitted PAR and SPC, the intended uses (label claims) as applied for by the applicant including target organisms, dose rates and application methods for Aroxol Antimoth Antiacari Spray are as follows:

Use #	Label claim and recommendation	Evaluation of the label claims
Use #1 Clothes moth control in wardrobes	30 g product/m³ or 45 g product/wardrobe; Apply every 3 months, max. 5 times per year The application of the product on the clothes must take place after they have been washed and dried. No wet cleaning or washing should take place after treatment and during the storage period. If it is planned to remove some of the clothes from the closet during the 3-month storage period, then the product should be applied on the closet's surface and not on the clothes. For a typical wardrobe of 1.5 m³, spray for 50 seconds in wardrobes on walls/panels or directly on clothing from a distance of about 30 cm, taking care not to damp the clothing. For larger wardrobes, prolong the spraying time appropriately.	The following laboratory and simulated use tests were performed: [redacted] The application rate in all tests was 30 g BP/m³, equivalent to 45 g BP per wardrobe of 1.5 m³. The tests covered the treatment of clothes as well as the treatment of surfaces in the wardrobe. The aerosol can was help upright and spraying was done from a 30 cm distance. The treated cloth or surfaces were not cleaned during the test. [redacted]
Use #2 Clothes moth control on carpets and moquettes	8g product/m² or 176g product/carpet of 22m²; once a year Vacuum or steam clean and then spray for about 9 seconds every square meter. Roll up the carpet/moquette and seal in plastic bags. Repeat application once per year.	The following laboratory and simulated use tests were performed: [redacted] The application rate in all tests was 8 g BP/m². The aerosol can was help upright and spraying was done from a 30 cm distance. In the simulated use trial, the treated carpet was rolled up and stored in a plastic bag. [redacted]

Use #	Label claim and recommendation	Evaluation of the label claims
Use #3 Ticks and mites control on machine washable articles (blankets, quilts, pillows)	4g product/m² (blankets, quilts, pillows); For example: 17g product/small blanket of 4.25m² and 23g product/large blanket of 5.75m²; Wash fabrics at 60°C. When dry, spray for about 4-5 seconds every square meter. Spray onto one side of the blanket or quilt only. Repeat application once per year. No wet cleaning or washing should take place after treatment and during the storage period.	The following laboratory and simulated use tests were performed: [redacted] The application rate in the laboratory and in the simulated use test was 4 g BP/m². The aerosol can was help upright and spraying was done from a 30 cm distance onto infested surfaces. [redacted]
Use # 4 Ticks and mites control on mattresses	4g product/m² or 18g product/single size mattress of 4.54m² or 26g product/double size mattress of 6.44m²; Vacuum or steam clean and then spray on mattress for 4-5 seconds every square meter (20 seconds per single size mattress or 29 seconds per double size mattress). Leave the treated mattress in the room for at least 4 hours, then vacuum clean again before making the bed because dead mites are as allergenic as live mites. Repeat application once per year.	The following laboratory and simulated use tests were performed: [redacted] The application rate in the laboratory and in the simulated use test was 4 g BP/m². The aerosol can was help upright and spraying was done from a 30 cm distance onto infested surfaces. [redacted]
Use # 5 Ticks and mites control on carpets and moquettes	4g product/m²; or 48g product/carpet of 12m²; Vacuum or steam clean and then spray for about 4-5 seconds every square meter. Leave the treated piece in the room for one day, then vacuum clean again because dead mites are as allergenic as live mites. Repeat application once per year.	The following laboratory and simulated use tests were performed: [redacted] The application rate in the laboratory and in the simulated use test was 4 g BP/m². The aerosol can was help upright and spraying was done from a 30 cm distance onto infested surfaces. [redacted]

Use #	Label claim and recommendation	Evaluation of the label claims
		[redacted]

Trials submitted by the applicant to substantiate label claims

Use #1

In the laboratory study by [redacted] (2018a, [redacted]), a bridging test was carried out between the old ([redacted]) and the new ([redacted]) formulation. Both products were applied on woolen cloths at a dose of 56 g product /m^2 from a distance of 30 cm and then, eggs, larvae and adults of the clothes moth (*Tineola bisselliella*) were exposed to the treated pieces of clothes under confined conditions. The results of this study revealed that no differences were observed between the old and the new formulation, providing 100% mortality against clothes moth adults and larvae (no wool damage) and 0 % egg hatching, 1 day after exposure to treated clothes aged for 1 day, 1, 2 and 3 months.

In the laboratory study by [redacted] (2018b, [redacted]) a bridging test was also carried out between the old ([redacted]) and the new ([redacted]) formulation. Both products were applied on woolen cloths at a dose of 56 g product/m^2 from a distance of 30 cm and then, adult clothes moths (*Tineola bisselliella*) were exposed [redacted].
The results of this study revealed that no differences were observed between the old and the new formulation, providing 100% mortality against clothes moth adults, 1 day after exposure to treated clothes aged for 1 day, 1, 2 and 3 months. This study was used to support efficacy of the product by spraying surfaces within wardrobes, and the woolen clothes that were used can be considered as worst case absorbent surfaces to extrapolate efficacy of the product applied on porous and non-porous surfaces in wardrobes.

The results of the aforementioned bridging laboratory studies can support the equivalence of the old and new formulation [redacted], in terms of their efficacy against a representative target species, namely clothes moth (*Tineola bisselliella*).

In the simulated use study by [redacted] (2016a), [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was tested on clothes against free flying and caged adults, larvae and eggs of the clothes_moth *Tineola bisselliella*. The test was performed in 0.5 m^3 cabinets. The product was applied [redacted] at a dose of 56 g product/m^2 from a distance of 30 cm and the treated clothes were placed on the rod, hanging in the center of the cabinet, without coming into contact with any surface of the cabinet, thus 30 gr product/m^3 wardrobe. For free flying and caged adults, mortality was 100%, 1 day after exposure to 1 day, 1, 2 and 3 months deposits. For larvae, mortality was 100% and no wool damage occured, 1-7 days after exposure to 1 day, 1, 2 and 3 months deposits. For eggs, 0 % hatch and no wool damage was observed, 1 day after exposure to 1 day, 1, 2 and 3 months deposits.

In the simulated use study by [redacted] (2016, [redacted]), the biocidal product Aroxol Antimoth Antiacari Spray was tested in wardrobes against free flying adults of the clothes_moth *Tineola bisselliella*. The test was performed in 0.5 m^3 cabinets. The product was applied on the wall surfaces of the cabinet (back and bottom) and on the top surface of the self at a dose of 30 g product /m^3 from a distance of 30 cm. A hanger with [redacted] untreated woolen clothes [redacted] was placed [redacted] after treating the cabinet

with the product. The application of the product resulted in 100% mortality, 1 day after exposure to 1 day, 1, 2 and 3 months deposits.

Hence, the intended use 1 of the product, from an efficacy point of view, is acceptable as applied for by the applicant, noting however the following:

It is claimed that the product is intended to be used by spraying on surfaces or clothes in wardroabes against eggs, larvae and adults of clothes moth *Tineola bisselliella.* The efficacy of the product against all developmental stages of the clothes moth by spraying on clothes in wardroabs is sufficiently supported by the lab study [redacted] (2018a, [redacted]) and the simulated study by [redacted] (2016a), [redacted]), however efficacy against the clothes moth by spraying on surfaces in wardrobes was tested and proved sufficient only against adults [lab study by [redacted] (2018b, [redacted]) and the simulated use study by [redacted] (2016, [redacted])]. Hence, it is proposed to indicate that "Application on the wardrobes walls/panels is effective against clothes moth adults", and that "Application on clothing is effective against clothes moth adults, larvae, eggs".

Use #2

In the laboratory study by [redacted] (2018c, [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was tested on carpets against adults, larvae and eggs of the clothes_moth *Tineola bisselliella.* The product was applied on carpet at a dose of 8 g product/m^2 from a distance of 30 cm, and then eggs, larvae and adults of clothes moths were exposed to the treated pieces of carpet under confined conditions. According to the results, the application of the product resulted in 100% mortality against clothes moth adults 1 day after exposure to treated carpets aged for 1 hour, 2 and 3 months. Mortality against larvae was 100%, 3 days after exposure to 1 hour aged treated carpets and 98-100%, 14 days after exposure to 2 and 3 month aged treated carpets. Against eggs, 0 % hatching was recorded 1 day after exposure to 1 hour, 2 and 3 months aged treated carpets.

In the simulated use study by [redacted] (2018d, [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was sprayed on carpets against adults, larvae and eggs of the cloth_moth *Tineola bisselliella.* The product was applied on carpet at a dose of 8 g product/m^2 from a distance of 30 cm. The adults were exposed directly on treated carpet pieces, which were positioned in wire cages and the larvae and eggs were placed on the treated carpet inside test boxes. [redacted] According to the results, the application of the product resulted in 100% mortality against clothes moth adults 1 day after exposure to treated carpets aged for 1 hour, 2 and 3 months. Mortality against larvae was 100%, 3 days after exposure to 1 hour aged treated carpets and 92-96%, 7-14 days after exposure to 2 and 3 month aged treated carpets. Against eggs, 0 % hatching was recorded 1 day after exposure to 1 hour, 2 and 3 months aged treated carpets.

Hence, the intended use 2 of the product, from an efficacy point of view, is acceptable as applied for by the applicant, noting however the following:

According to the results of the submitted studies by [redacted] (2018c, [redacted]) and [redacted] (2018d, [redacted]), the efficacy of the product was evaluated

and proved sufficient against eggs, larvae and adults of clothes moths for up to 3 months after treatment, and this should be addressed by stating that "The application is effective for up to 3 months".

Uses #3, 4 and 5

In the laboratory (non-choice) study by [redacted] (2020a, [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was sprayed against adults of the sheep tick *Ixodes ricinus* and against mixed populations of the house dust mite *Dermatophagoides pteronyssinus*. [redacted] at a dose of 4 g product/m^2 from a distance of 30 cm. [redacted] According to the results, knock down after 1 hour was 100% for ticks and 82 % for mites (96% after 8 hours). Mortality was 100%, 24 hours after treatment for both ticks and house dust mites.

In the laboratory study by [redacted](2016c, [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was sprayed on fabrics against adults of the sheep tick *Ixodes ricinus* and against mixed populations of the house dust mite *Dermatophagoides pteronyssinus*. The product was applied [redacted] at a dose of 30 g product/m^2 from a distance of 30 cm, [redacted]. According to the results, mortality was 100%, 24 hours after exposure to treated woolen fabrics for both ticks and house dust mites. However, the dose rate used in this study (30 g product/m^2) was higher than the claimed one (4 g product/m^2).

In the laboratory study by [redacted](2018e, [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was sprayed, in a non-choice test, on fabrics against adults of the sheep tick *Ixodes ricinus* and against mixed populations of *Dermatophagoides pteronyssinus*. The product was applied [redacted] at the claimed dose of 4 g product/m^2 from a distance of 30 cm. [redacted] According to the results, the application of the product resulted in 82-100% and 100% mortality against ticks 24 hours and 7 days, respectively, after treatment. Mortality against mites was 19-50% and 77-100%, 24 hours and 7 days, respectively, after treatment.

In the simulated use study by [redacted] (2020b, [redacted]) the biocidal product Aroxol Antimoth Antiacari Spray was sprayed onto fabrics infested with adults of the sheep tick *Ixodes ricinus* and mixed populations of *Dermatophagoides pteronyssinus*. [redacted] at the claimed dose of 4 g product/m^2 from a distance of 30 cm. [redacted] Against ticks, on all tested fabrics, 100% knock down was achieved within 4 hours after treatment. 8 hours after treatment 100% of ticks were knocked down [redacted]. Within 24 hours, 100% mortality was achieved, [redacted]. Against mites, on quilt, pillow, mattress and blanket cloth, 94-100% knock down was achieved after 8 hours, and 100% mortality on average was recorded in 24 hours. On dense felt and thick woolen carpet, 91% and 73% mortality was recorded against mites in 24 hours, respectively.

It is noted that for the intended uses 3, 4 & 5, the claimed application method of " Direct spraying onto infested surfaces" is supported by the laboratory study (non-choice test) by [redacted] 2020a and the simulated use study (choice test) by [redacted] 2020b, where the product was applied according to the claimed directions for use, i.e. spray onto surfaces where arthopods were present. However, according to the study by [redacted] 2020b, efficacy level of the product on thick woolen surfaces infested by mites is not acceptable due to low mortality (73%) that was recorded in 24 hours. Nevertheless, acceptable efficacy level (91% mortality in 24 hours) was achieved after treatment of infested dense felt carpet surfaces (Kala 2020b), to support efficacy of the product when applied on infested carpets against mites.

Hence, the intended uses 3, 4 and 5 of the product, from an efficacy point of view, are acceptable as applied for by the applicant, however with the following limitation: "The product is not effective on infested thick woolen carpet against mites".

Overall, based on the submitted efficacy studies and after evaluation process in all sections, the eCA concludes into the proposed authorized uses of the product as described in 2.1.4.

2.2.5.9 Relevant information if the product is intended to be authorised for use with other biocidal product(s)

No use with other biocidal product(s) is intended.

2.2.6 Risk assessment for human health

The biocidal product product contains the following active substances:

- 0.1% w/w Transfluthrin (CAS No. 118712-89-3)
- 0.1% w/w Piperonyl butoxide (CAS No. 51-03-6).

2.2.6.1 Assessment of effects on Human Health

No toxicological studies have been conducted with the biocidal product. The toxicological hazard assessment for the biocidal product relies on the information available for the individual components (please refer to the Confidential annex of this PAR).

All concentrations discussed in the following sections refer to the biocidal product without the propellant.

Skin corrosion and irritation

Conclusion used in Risk Assessment – Skin corrosion and irritation	
Value/conclusion	Not irritating to skin.
Justification for the value/conclusion	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

	[redacted]

Eye irritation

Conclusion used in Risk Assessment – Eye irritation	
Value/conclusion	Irritating to eyes.
Justification for the value/conclusion	No data for Aroxol Antimoth Antiacari Spray is provided. The classification of the product was conducted using the endpoints included in the Assessment Reports (PT18) of transfluthrin (The Netherlands, 2014) and piperonyl butoxide (Greece, 2019) and the MSDS of the other components of the product. The biocidal product contains isopropyl alcohol, which is classified for eye irritation (Eye Irritant, Category 2). As the concentration of this component in the biocidal product is above the threshold for classification, the biocidal product should be classified as Eye irritant Cat. 2, according to Regulation (EC) No. 1272/2008.
Classification of the product according to CLP and DSD	Eye Irritant, Category 2 – H319: Causes serious eye irritation.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Respiratory tract irritation

Conclusion used in Risk Assessment – Respiratory tract irritation	
Value/conclusion	Not irritating to the respiratory tract.
Justification for the value/conclusion	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Skin sensitization

Conclusion used in Risk Assessment – Skin sensitisation	
Value/conclusion	Not sensitising to skin.
Justification for the value/conclusion	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Respiratory sensitization (ADS)

Conclusion used in Risk Assessment – Respiratory sensitisation	
Value/conclusion	Not a respiratory sensitizer.
Justification for the value/conclusion	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Acute toxicity

Acute toxicity by oral route

Acute oral toxicity values of the active substances transfluthrin (Assessment report; The Netherlands, 2014) and piperonyl butoxide (Assessment report; Greece, 2019) are detailed below.

Transfluthrin	
Mouse LD_{50} oral	583 mg/kg bw
Currently transfluthrin is not classified for acute oral toxicity. However, on the basis on the most recent review of the active substance (Assessment Report; The Netherlands, 2014), the RMS proposed classification of transfluthrin as Acute Tox. Cat. 4 (H302). A CLH intention, with proposed classification for Acute Tox. Cat. 4 (H302), has been submitted but has not officially been accepted.	
Piperonyl butoxide	
Rat LD_{50} oral	> 2000 mg/kg bw (male)
Rat LD_{50} oral	> 5000 mg/kg bw (female)
Piperonyl butoxide is not classified for acute oral toxicity.	

Value used in the Risk Assessment – Acute oral toxicity

Value	Non-toxic *via* the oral route.
Justification for the selected value	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Acute toxicity by inhalation

Acute inhalation toxicity values of the active substances transfluthrin (Assessment report; The Netherlands, 2014) and piperonyl butoxide (Assessment report; Greece, 2019) are detailed below.

Transfluthrin	
Rat LC_{50} inhalation	> 513 mg/m^3
Transfluthrin is not classified for acute inhalation toxicity.	
Piperonyl butoxide	
Rat LC_{50} inhalation	> 5.9 mg/L/4h (male and female; whole body exposure)
Piperonyl butoxide is not classified for acute inhalation toxicity.	

Value used in the Risk Assessment – Acute inhalation toxicity	
Value	Non-toxic *via* the inhalation route.
Justification for the selected value	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Acute toxicity by dermal route

Acute dermal toxicity values of the active substances transfluthrin (Assessment report; The Netherlands, 2014) and piperonyl butoxide (Assessment report; Greece, 2019) are detailed below.

Transfluthrin	
Mouse LD_{50} dermal	> 4000 mg/kg bw
Transfluthrin is not classified for acute dermal toxicity.	
Piperonyl butoxide	
Rat LD_{50} dermal	> 2000 mg/kg bw (male and female)
Piperonyl butoxide is not classified for acute dermal toxicity.	

Value used in the Risk Assessment – Acute dermal toxicity	
Value	Non-toxic *via* the dermal route.
Justification for the selected value	[redacted]

	[redacted]
Classification of the product according to CLP and DSD	Not classified.

Data waiving	
Information requirement	[redacted]
Justification	[redacted]

Narcotic effects

Conclusion used in Risk Assessment – Narcotic effects	
Value/conclusion	May cause drowsiness or dizziness.
Justification for the value/conclusion	The biocidal product contains isopropyl alcohol, which is classified as STOT SE Category 3 (H336). The concentration of this co-formulant in the biocidal product is above the generic concentration limit for classification, therefore the biocidal product should be classified as STOT SE Category 3 (H336) according to Regulation (EC) No. 1272/2008.
Classification of the product according to CLP and DSD	STOT SE Category 3 – H336: May cause drowsiness or dizziness.

Additional information on the classification of the active substances

The current harmonised classification and labelling for transfluthrin has been used (Skin Irritation Cat. 2, H315). On the basis on the most recent review of the active substance (Assessment Report; The Netherlands, 2014), the RMS proposed a change of the current classification. A CLH intention, with proposed classification has been submitted but has not officially been accepted. If/when the proposed classification of transfluthrin is formally adopted, then the classification of the biocidal product may need to be revisited.

The classification of piperonyl butoxide has been discussed in RAC-53 (June 2020). The agreed classification (STOT SE Cat. 3, H335; EUH066) has been used for the toxicological hazard assessment of the biocidal product.

Information on dermal absorption

Dermal absorption data for Aroxol Antimoth Antiacari Spray are not available; therefore, default values of dermal absorption have to be used in the risk assessment, as proposed in the current EFSA Guidance on dermal absorption [EFSA Journal, 2017; 15(6): 4873] [12].

Value(s) used in the Risk Assessment – Dermal absorption		
Substance	Transfluthrin	Piperonyl Butoxide
Value(s)*	70%	70%
Justification for the selected value(s)	Dermal absorption studies have not been conducted with the biocidal product therefore, therefore default values of dermal absorption have to be used in the risk assessment. Aroxol Antimoth Antiacari Spray contains 0.345% transfluthrin and 0.353% piperonyl butoxide dissolved in isopropyl alcohol (without propellant). The percentages of the two active substances in the biocidal product are both below 5%, that is the threshold used to identify dilutions according to the previous EFSA Guidance on Dermal Absorption (2012, section 6.1). The current EFSA Guidance on Dermal Absorption (2017) proposes a default dermal absorption value of 70% for dilutions of organic solvent-based formulations. Therefore, the default value of 70% was considered appropriate as dermal absorption value for both active substances and was used for the exposure calculations.	

Data waiving	
Information requirement	Dermal absorption
Justification	In the absence of relevant dermal absorption data with the biocidal product, the default value of 70% will be considered in the risk assessment for both active substances, as proposed in the current EFSA Guidance on dermal absorption for dilutions of organic solvent-based formulations [EFSA Journal, 2017; 15(6): 4873].

Available toxicological data relating to non-active substance(s) (i.e. substance(s) of concern)

Aroxol Antimoth Antiacari Spray contains >97% (w/w) isopropyl alcohol. Isopropyl alcohol is an approved biocidal active substance in PTs 1, 2, and 4 (Reg. (EU) 2015/407), which is classified as follows:

- Flammable liquid Category 2 - H225: Highly flammable liquid and vapour
- Eye irritation Category 2 - H319: Causes serious eye irritation
- STOT SE Category 3 - H336: May cause drowsiness or dizziness
- EUH066: Repeated exposure may cause skin dryness or cracking

[12] EFSA (European Food Safety Authority), Buist H. *et al.* (2017). Guidance on dermal absorption. *EFSA J.*l **15**(6):4873, 60 pp. https://doi.org/10.2903/j.efsa.2017.4873

A substance of concern (SoC) is defined in Art 3(f) of Regulation (EU) No. 528/2012/EC or the Biocidal Product Regulation (BPR) as a classified co-formulant present in the biocidal product at a concentration above the respective specific or generic concentration limit of the Regulation (EC) No 1272/2008, thus leading to the classification of the biocidal product.

Isopropyl alcohol is considered a substance of concern (SoC) for human health since it provides classification to the biocidal product Aroxol Antimoth Antiacari Spray.

According to the ECHA Guidance on the Biocidal Products Regulation (December 2017), SoCs which trigger biocidal products to be classified as Eye Irrit. Category 2 (H319) and STOT SE Category 3 (H336) are categorized to Band A of the banding evaluation scheme. This band includes SoCs which trigger products to be classified for moderate acute toxicity, including narcosis, and/or mild irritation. It should be noted that for these hazards, a fully quantitative risk assessment is not usually performed because only qualitative or semi-quantitative dose-response information is normally available. It is proposed that for these SoCs, appropriate risk mitigation measures, in the form of the precautionary (P)-statements normally associated with the concerned hazard (H)-statements under the CLP Regulation, should be applied.

Safety Data Sheets for all non-active substances are provided in the respective substance data sets of the IUCLID dossier.

Available toxicological data relating to a mixture

Available toxicological data relating to mixtures that contain a component defined as SoC are listed in the Confidential Annex. The classifications of the mixtures do not apply to the biocidal product and hence the mixtures do not qualify as SoCs. Safety Data Sheets for all non-active substances are provided in the IUCLID dossier.

Synergistic effects between the components of the product

The applicant has provided a White Paper describing the mode of action of natural pyrethrins, synthetic pyrethroids and piperonyl butoxide with regard to the synergistic effect that can be achieved in target species and non-target species such as other arthropods, aquatic organisms and mammalian organisms [13]. The full assessment report has been attached in section 8.7.1 of IUCLID. A detailed summary of the information available is presented below:

Mode of action

Pyrethrins and pyrethroid insecticides are neurotoxic, they affect both the peripheral and central nervous systems of insects. More specifically, pyrethrins and pyrethroids rapidly penetrate the epidermis or cuticle and are distributed through the insect body, stimulating nerve cells to produce repetitive firings causing paralysis (knockdown). Pyrethrins and

13 [redacted]: Synergism with natural pyrethrins and synthetic pyrethroids. Version 1.0. [redacted] 2018.

pyrethroids are often used in combination with Piperonyl Butoxide to further enhance their efficacy.

Piperonyl butoxide (PBO) is able to act as a synergist for pyrethroid insecticides by inhibiting the detoxification enzymes such as P450s and carboxylesterases that metabolise pyrethroids.

Synergistic effect in mammalian organisms

Summary

There are similarities between mammalian and insect enzyme systems, which theoretically allow for synergism also in mammals. However, no synergistic effects in mammals have been observed so far. There is generally a 15000-fold difference in sensitivity between insect and mammals towards pyrethroids (Narahashi et al, 2007 [14]) and the impact of the detoxification rate on the sensitivity is minimal, as it is described in more detail below.

Relevant data

Mammalian detoxification systems reflect those found in insects; major enzyme groups responsible are the P450s and non-specific esterases. In humans, for example, of the 57 P450 proteins, 15 are known to be involved in metabolism of xenobiotics (Johnson, 2008 [15]). Studies have shown that oral administration of 0.71 mg of piperonyl butoxide per kg body weight in humans did not affect antipyrine metabolism (Conney et al, 1972 [16]). Although little is known about interactions of piperonyl butoxide with individual human P450s, other systems containing an equivalent methylenedioxyphenyl moiety such as Goldenseal (Hydrastis Canadensis) and kava extracts have been shown to inhibit recombinant CYP2C9, CYP2D6, CYP2E1 and CYP3A4 (Johnson, 2008). PBO has been shown to induce CYP2B in mice with resultant liver hypertrophy, whilst repeated treatment to rats resulted in a down-regulation of the same enzyme (Sakamoto et al, 2013 [17]; Park et al, 2009 [18]).

These results must be viewed together with which P450s are thought to be involved in insecticide metabolism. A series of pyrethroid mimetic probes were used to highlight those P450s in rat liver which were likely to be involved in pyrethroid metabolism (Ismail et al, 2013 [19]). This resulted in CYP2C11 and CYP2C6 being identified as likely metabolising

14 Narahashi T, Zhao X, Ikeda T, Nagata K, Yeh JZ, Differential actions of insecticides on target sites: basis for selective toxicity, Hum Exp Toxicol 26: 361-366 (2007).

15 Johnson WW, Cytochrome P450 inactivation by pharmaceuticals and phytochemicals: therapeutic relevance, Drug Metabolism Reviews 40: 101-147 (2008).

16 Conney AH, Chang R, Levin WM, Garbut A, Munro-Faure AD, Peck AW, Bye A, Effects of piperonyl butoxide on drug metabolism in rodents and man, Arch Environ Health 24: 97-106 (1972).

17 Sakamoto Y, Inoue K, Takahashi M, Taketa Y, Kodama Y, Nemoto K, degawa M, Gamou T, Ozawa S, Nishikawa A, Yoshida M, dfferent pathways of constituent androstane receptor- mediated liver hyperthrophy and hepatocarcinogenesis in mice treated with piperonyl butoxide or decabromodiphenyl ether, Toxicologic Pathology 41: 1078-1092 (2013).

18 Park D, Kim S, Kang H, Oh J, Jang JY, Shin S, Kim TK, Choi YJ, Lee SH, Kim KY, Joo SS, Kim YB, Preventative effect of piperonyl butoxide on cyclophosphamide-induced teratogenesis in rats Birth Defects Res Dev Reprod Toxic 86: 402-408 (2009).

19 Ismail HM, O'Neil PM, Hong DW, Finn RD, Henderson CJ, Wright AT, Cravatt BF, Hemingway J, Paine MJI, Pyrethroid activity-based probes for profiling cytochrome P450 activities associated with insecticide interactions PNAS 110: 19766-19771 (2013).

deltamethrin, with CYP2C13 and CYP2D1 also being mentioned. In vitro metabolism of pyrethroids by rat and human liver microsomes revealed that several rat and human P450 isoforms consistently metabolised pyrethroids (Scollon et al, 2009 [20]). Rat CYP1A1 was very active but is only expressed at low levels in the liver; however, it could have a role in metabolising pyrethroids in the small intestine. CYP2C11 and CYP2C6 were also active, and the former is most likely the predominant form that metabolises pyrethroids in rat liver. In human liver, CYP3A4 and CYP2C9 are the most likely candidates for pyrethroid metabolism. CYP2C19 was the most active but is only expressed to a minor extent (Martignoni et al, 2006 [21]).

The two major esterases in humans involved in the metabolism of xenobiotics and drugs are hCE-1 and hCE-2 (Laizure et al, 2013 [22]). Although less studied than the P450 system, it is now becoming recognised that carboxylesterase hydrolysis is subject to the same issues as P450s and could be responsible for variability of therapeutic response following drug administration. Recombinant hCE-1 and hCE-2 were found to be capable of hydrolysing different pyrethroids at different rates according to structure (Nishi K, et al, 2006 [23]). When specific esterase inhibitors were applied to mice intraperitoneally, the toxicity of the pyrethroid fenvalerate increased 25-fold (Gaughan et al, 1980 [24]). It was reported that rabbit carboxylesterase and two rat carboxylesterases as well as hCE-1 and hCE-2 hydrolysed trans-permethrin more effectively than cis-permethrin and Type I pyrethroids were better substrates than Type II (Ross et al, 2006 [25]).

Since CYP3A4 and CYP2C9 are both reported to be inhibited by MDP compounds, it could be concluded that a mix of piperonyl butoxide and pyrethroid will reduce pyrethroid metabolism in human liver. However, metabolism of pyrethroid insecticides by carboxylesterases accounts for a significant proportion of the clearance of these xenobiotics from the body (Ross et al, 2006, Nishi et al, 2006). Although interactions of piperonyl butoxide with mammalian esterase systems seems to be unreported, carboxylesterases tend to be found in large quantities in the liver, probably to compensate for the fact that are relatively inefficient enzymes (Testa and Mayer, 2003 [26]).

Notwithstanding the possible interactions between piperonyl butoxide and mammalian detoxification systems, pyrethroids are more potent to insect sodium channels that those

---

20 Scollon EJ, Starr JM, Godin SJ, DeVito MJ, Hughes MJ, In Vitro metabolism of pyrethroid pesticides by rat and human hepatic microsomes and cytochrome P450 isoforms Drug Metabolism and Disposition 37: 221-228 (2009).

21 Martignoni M, Groothuis GM, de Kanter R. Species differences between mouse, rat, dog, monkey and human CYP-mediated drug metabolism, inhibition and induction. Expert Opin Drug Metab Toxicol. 2006 Dec; 2(6):875-94.

22 Laizure SC, Herring V, Hu Z, Witbrodt K, Parker R. The role of human carboxylesterases in drug metabolism: have we overlooked their importance? Pharmacotherapy 33: 210-222 (2013).

23 Nishi K, Huang H, Kamita S, Kim I, Morisseau C, Hammock BD, characterisation of pyrethroid hydrolysis by the human liver carboxylesterases hCE-1 and hCE-2, Arch Biochem Biophys 445: 115-123 (2006).

24 Gaughan LC, Engel JL, Casida JE, pesticide interactions: effects of organophosphorus pesticides on the metabolism, toxicity and persistence of selected pyrethroid insecticides, Pest Biochem Physiol 14: 81-85 (1980).

25 Ross MK, Borazjani A, Edwards CC, Potter PM, hydrolytic metabolism of pyrethroids by human and other mammalian carboxylesterases, Biochem Pharmacol 71: 657-669 (2006).

26 Testa B, Mayer JM, Hydrolysis in Drug and Prodrug Metabolism: Chemistry, Biochemistry, and Enzymology. Verlag Chimica Acta; Zurich, Switzerland: (2003).

of mammals. Certain residues surrounding the putative binding domain of pyrethroids on the mammalian channel can be mutated to those found in insects, resulting in increased sensitivity (Vais et al, 2001 [27]). Further, pyrethroid activity increases at lower temperatures, such as those found in insect bodies rather than mammalian (Narahashi T, 1996 [28]). Taking these factors together, it was reported that for a pyrethroid having a 15000-fold difference in sensitivity between insect and mammals, only a 3-fold factor would be contributed by detoxification rate; 5-fold being due to temperature dependence and 1000-fold due to the intrinsic sensitivity of the binding site (Narahashi et al, 2007).

Relevance of synergistic effects against non-target organisms

The synergistic effect of piperonyl butoxide - both in susceptible as well as in resistant insects - results from the inhibition of enzymes, which are then no longer available to detoxify insecticides such as pyrethrins and pyrethroids.

It is important to understand whether synergistic effect can be observed in non-target species and if yes, whether they must be considered for mixture toxicity assessments under the European regulatory frameworks. Here, synergistic effects are generally considered relevant when they are greater than a factor of 5X for environmental effects (ECHA, 2014 [29]) and greater than a factor 2X for effects in mammalian organisms (DG SANCO, 2012 [30]).

Synergism in mammalian organisms: No synergistic effects in mammals have been observed so far. The synergism factory would be <2X.

Conclusion

In conclusion, synergistic effects towards non-target organisms such as mammalian organisms, should not be considered relevant with regard to mixture toxicity assessments under the European regulatory frameworks.

Endocrine-disrupting properties for human health: screening for co-formulants

The assessment of the endocrine-disrupting properties of the co-formulants in the biocidal product Aroxol Antimoth Antiacari Spray has been performed according to the instructions described in the document agreed in the Coordination Group (CG-34-2019-02 AP 16.5 e-consultation ED potential of co-formulants).

To assess the endocrine-disrupting (ED) potential of each co-formulant in the biocidal product, a step-wise approach was performed, which included screening of relevant databases and searching for freely available information in reliable literature sources.

27 Vais H, Williamson MS, Devonshire AL, Usherwood PN, The molecular interactions of pyrethroid insecticides with insect and mammalian sodium channels, Pest Manag Sci 57:877-888 (2001).

28 Narahashi T. Neuronal ion channels as the target sites of insecticides. Pharmacol Toxicol. 1996 Jul;79(1):1-14.

29 ECHA Guidance on the Biocidal Products Regulation, Volume IV: Environment, Part A: Information Requirements, Version 1.1, November 2014.

30 DG SANCO, Guidance document on the assessment of the equivalence of technical materials of substances regulated under Regulation (EC) No 1107/2009; 2012.

The information sources and the databases consulted as well as the results of the screening for endocrine-disrupting properties of the co-formulants in the biocidal product Aroxol Antimoth Antiacari Spray are presented in detail in the Confidential Annex.

Considering the available data, it was **not possible to conclude** whether the biocidal product Aroxol Antimoth Antiacari Spray is considered to have endocrine-disrupting properties. This is because no decision is made on the endocrine-disrupting properties of one co-formulant in the frames of REACH. Once the conclusion regarding the endocrine-disrupting properties of this co-formulant is available, the applicant must inform eCA/rMS, so that the conclusion is reflected in the conditions of product authorization.

2.2.6.2 Exposure assessment

General remarks

Aroxol Antimoth Antiacari Spray is an aerosol spray insecticide containing the following active substances:

• Transfluthrin (CAS No. 118712-89-3)

• Piperonyl butoxide (CAS No. 51-03-6)

The biocidal product is sprayed into wardrobes or onto carpets/moquettes for clothes moth control and on machine washable articles (blankets, quilts, pillows), mattresses and carpets/moquettes for ticks and house dust mites control.

Expected patterns of exposure

The biocidal product is only intended to be used by non-professional users in domestic premises.

Exposure in workplace may be only expected during industrial formulation of the biocidal product; however, this use is out of the scope of this assessment.

Human exposure, both primary and secondary, arising from the use of the biocidal product for general surface applications by non-professional users can be summarised as follows:

- Primary exposure: application of the product by non-professional users.

- Secondary exposure: indirect exposure for the general public through contact with treated items, hand-to-mouth contact (toddlers) and inhalation of volatilised residues.

Identification of main paths of human exposure towards active substance(s) and substances of concern from its use in biocidal product

Summary table: relevant paths of human exposure							
Exposure path	**Primary (direct) exposure**			**Secondary (indirect) exposure**			
	Industrial use *	**Professional use**	**Non-professional use**	**Industrial use**	**Professional use**	**General public**	**Via food**
Inhalation	n.a.	n.a.	yes	n.a.	n.a.	yes	n.a.
Dermal	n.a.	n.a.	yes	n.a.	n.a.	yes	n.a.
Oral	n.a.	n.a.	no	n.a.	n.a.	yes**	n.a.

n.a.: not applicable

* Industrial use (manufacture of active substances and formulation) is not covered by the BPR.
** Oral exposure is due to hand-to-mouth contact for infants and toddlers.

List of scenarios

Summary table: scenarios			
Scenario number	**Scenario**	**Primary or secondary exposure Description of scenario**	**Exposed group**
1.	Application	Primary exposure: application of aerosol spray	Non-professional users
2.	Post-application	Secondary exposure: dermal contact with treated textiles oral exposure *via* mouthing of textiles (toddlers)	General public
3.	Post-application	Secondary exposure: dermal contact with treated carpet, oral exposure *via* hand-to-mouth transfer (toddlers)	General public
4.	Post-application	Secondary exposure: dermal contact with treated mattress, oral exposure *via* hand-to-mouth transfer (toddlers)	General public
5.	Post-application	Secondary exposure: inhalation of volatilised residues (toddlers + adults)	General public
1+4+5	Combined	Combined exposure for adults: application of aerosol spray and dermal contact with treated mattresses and inhalation of volatilised residues.	Adults

Industrial exposure

Not applicable.

Professional exposure

Not applicable.

Non-professional exposure

2.2.6.2.1 Scenario 1 – Spraying onto surfaces

Aroxol Antimoth Antiacari Spray is an aerosol spray intended to be used by non-professional users into wardrobes or onto carpets/moquettes for clothes moth control and on machine washable articles (blankets, quilts, pillows), mattresses and carpets/moquettes for ticks and house dust mites control.

[redacted]

The application rates are expressed as the weight of the product applied per square meter of the treated surface (grams of product / m^2) or in grams of product per cubic meter of the wardrobe volume and in addition in seconds per treated surface or wardrobe unit.

In the following table, the application rates, application frequency and human health risk assessment assumptions are presented for the 5 uses of the biocidal product.

Use #	Application rate	Treated item	Product per application	Spray duration	Application frequency
Use #1 wardrobes	30 g/m³	[redacted]	[redacted]	[redacted]	Max. 4/year
Use #2 carpets moquettes	8 g/m²	[redacted]	[redacted]	[redacted]	1/year
Use #3 blankets pillows	4 g/m²	[redacted]	[redacted]	[redacted]	1/year
Use #4 mattresses	4 g/m²	[redacted]	[redacted]	[redacted]	1/year
Use #5 carpets moquettes	4 g/m²	[redacted]	[redacted]	[redacted]	1/year

Description of Scenario 1: Spraying onto surfaces - ConsExpo Web, version 1.0.6.

[redacted]

Description of Scenario 1: Spraying onto surfaces - ConsExpo Web, version 1.0.6.		
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Description of Scenario 1: Spraying onto surfaces - ConsExpo Web, version 1.0.6.		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Description of Scenario 1: Spraying onto surfaces - ConsExpo Web, version 1.0.6.		
[redacted]	[redacted]	[redacted]

Calculations for Scenario 1

Summary table: exposure from non-professional uses					
Scenario 1	**Active substance**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake***	**Estimated total uptake**
		mg/kg bw/day			
All uses	TFL	0.022	0.012	7.3×10^{-6}	**0.033**
	PBO	0.022	0.012	7.3×10^{-6}	**0.033**
Use #1 wardrobes	TFL	0.0045	0.0024	1.5×10^{-6}	**0.0069**
	PBO	0.0045	0.0024	1.5×10^{-6}	**0.0069**
Use #2 carpets	TFL	0.0071	0.0039	2.4×10^{-6}	**0.011**
	PBO	0.0071	0.0039	2.4×10^{-6}	**0.011**
Use #3 blankets	TFL	0.0025	0.0014	8.7×10^{-7}	**0.0039**
	PBO	0.0025	0.0014	8.7×10^{-7}	**0.0039**
Use #4 mattresses	TFL	0.0025	0.0013	8.4×10^{-7}	**0.0038**
	PBO	0.0025	0.0013	8.4×10^{-7}	**0.0038**
Use #5 carpets	TFL	0.0039	0.0021	1.3×10^{-6}	**0.0061**
	PBO	0.0039	0.0021	1.3×10^{-6}	**0.0061**

* Ingestion of non-respirable spray fraction

Please refer to Confidential Annex 3.2 for detailed calculations of Scenario 1 for the application of the biocidal product from the non-professional user.

Exposure of the general public

Indirect secondary exposure could occur in the residential environment following the application of Aroxol Antimoth Antiacari Spray by the non-professional user. Secondary exposure is considered to be relevant to the general public and is derived *via* inhalation, dermal and oral route (hand-to-mouth or object-to-mouth contact).

Inhalation exposure to vapours of active substances may occur from volatilisation of residues from treated materials.

Dermal exposure can arise from contacting treated materials, such as wearing treated clothing, crawling or playing on treated carpets, using treated blankets or pillows and sleeping on treated mattresses. Oral exposure is relevant for toddlers, that exhibit hand-to-mouth or object-to-mouth contact. Therefore, a part of residues present on the hands or the treated object will be dislodged by saliva and eventually ingested.

Potential exposed populations include infants, toddlers, children and adults. While exposure may occur for people of all ages, adults and toddlers 1 < 2 years old are considered the index lifestages based on behavioral characteristics.

Based on the intended uses applied from the applicant, after the product application, a 3-month storage period will follow for clothes and carpets/moquettes treated against clothes moths as well as for the machine washable articles such as blankets, pillows and quilts treated against ticks and house dust mites. Following the treatment, the clothes and the machine washable articles are stored in the closet for 3-months, while the carpets/moquettes are rolled up and sealed in plastic bags for the 3-month storage period.

Therefore, regarding the above-mentioned items it is considered highly unlikely that there will be indirect secondary exposure for the general public, as the treated items will be stored immediately after the product application. However, for completeness reasons the risk assessment for the secondary exposure of the general public was performed for all the product uses, regardless of the 3-month storage period that takes place.

Secondary exposure to active substances in the treated materials is assessed using the US EPA SOPs for Residential Exposure Assessment[31]:
- Section 7 "Indoor Environments" for mattresses.
- Section 9 "Impregnated Materials" for textiles and carpets.

2.2.6.2.2 Scenario 2 – Wearing treated textiles

Description of Scenario 2		
[redacted]		
[redacted]		
[redacted]		
[redacted]		
[redacted]		

31 US EPA: Standard Operating Procedures for Residential Pesticide Exposure Assessment. October 2012, available at https://www.epa.gov/sites/production/files/2015-08/documents/usepa-opp-hed_residential_sops_oct2012.pdf

Description of Scenario 2		
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]

Description of Scenario 2		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

Calculations for Scenario 2

Summary table: systemic exposure from wearing treated textile					
Exposed group	**Active substance**	**Estimated inhalation uptake***	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
		mg/kg bw/day			
Toddler	TFL	–	0.004	0.00035	0.00435
	PBO	–	0.004	0.00012	0.00412
Adult	TFL	–	0.0023	-	0.0023
	PBO	–	0.0023	-	0.0023

* covered in Scenario 5

2.2.6.2.3 Scenario 3 – Contact with treated carpets (toddlers)

Description of Scenario 3
[redacted]

Description of Scenario 3		
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Description of Scenario 3		
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	
	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Description of Scenario 3		
[redacted]	[redacted]	[redacted]

Post-application **dermal exposure** is calculated according to the algorithm used by US EPA [redacted]

Calculations for Scenario 3

Summary table: systemic exposure from contacting treated carpets					
Exposed group/ Use	**Active substance**	**Estimated inhalation uptake***	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
		mg/kg bw/day			
Toddler Use #2	TFL	–	8.1×10^{-3}	1.44×10^{-3}	**9.54×10^{-3}**
	PBO	–	2.7×10^{-3}	0.48×10^{-3}	**3.18×10^{-3}**
Toddler Use #5	TFL	–	4.05×10^{-3}	0.72×10^{-3}	**4.77×10^{-3}**
	PBO	–	1.35×10^{-3}	0.24×10^{-3}	**1.59×10^{-3}**

* covered in Scenario 5

2.2.6.2.4 Scenario 4 – Contact with treated mattress (toddlers, adults)

Description of Scenario 4		
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Description of Scenario 4		
		[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		
[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Description of Scenario 4		

[redacted]

Calculations for Scenario 4

Summary table: systemic exposure from contacting treated mattresses					
Exposed group	**Active substance**	**Estimated inhalation uptake***	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
		mg/kg bw/day			
Toddler	TFL	–	0.002	0.0004	**0.0024**
	PBO	–	0.0007	0.0002	**0.0009**
Adult	TFL	–	0.0012	–	**0.0012**
	PBO	–	0.0004	–	**0.0004**

* covered in Scenario 5

2.2.6.2.5 Scenario 5 – Inhalation of active substances vapours released from treated surfaces (toddlers, adults)

Scenario 5		
[redacted]		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

Calculations for Scenario 5

Summary table: systemic exposure from inhalation of volatilised residues

Summary table: systemic exposure from inhalation of volatilised residues					
Exposed group	**Active Substance**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
		mg/kg bw/day			
Toddler	TFL	2.76×10^{-4}	–	–	2.76×10^{-4}
	PBO	3.73×10^{-6}	–	–	3.73×10^{-6}
Adult	TFL	0.46×10^{-4}	–	–	0.46×10^{-4}
	PBO	0.62×10^{-6}	–	–	0.62×10^{-6}

2.2.6.2.6 Combined scenarios

Combined exposure is expected only for the adult non-professional user who is exposed *via* the inhalation and dermal route during the spray application of the product (primary exposure) and following product application through dermal contact with a treated mattress (secondary exposure).

Summary table: combined systemic exposure from non-professional uses					
Scenarios combined	**AS**	**Estimated inhalation uptake**	**Estimated dermal uptake**	**Estimated oral uptake**	**Estimated total uptake**
Scenarios 1, 4, 5 Adult Tier 1	TFL	0.022	0.013	7.3×10^{-6}	0.035
	PBO	0.022	0.012	7.3×10^{-6}	0.034

Monitoring data

Not available

Dietary exposure

The product must not be used where food is stored or prepared. Any food or feed items must be covered or stowed away. The product is also not intended for application onto animals, especially not onto livestock. With these precautions, dietary exposure of humans or animals can be prevented.
The product must not be used where food is stored or prepared. Any food or feed items must be covered or stowed away. The product is also not intended for application onto animals, especially not onto livestock. With these precautions, dietary exposure of humans or animals can be prevented.

Residue definitions:
Not relevant.

Information of non-biocidal use of the active substance

Not relevant.

Estimating Livestock Exposure to Active Substances used in Biocidal Products

Not relevant.

Estimating transfer of biocidal active substances into foods as a result of professional and/or industrial application(s)

Not relevant.

Estimating transfer of biocidal active substances into foods as a result of non-professional use

Not relevant.

Exposure associated with production, formulation and disposal of the biocidal product

Not relevant.

Aggregated exposure

Not relevant.

Summary of exposure assessment

2.2.6.2.7 Summary of exposure assessment

Scenarios and values to be used in risk assessment			
Scenario number	**Exposed group (e.g. professionals, non-professionals, bystanders)**	**Tier/PPE**	**Estimated total uptake (mg/kg bw/day)**
1.	non-professional user	1 / no PPE All uses	TFL: 3.3×10^{-2} PBO: 3.3×10^{-2}
		2 / no PPE	
		Use #1 wardrobes	TFL: 6.9×10^{-3} PBO: 6.9×10^{-3}
		Use #2 carpets	TFL: 1.1×10^{-2} PBO: 1.1×10^{-2}
		Use #3 blankets	TFL: 3.9×10^{-3} PBO: 3.9×10^{-3}
		Use #4 mattresses	TFL: 3.8×10^{-3} PBO: 3.8×10^{-3}
		Use #5 carpets	TFL: 6.1×10^{-3} PBO: 6.1×10^{-3}
2.	general public, toddler	1 / no PPE	TFL: 4.35×10^{-3} PBO: 4.12×10^{-3}
	general public, adult	1 / no PPE	TFL: 2.3×10^{-3}

Scenarios and values to be used in risk assessment			
			PBO: 2.3 x 10^{-3}
3.	general public, toddler	1 / no PPE	
		Use #2 carpets	TFL: 9.54 x 10^{-3} PBO: 3.18 x 10^{-3}
		Use #5 carpets	TFL: 4.77 x 10^{-3} PBO: 1.59 x 10^{-3}
4.	general public, toddler	1 / no PPE	TFL: 2.4 x 10^{-3} PBO: 0.9 x 10^{-3}
	general public, adult	1 / no PPE	TFL: 1.2 x 10^{-3} PBO: 0.4 x 10^{-3}
5.	general public, toddler	1 / no PPE	TFL: 2.76 x 10^{-4} PBO: 3.73 x 10^{-6}
	general public, adult	1 / no PPE	TFL: 0.46 x 10^{-4} PBO: 0.62 x 10^{-6}

2.2.6.3 Risk characterisation for human health

The following information has been adapted from section 2.2.1.2 (Risk Assessment) of the PT18 Transfluthrin Assessment Report (The Netherlands, 2014) and from section 2.2.1.2 (Effects Assessment) of the PT18 Piperonyl butoxide Assessment Report (Greece, 2019). The Reference values and the studies from which they were derived are detailed in the tables below.

Reference values to be used in Risk Characterisation – Transfluthrin

Reference	Study	NOAEL (LOAEL)	AF*	Correction for absorption	Value
$AEC_{acute,\ inhalation}$	13-week, rat	46.7 mg/m^3 or 17 mg/kg bw/d	100	No	0.5 mg/m^3 or 0.17 mg/kg bw/d
$AEL_{acute,\ dermal}$	3-week, rabbit	1000 mg/kg bw/d	100	10% dermal abs.	1 mg/kg bw/d
$AEL_{acute,\ oral}$	Dev.tox, rabbit	15 mg/kg bw/d	100	No	0.15 mg/kg bw/d
$AEL_{chronic,\ systemic}$	2-year, rat	1.0 mg/kg bw/d	100	No	0.01 mg/kg bw/d
ADI	2-year, rat	1.0 mg/kg bw/d	100	n.a.	0.01 mg/kg bw/d
ARfD	Dev.tox, rabbit	15 mg/kg bw/d	100	n.a.	0.15 mg/kg bw/d

*AF: Assessment Factor

Reference values to be used in Risk Characterisation – Piperonyl Butoxide

Reference	Study	NOAEL (LOAEL)	AF*	Correction for absorption	Value
$AEL_{short\text{-}term}$	Dev.tox, rabbit	100 mg/kg bw/d	100	No	1 mg/kg bw/d
$AEL_{medium\text{-}term}$	1-year, dog	16 mg/kg bw/d	100	No	0.2 mg/kg bw/d
ADI	1-year, dog	16 mg/kg bw/d	100	No	0.2 mg/kg bw/d
ARfD	Not set, not required				

*AF: Assessment Factor

2.2.6.3.1 Risk for non-professional users

The envisaged use pattern of the biocidal product is intermittent, i.e. a sequence of acute exposure events occurring in intervals of 3-12 months. Therefore, as the product is only used sporadically (max 4 applications per year), the acute AEL for transflutrhin and the short-term AEL for piperonyl butoxide were used for assessing the primary exposure of the non-professional user. For transfluthrin, route-specific AELs were employed for risk characterization.

Systemic effects for piperonyl butoxide in Scenario 1

Scenario 1: piperonyl buroxide				
Use	**Estimated uptake mg/kg bw/day**	**$AEL_{short\text{-}term}$ mg/kg bw/day**	**Estimated uptake/AEL (%)**	**Acceptable (yes/no)**
All uses	3.3 x 10^{-2}	1	3.3 %	Yes

Use #1 wardrobes	6.9×10^{-3}		0.7 %	Yes
Use #2 carpets	1.1×10^{-2}		1.1 %	Yes
Use #3 blankets	3.9×10^{-3}		0.4 %	Yes
Use #4 mattresses	3.8×10^{-3}		0.4 %	Yes
Use #5 carpets	6.1×10^{-3}		0.6 %	Yes

Route-specific assessment for transfluthrin in Scenario 1

Scenario 1: transfluthrin – all uses				
Route	**Estimated exposure mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
Inhalation	0.022	0.17	12.9 %	Yes
Dermal	0.012	1	1.2 %	Yes
Oral	7.3×10^{-6}	0.15	0.0 %	Yes
Combined	**-**	**-**	**14.1 %**	**Yes**
Scenario 1: transfluthrin – Use #1 wardrobes				
Route	**Estimated exposure mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
Inhalation	0.0045	0.17	2.65 %	Yes
Dermal	0.0024	1	0.24 %	Yes
Oral	1.5×10^{-6}	0.15	0.0 %	Yes
Combined	**-**	**-**	**2.9 %**	**Yes**
Scenario 1: transfluthrin – Use #2 carpets				
Route	**Estimated exposure mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
Inhalation	0.0071	0.17	4.18 %	Yes
Dermal	0.0039	1	0.39 %	Yes
Oral	2.4×10^{-6}	0.15	0.0 %	Yes
Combined	**-**	**-**	**4.57 %**	**Yes**
Scenario 1: transfluthrin – Use #3 blankets				
Route	**Estimated exposure mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
Inhalation	0.0025	0.17	1.47 %	Yes
Dermal	0.0014	1	0.14 %	Yes
Oral	8.7×10^{-7}	0.15	0.0 %	Yes
Combined	**-**	**-**	**1.61 %**	**Yes**
Scenario 1: transfluthrin – Use #4 mattresses				
Route	**Estimated exposure mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
Inhalation	0.0025	0.17	1.47 %	Yes
Dermal	0.0013	1	0.13 %	Yes
Oral	8.4×10^{-7}	0.15	0.0 %	Yes

Combined	**-**	**-**	**1.6 %**	**Yes**
Scenario 1: transfluthrin – Use #5 carpets				
Route	**Estimated exposure mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
Inhalation	0.0039	0.17	2.29 %	Yes
Dermal	0.0021	1	0.21 %	Yes
Oral	1.3×10^{-6}	0.15	0.0 %	Yes
Combined	**-**	**-**	**2.5 %**	**Yes**

Conclusion

Primary exposure to transfluthrin and piperonyl butoxide predicts an acceptable risk for the adult non-professional user during product application, even with the worst-case scenario that assumes that all the treatments are performed in a single day.

Local effects

Taking into account the classification of the biocidal product, a risk characterization for local effects has been performed according to BPR guidance Vol III-Parts B+C (p.246). Both H319 and EUH066 classifications allocate the biocidal product to "low" hazard category as they cause moderate, reversible effects at relatively high concentrations. The qualitative risk assessment for local effects for the non-professional user is summarized in the following table:

Local effects for the non-professional user

Hazard category	Effects in terms of C&L	Who is exposed	Tasks, uses	Potential exposure route	Frequency and duration of potential exposure	Potential degree of exposure	Relevant RMMs (PPE not relevant)	Conclusion on risk
Low	Eye irritant 2; H319 EUH066 Repeated exposure may cause skin dryness or cracking	Non-professional user	Spraying on materials	Dermal	10 min/day Max 4 times/year Several months interval between applications	Minimal exposure	- Labelling, proper instructions for use - Spraying away from the user and in downward direction onto surface - Use only outdoors (carpets, machine washable articles, mattresses) or in a well-	Acceptable: - Low frequency of use - Short spray duration - Low degree of exposure - Negligible eye exposure potential (H319) - Adverse effect not expected, as

							ventilated area.	no repeated or prolonged exposure is expected (EUH066).

Conclusion for local effects for non-professional users

Aroxol Antimoth Antiacari Spray is classified as Eye irritant Cat. 2 (H319) and carries also the hazard phrase EUH066 "Repeated exposure may cause skin dryness or cracking" according to Regulation (EC) No. 1272/2008. Based on that classification, Aroxol Antimoth Antiacari Spray is allocated to the "low" hazard category (BPR guidance Vol III-Part B, p.247) and a qualitative risk assessment for local effects for the non-professional user was performed.

An acceptable risk is anticipated for local effects (H319, EUH066) for the non-professional user, due to the relevant risk mitigation measures, the low frequency of use, the short spray duration and the low degree of potential exposure. Regarding EUH066, adverse effect is not expected, as no repeated or prolonged exposure of the non-professional user is expected due to the low use frequency of the biocidal product. In addition, there is negligible eye exposure potential (H319), as the biocidal product is sprayed away from the user and predominantly in downward direction onto surfaces.

Therefore, the risk for local effects for the non-professional user is considered as acceptable.

According to the ECHA Guidance on Labelling and Packaging (Version 4.0 - March2019), the precautionary statement P280 "Wear eye protection/face protection" is recommended for the hazard label H319, Category 2. Considering however, the results of the risk characterization for local effects performed for the non-professional user, where an acceptable risk has been identified, this P statement can be omitted from the product label.

2.2.6.3.2 Risk for the general public

The biocidal product is only used sporadically (max 4 applications per year). Secondary exposure of the general public can occur within a short period after treatment and is therefore expected to be of medium-term duration. Therefore, the medium/chronic/systemic AEL for transflutrhin and the medium-term AEL for piperonyl butoxide were used for assessing the secondary exposure of the general public.

Systemic effects

Scenario	Active Substance	Estimated uptake mg/kg bw/day	AEL* mg/kg bw/day	Estimated uptake/ AEL (%)	Acceptable (yes/no)
2 – Toddler	TFL	4.35×10^{-3}	0.01	43.5%	Yes
	PBO	4.12×10^{-3}	0.2	2.06%	Yes
2 - Adult	TFL	2.30×10^{-3}	0.01	23%	Yes
	PBO	2.30×10^{-3}	0.2	1.15%	Yes
3 – Toddler	TFL	9.54×10^{-3}	0.01	95.4%	Yes

	PBO	3.18×10^{-3}	0.2	1.6%	Yes
3 – Toddler Use #5	TFL	4.77×10^{-3}	0.01	47.7%	Yes
	PBO	1.59×10^{-3}	0.2	0.8%	Yes
4 - Toddler	TFL	2.4×10^{-3}	0.01	24%	Yes
	PBO	0.9×10^{-3}	0.2	0.45%	Yes
4 - Adults	TFL	1.2×10^{-3}	0.01	12%	Yes
	PBO	0.4×10^{-3}	0.2	0.2%	Yes
5 – Toddler	TFL	2.76×10^{-4}	0.01	2.76%	Yes
	PBO	3.73×10^{-6}	0.2	0.002%	Yes
5 – Adult	TFL	0.46×10^{-4}	0.01	0.46%	Yes
	PBO	0.62×10^{-6}	0.2	0.0003%	Yes

* $AEL_{chronic,\ systemic}$ (0.01 mg/kg bw/day) was used for transfluthrin and $AEL_{medium\text{-}term}$ (0.2 mg/kg bw/day) was used for piperonyl butoxide.

Combined scenarios - Transfluthrin					
Scenarios	**Active Substance**	**Estimated uptake mg/kg bw/day**	**AEL_{acute} mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
1+ 4 Adults Tier 1	TFL inhalation	0.022	0.17	12.9%	Yes
	TFL dermal	0.012 + 0.0012 = 0.0132	1	1.32%	Yes
Combined				14.22 %	

* $AEL_{acute\ inhalation}$ (0.17 mg/kg bw/day) and $AEL_{acute\ dermal}$ (0.17 mg/kg bw/day) were used for transfluthrin.

Combined scenarios – Piperonyl butoxide					
Scenarios	**Active Substance**	**Estimated uptake mg/kg bw/day**	**$AEL_{short\text{-}term}$ * mg/kg bw/day**	**Estimated uptake/ AEL (%)**	**Acceptable (yes/no)**
1+ 4 Adults Tier 1	PBO	0.033	1	3.3%	Yes

* $AEL_{short\text{-}term}$ (1 mg/kg bw/day) was used for piperonyl butoxide.

Conclusion

Secondary exposure to transfluthrin and piperonyl butoxide from contacting treated textiles, carpets and mattresses does not entail unacceptable health risks for toddlers or adults.

The combination of all foreseeable exposure scenarios predicts an acceptable risk for the adult non-professional user.

Local effects

Taking into account the classification of the biocidal product, a risk characterization for local effects has been performed according to BPR guidance Vol III-Parts B+C (p.246). Both H319 and EUH066 classifications allocate the biocidal product to "low" hazard

category as they cause moderate, reversible effects at relatively high concentrations. The qualitative risk assessment for local effects for the general public is summarized in the following table:

Local effects for the general public

Hazard category	Effects in terms of C&L	Who is exposed	Tasks, uses	Potential exposure route	Frequency and duration of potential exposure	Potential degree of exposure	Relevant RMMs (PPE not relevant)	Conclusion on risk
Low	Eye irritant 2; H319 EUH066 Repeated exposure may cause skin dryness or cracking	General public	Spraying on materials	Dermal	60 min/day Max 4 times/year	Minimal exposure	- Labelling, proper instructions for use - Use only outdoors (carpets, machine washable articles, mattresses) or in a well-ventilated area.	Acceptable: - Low frequency of use - Low degree of exposure - Low likelihood for exposure of critical initial sites of contact: eyes (H319) - Adverse effect not expected, as no repeated or prolonged exposure is expected (EUH066).

Conclusion for local effects for the general public

Aroxol Antimoth Antiacari Spray is classified as Eye irritant Cat. 2 (H319) and should carry also the hazard phrase EUH066 "Repeated exposure may cause skin dryness or cracking" according to Regulation (EC) No. 1272/2008. Based on that classification, Aroxol Antimoth Antiacari Spray is allocated in the "low" hazard category (BPR guidance Vol III-Part B, p.247) and a qualitative risk assessment for local effects was performed.

An acceptable risk is anticipated for local effects (H319, EUH066) for the general public, due to the relevant risk mitigation measures, the low frequency of use and the low degree of potential exposure. Regarding EUH066, adverse effect is not expected, as no repeated or prolonged exposure of the general public is expected due to the low use frequency of the biocidal product. Moreover, there is negligible eye exposure potential (H319), as the biocidal product is sprayed predominantly in downward direction onto surfaces, i.e., not in the direction of bystanders. The label instructions stipulate that the product must only be used outdoors (carpets, machine washable articles, mattresses) or in a well-ventilated area. Under these conditions, isopropyl alcohol in room air will be removed by ventilation within a short time and will evaporate before residents come into contact with treated materials. This eliminates the risk for eye irritation (H319) and skin dryness or cracking (EUH066).

Therefore, the risk for local effects for the general public is considered as acceptable.

2.2.6.3.3 Combined exposure

A risk characterisation from combined exposure to several active substances is relevant for the biocidal product Aroxol Antimoth Antiacari Spray as it contains two active substances: transfluthrin and piperonyl butoxide.

Based on the ECHA BPR Guidance[32], a Tiered approach was implemented. According to the guidance, the "Tier 1" of this method is an intermediary step to verify risk acceptability for each substance used in the product. The calculations for this level were performed in the sections presented above. This step is to be followed by "Tier 2", which involves assessing the combined exposure to the substances of the biocidal product.

According to the ECHA guidance, the "Tier 1" step calculations must be undertaken in accordance with the methodology that is currently used for the assessment of products. Each active substance is assessed in terms of risks to primary and secondary exposure following all the scenarios which are relevant to the product use. The decision-making criterion for acceptability of risk remains as in the case of quantitative risk: the estimated level of exposure to each substance must be lower than its AEL. The Hazard Quotient which is defined by the ratio of internal exposure and AEL has to remain below 1.

The calculations presented above for transfluthrin and piperonyl butoxide have shown acceptable risks (and hazard quotients) for all relevant scenarios for the active substances when considered separately (for details see above).

According to the ECHA Guidance on BPR, the "Tier 2" - level assessment of combined exposure to mixture is performed by concentration (dose) addition. This means that the effects of the active substances in the biocidal product are assumed to be concentration or dose-additive.

Piperonyl butoxide is able to act as a synergist with synthetic pyrethroids, like transflutrin, by virtue of its ability to inhibit the detoxification enzymes such as cytochrome P450 enzymes and carboxylesterases that metabolise pyrethroids. As a result, piperonyl butoxide delays the degradation of the co-applied insecticidal substance and thereby prolongs its potential action.

For the aforementioned reasons, it cannot be stated that transfluthrin and piperonyl butoxide have completely different modes of action and only have to be considered separately. Therefore, the assessment of their combined exposure should be conducted.

According to the ECHA guidance on BPR, the Tier 2 assessment is performed with the same parameters as the first tier. The HQ for each substance is used to calculate a HI (Hazard Index) for the biocidal product according to the following method:

HI = Σ HQa.s.

The Hazard Quotient (HQ) is defined as the ratio estimation of internal exposure/AEL.
The HI is the sum of the HQs for each substance. HI should be ≤1 to show an acceptable risk related to the use of the biocidal product.

32 ECHA (2017) Guidance on the BPR: Volume III Human Health Assessment & Evaluation (Parts B+C) V2.1, ECHA-17-G-04-EN

Based on this approach, the additive risks from both active substances have been calculated for the non-professional user (primary exposure) as well as for the general public (secondary exposure).

Non-professional user

Combined risks from both active substances for the non-professional user (additive effect).

Scenario 1					
Use	**Tier**	**HQ TFL**	**HQ PBO**	**HI product**	**Acceptable**
All uses	Tier 1 No PPE	0.141	0.033	**0.174**	yes
Use #1 wardrobes	Tier 2 No PPE	0.029	0.007	**0.036**	yes
Use #2 carpets		0.046	0.011	**0.057**	yes
Use #3 blankets		0.016	0.004	**0.02**	yes
Use #4 mattresses		0.016	0.004	**0.02**	yes
Use #5 carpets		0.025	0.006	**0.031**	yes

Conclusion for the non-professional user

The simple addition of the AEL coverage (= hazard quotient, HQ) by both active substances leads to an HI (sum of HQs for both active substances) which is below 1 for the non-professional user, even with the worst-case Tier 1, that assumes that all the treatments are performed in a single day.

Therefore, combined additive risk calculations for both active substances show acceptable risks for all the uses of the product from the non-professional user.

General public

Combined risks from both active substances for the general public (additive effect).

Scenario	**Tier**	**HQ TFL**	**HQ PBO**	**HI product**	**Acceptable**
Scenario 2 - Toddler	Tier 1 No PPE	0.435	0.021	**0.456**	yes
Scenario 2 - Adult		0.23	0.012	**0.242**	yes
Scenario 3 – Toddler Use #2	Tier 1 No PPE	0.954	0.016	**0.97**	yes
Scenario 3 - Toddler Use #5		0.477	0.008	**0.485**	yes
Scenario 4 - Toddler	Tier 1 No PPE	0.24	0.005	**0.245**	yes
Scenario 4 - Adult		0.12	0.002	**0.122**	yes
Scenario 5 - Toddler	Tier 1 No PPE	0.028	0.00002	**0.028**	yes
Scenario 5 - Adult		0.0046	0.000003	**0.0046**	yes

Combined scenarios	Tier	HQ TFL	HQ PBO	HI product	Acceptable
Scenarios 1 and 4 Adult	Tier 1 No PPE	0.14	0.033	**0.18**	yes

Conclusion for the general public

The simple addition of the AEL coverage (= hazard quotient, HQ) by both active substances leads to an HI (sum of HQs for both active substances) which is below 1 for all scenarios of the general public.

Therefore, risks are acceptable for all scenarios of the general public when considering an additive effect of both active substances in the biocidal product.

Considerations on synergistic effects

There is strong evidence from the literature, that Piperonyl Butoxide (PBO) is able to act as a synergist for synthetic pyrethroids like transfluthrin, by enhancing their insecticidal toxicity. It has been proposed that the mechanism of acting as a synergist together with pyrethrins and synthetic pyrethroids is by inhibiting cytochrome P450 enzymes (and carboxylesterases), thus inhibiting the enzymatic degradation of pyrethrins and synthetic pyrethroids.

The ECHA BPR guidance states that "if synergistic effects have been identified or are suspected between the substances in the product, the risk related to use of the mixture will be considered acceptable if the value of HI is less or equal to a reference HI (HI_{ref})". The reference HI should be derived on a case by case basis on the available data and should be determined with the use of a safety factor which takes into account the magnitude of the suspected synergistic effect.

In the Guidance BPR guidance Vol III Parts B+C, Section 4.4.1, "Specific case of synergistic effects", it is recommended to use the worst-case pragmatic factor of 10 to estimate the reference hazard index. This proposal is based on the publication by Boobis et al., 2011 showing that the magnitude of synergy at low doses did not exceed the levels predicted by additive models by more than a factor of 4. More specifically, Boobis et al (2011) estimated the ratio of measured / predicted (based on dose addition) mixture toxicity and it was found to be less than 4 in six examined cases. In the same publication it is concluded that synergisms at low doses (i.e. close to the POD) are rather rare and that synergisms cannot be predicted quantitatively on the basis of the toxicity of components. This conclusion is also taken up by the OECD (2018).

Therefore, component-based human health risk assessment of the product considering potential synergistic effects of piperonyl butoxide cannot be reliably performed.

In addition, it has been demonstrated in mechanistic studies in rodents that upon repeated exposure, piperonyl butoxide induced hepatic cytochrome P450 enzymes, resulting, at high dose levels, in hepatocellular hypertrophy, cell proliferation and hepatotoxicity (Assessment report of piperonyl butoxide). Hence, it appears that piperonyl butoxide exhibits its toxic effects at doses at which synergistic effects in mammals do not occur, as it is shown that instead of enzymatic inhibition, an induction is occurring. As a consequence, it is not reasonable to perform risk characterisation taking into account simultaneously both additive and synergistic effects.

There is also evidence from the literature encouraging this approach. Giddings et. al., 2016 have determined that the highest assumed factor of synergism was 1.7, which was found at very high piperonyl butoxide:permethrin ratios. In the publication edited by D. Glynne Jones (1998) it is stated that there is no evidence indicating that piperonyl butoxide increases the low toxicity of pyrethrins and pyrethroids to mammals. Moreover, piperonyl butoxide is not known to synergistically enhance the toxicity of pyrethroids in mammals (Moores and Thom, 2018). Interactions of piperonyl butoxide with mammalian esterase systems have not been reported. This may be due to the fact that the liver expresses large quantities of carboxylesterases, probably to compensate for the fact that these are relatively inefficient enzymes (Testa B, Mayer JM, 2003).

Studies have shown that oral administration of 0.71 mg PBO/ kg bw in humans did not affect the metabolism of antipyrine, a drug which is metabolised by CYP enzymes (Conney AH *et al.,* 1972). It is therefore unlikely that the maximum predicted piperonly butoxide exposure of 0.033 mg/kg bw/day (worst-case exposure for adults from combination of Scenarios 1 and 4 of Aroxol Antimoth Antiacari Spray) will lead to a significant impairment of transfluthrin metabolism.

On these grounds, no synergism between piperonyl butoxide and transfluthrin is expected to occur in realistic exposure situations. Thus, the combined additive risk calculations are already sufficient to cover all expected risks, especially at this 1:1 ratio of the active substances in the biocidal product.

2.2.7 Risk assessment for animal health

Relevant animal exposure is not foreseen in the proposed use pattern. The exposure of pets in contact with treated surfaces is going to be comparable to the exposure predicted for humans, especially infants.

However, the AEL for cats and dogs is going to be much higher than for humans, because the NOAELs for dogs (14 mg/kg bw/d for TFL; 16 mg/kg bw/d for TFL) can be used as AELs for dogs without application of assessment factors. Even if 10-times higher sensitivity of cats to both active substances compared to dogs is assumed, a hypothetical AEL for cats would still be higher than the AEL for humans.

Therefore, a quantitative risk assessment for animal health is not deemed necessary.

2.2.8 Risk assessment for the environment

The biocidal product contains the active substances Transfluthrin (TFL) and Piperonyl Butoxide (PBO).

Common name	IUPAC name	Function	CAS number	EC number	Content (%)
Transfluthrin	2,3,5,6-tetrafluorobenzyl (1R,3S)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate, or, 2,3,5,6-tetrafluorobenzyl (1R)-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate	Active substance	118712-89-3	405-060-5	0.1 % w/w 0.100 % w/w (pure) 0.104 % w/w (technical with 96% purity)
Piperonyl Butoxide	5-[2-(2-butoxyethoxy)ethoxy methyl]-6-propyl-1,3-benzodioxole	Active substance	51-03-6	200-076-7	0.1 % w/w 0.100 % w/w (pure) 0.106 % w/w (technical with 94% purity)

For both active substances, the concentration of technical active substance of 0.104 % w/w for Transfluthrin and 0.106 % for PBO was used for the risk assessment.

Isopropyl alcohol is an approved biocidal active substance in PTs 1, 2, and 4 (Reg. (EU) 2015/407). According to Guidance on BPR Vol IV (Version 2.0, October 2017, p.357) an AS from other PTs contained in the product is considered as SoC. Thus, Isopropyl alcohol is considered as SoC according to the Guidance.

However, Isopropyl alcohol is contributing only to a limited extent to the overall toxicity. It was not considered for mixture toxicity in the ERA, as it is not classified for the environment. Furthermore, it can be assumed due to its vapour pressure to evaporate completely before it can reach any of the relevant compartments.

Further calculations are not considered necessary.

There is new data/information on environment and exposure for the active substance Transfluthrin (Blondaz, 2019). Also, the biocidal product applied for authorisation is not identical to the representative product in the CAR. Therefore, a new environmental risk assessment had to be performed.

2.2.8.1 Effects assessment on the environment

PNECs of active substances

Transfluthrin:

Compartment	Value	AF	Based on	Source
$PNEC_{STP}$	0.057 mg/L	1	Water solubility limit	AR
$PNEC_{water}$	1.75 ng/L	10	NOEC, reproduction, daphnia	ENV WGIV2017
$PNEC_{sediment}$	1.64 µg/kg dw, equivalent to 0.36 µg/kg wwt, equivalent to	100	NOEC, 28-d, Chironomus,	ENV WGIV2017
$PNEC_{soil}$	0.1 mg/kg dw, equivalent to 0.0882 mg/kg wwt	50	NOEC, microorganism study	ENV WGIV2017
$PNEC_{oral,\ birds}$	-	Not applicable		According to the AR, no PNEC for birds can be derived.
$PNEC_{oral\ mammals}$	6.67 mg/kg	300	NOAEL mammal, oral	AR

Piperonyl Butoxide

Compartment	Value	AF	Based on	Source
$PNEC_{STP}$	2.89 mg/ L	10	AR; NOEC for STP microorganisms was set equal to the water solubility value of 28.9 mg/L, chronic	AR
$PNEC_{water}$	0.00148 mg/ L	10	AR; NOEC, chronic, *Chironomus*	AR
$PNEC_{sediment}$	0.04292 mg/kg dwt, equivalent to 0.00933 mg/kg wwt	10	NOEC, chronic, *Chironomus*:	ENV WGV2019
$PNEC_{soil}$	0.098 mg/ kg wwt	-	AR; Calculated, Equilibrium Partitioning Method	AR
$PNEC_{oral,\ birds}$	10 mg/ kg diet	30	NOEC, short term dietary study, *Anas platyrhynchos* and *Colinus virginianus*	AR
$PNEC_{oral,\ mammals}$	20 mg/ kg diet	30	NOEL, chronic toxicity dogs	AR

PNECs of metabolites

PNECs provided for Transfluthrin and PBO metabolites are higher than or equal to the PNECs for the respective active substances. They are presented in the following sections.

PNECs for 2,3,5,6-tetrafluorobenzoic acid (TFB-COOH, metabolite of TFL)

Compartment	Value	AF	Based on	Source
$PNEC_{water}$	>0.1 mg/L	1000	NOEC, reproduction, daphnia	AR
$PNEC_{STP}$	No data			AR
$PNEC_{sediment}$	Not relevant			AR
PNECsoil	0.012 mg/kg wwt		EPM	AR updated 2019

PNECs for 2,3,5,6-Tetrafluorobenzyl alcohol (TFB-OH, metabolite of TFL)

Compartment	Value	AF	Based on	Source
$PNEC_{water}$	>0.1 mg/L	1000	NOEC, reproduction, daphnia	AR
$PNEC_{STP}$	No data			AR
$PNEC_{sediment}$	Not relevant			AR
$PNEC_{soil}$	Not relevant			Hein (2015) in Blondaz (2019)

PNECs for PBO metabolites (AR)

Substance	PNEC values for environmental compartments under concern					
	Surface water [$PNEC_{aquatic}$ (mg/L)]	**Sediment [$PNEC_{sediment}$ (mg/kg wwt)]**	**STP microorganisms [$PNEC_{STP(micro-organisms)}$ (mg/L)]**	**Soil [$PNEC_{soil}$ (mg/kg soil wwt)]**	**Birds [$PNEC_{oral,\ birds}$ (mg/kg diet)]**	**Mammals [$PNEC_{oral,\ mammals}$ (mg/kg diet)]**
Metabolite M-1	0.0028	- [1]	Not relevant	0.0980 [2]	Not relevant	Not relevant
Metabolite M-2	0.0033	- [1]	Not relevant	0.0980 [2]	Not relevant	Not relevant
Metabolite M-8	Not relevant	Not relevant	Not relevant	0.0980 [2]	Not relevant	Not relevant
Metabolite M-12 (or EN 1-93/3 or PBO acid)	0.0023	- [1]	Not relevant	0.0980 [2]	10 [2]	20 [2]
Metabolite EN 1-101/4 (or Metabolite F)	Not relevant	Not relevant	Not relevant	0.0980 [2]	Not relevant	Not relevant

[1] No $PNEC_{sed}$ calculation for major metabolites has been conducted; the risk to sediment-dwelling organisms from Piperonyl Butoxide metabolites is considered to be covered by the risk assessment for aquatic organisms
[2] No relevant toxicity data are available; as a worst-case approach, Piperonyl Butoxide metabolites have been considered as toxic to the respective non-target organisms as the parent compound

PBT assessment

It is referred to the information on the active substances in the respective assessment reports.

Measured aquatic bioconcentration

Transfluthrin:
The average experimental bioconcentration factor (BCF) for fish is 1783 L/kg, based on Total Radioactive Residues (TRR) in whole fish (transfluthrin and transformation products). Based on the information of a transformation study, the BCF based on TRR is considered to be a reasonable estimate of the BCF for the parent compound. The resulting biomagnification factor (BMF) in fish is 1 according to BPR (2015).

Piperonyl Butoxide:
The bioconcentration factor (BCF) for Piperonyl Butoxide in fish (*Lepomis macrochirus*) was experimentally determined to be 290 L/kg. The resulting biomagnification factor (BMF) in fish is 1 according to BPR (2015).

Estimated terrestrial bioconcentration

Transfluthrin:
The BCF for earthworms, estimated according to the BPR Guidance, is 10452 L/kg.

Piperonyl Butoxide:
The BCF for earthworms, estimated according to the BPR Guidance, is 757 L/kg.

Information relating to the ecotoxicity of the biocidal product which is sufficient to enable a decision to be made concerning the classification of the product is required

The BP is classified and labelled as Acute Aquatic Cat. 1, H400, Chronic Aquatic Cat. 1, H410, due to components that are present at levels of 0.1% or above and that are classified as Acut. Aq. Cat. 1, H400 and/or Chr. Aq. Cat. 1, H410.

Endocrine-disrupting properties for the environment: screening for co-formulants

Summary

The assessment of the endocrine-disrupting properties of the co-formulants in the biocidal product Aroxol Antimoth Antiacari Spray has been performed according to the instructions described in the document agreed in the Coordination Group (CG-34-2019-02 AP 16.5 e-consultation ED potential of co-formulants).

To assess the endocrine-disrupting (ED) potential of each co-formulant in the biocidal product, a step-wise approach was performed, which included screening of relevant databases and searching for freely available information in reliable literature sources.

The information sources and the databases consulted as well as the results of the screening for endocrine-disrupting properties of the co-formulants in the biocidal product Aroxol Antimoth Antiacari Spray are presented in detail in the Confidential Annex.

Conclusion of endocrine-disrupting assessment for co-formulants

Considering the available data, it was **not possible to conclude** whether the biocidal product Aroxol Antimoth Antiacari Spray is considered to have endocrine-disrupting properties. This is because no decision is made on the endocrine-disrupting properties of one co-formulant in the frames of REACH. Once the conclusion regarding the endocrine-disrupting properties of this co-formulant is available, the applicant must inform eCA/rMS, so that the conclusion is reflected in the conditions of product authorization.

Synergistic effects between a.s.

As regards potential synergistic effects due to the presence of Piperonyl butoxide, a comprehensive White Paper is provided in the dossier:

[redacted] *(2018) Piperonyl butoxide: Synergism with natural pyrethrins and synthetic pyrethroids. Version 1.0.* [redacted]

The synergistic effect of PBO - both in susceptible as well as in resistant insects - results from the inhibition of enzymes, which are then no longer available to detoxify insecticides such as pyrethrins and pyrethroids. It is important to understand whether synergistic effect can be observed in non-target species and if yes, whether they must be considered for mixture toxicity assessments under the European regulatory frameworks.

Here, synergistic effects are generally considered relevant when they are greater than a factor of 5X for environmental effects (ECHA, 2014).

Synergism in non-target arthropods: The mode of action of PBO implies that the corresponding enzyme systems of non-target insects may also be affected. However, at typical application rates, both in field as well as in laboratory studies, no discernable effect was found on bee mortality or behaviour. The addition of PBO has not overly sensitised the bees to the effects of the pyrethrins. The synergism factor would be <5X. Synergism in aquatic organisms: Synergistic effects have also been studied in aquatic organisms. For instance, a synergism factor of 1.7-fold was determined for invertebrates and up to 3.2X for fish. The synergism factory would be <5X.

In a recent ecological risk assessment, EPA (2017) states that PBO may result in lower environmental loadings of other pyrethrin/pyrethroid insecticides that are more toxic. A risk reduction by reducing PBO would therefore not be straightforward.

In conclusion, synergistic effects towards non-target organisms such as terrestrial arthropods, aquatic organisms as well as mammalian organisms, should not be considered relevant with regard to mixture toxicity assessments under the European regulatory frameworks.

Further Ecotoxicological studies

No data available.

Effects on any other specific, non-target organisms (flora and fauna) believed to be at risk (ADS)

No data available.

Supervised trials to assess risks to non-target organisms under field conditions

No data available.

Studies on acceptance by ingestion of the biocidal product by any non-target organisms thought to be at risk

No data available.

Secondary ecological effect e.g. when a large proportion of a specific habitat type is treated (ADS)

Not relevant.

Foreseeable routes of entry into the environment on the basis of the use envisaged

The BP will be applied indoors to control flying and crawling insects like clothes moths, mites and ticks in private houses and to prevent textile damage, allergenic excreta and itching bites. The product is a self-pressurised aerosol can which is applied as Ready-To-Use-Spray.

While pressing the valve of the can the expansion of the biocidal mixture propellant/insecticide forms an aerosol in suspension in air.

Thus, the insecticide is directly applied onto the surfaces in wardrobes or onto infested materials/textiles.

Further studies on fate and behaviour in the environment (ADS)

No data available.

Leaching behaviour (ADS)

No data available.

Testing for distribution and dissipation in soil (ADS)

No data available for biocidal product. For information on the active substances refer to the assessment report.

Testing for distribution and dissipation in water and sediment (ADS)

No data available for biocidal product. For information on the active substances refer to the assessment report.

Testing for distribution and dissipation in air (ADS)

No data available for biocidal product. For information on the active substances refer to the assessment report.

If the biocidal product is to be sprayed near to surface waters then an overspray study may be required to assess risks to aquatic organisms or plants under field conditions (ADS)

Not relevant.

If the biocidal product is to be sprayed outside or if potential for large scale formation of dust is given then data on overspray behaviour may be required to assess risks to bees and non-target arthropods under field conditions (ADS)

Not relevant.

2.2.8.2 Exposure assessment

General aspects

Aroxol Antimoth Antiacari is a biocidal product used as insecticide, containing the active substances: Transfluthrin 0.104% w/w, Piperonyl butoxide 0.106% w/w (% w/w technical grade active ingredients, TGAI). The product is an aerosol and it is a ready to use product (RTU).

General information

Assessed PT	PT 18
Assessed scenarios	**Scenario 1:** Use # 1 – Clothes moth control in wardrobes **Scenario 2:** Use # 2 – Clothes moth control on carpets and moquettes **Scenario 3:** Use # 3 – Mites and ticks control on machine washable articles **Scenario 4:** Use # 4 – Mites and ticks control on mattresses **Scenario 5:** Use # 5 – Mites and ticks control on carpets and moquettes
ESD(s) used	ESD for Insecticides, acaricides and products to control other arthropods for household and professional uses (PT18), July 2008
Approach	**Scenario 1 to 5:** Average consumption
Distribution in the environment	Calculated based on Guidance on the Biocidal Products Regulation. Volume IV Environment - Assessment and Evaluation (Parts B + C). Version 2.0. October 2017. Technical Agreements for Biocides (TAB) Version 2.0, August 2018) & (TAB ENV 2.1, December 2019)
Groundwater simulation	No. As an indication for potential groundwater levels, the concentration in porewater of agricultural soil is taken.
Confidential Annexes	No.
Life cycle steps assessed	**Scenarios 1 to 5**: Production: No, Formulation: No, Use: Yes, Service life: NO
Remarks	The surface spray scenario was used from the ESD. It was adapted accordingly because no specific emission scenarios for the intended uses are available. Specifically, for Use#1, a combination of two separate scenarios, adapting 'surface spray scenario' and the 'diffuser scenario' was applied to thoroughly cover the exposure assessment.

Compared to emissions from the application event (considered worst case for the risk assessment), emissions from the product formulation and service phase of the product are considered less relevant, as reported in "Guidance on the Biocidal Products Regulation, Volume IV Environment – Part B Risk Assessment, version 1.0".

Emission estimation

General aspects for the emission calculations

Aroxol Antimoth Antiacari Spray is an aerosol product, intended to be used only in domestic premises by non-professional users. The product is always sold under ready to use (RTU) form. Therefore, emissions were calculated for private houses only, and no emissions were calculated for the preparation (mixing/loading) step.

The calcula\tions are based on the ESD for Insecticides, acaricides and products to control other arthropods for household and professional uses (PT18).

After indoor use of the insecticide product, STP is regarded as the unique point source of direct active ingredients emissions to environmental compartments per day.

The relevant parameter that quantifies the amount of the product reaching the STP is: $E_{local\ water}$. In order to take into account the simultaneity of the treatment for indoor uses the calculated local emission rates were multiplied by:

- the number of houses connected to STP (4000 for private houses for indoor use)
- the simultaneity factor Fsim (as claimed by the applicant) for indoor uses

For emission calculations of the RTU product, Aroxol, the following formulas (ESD for PT18 products, July 2008) were used to calculate daily local emission to STP:

Application step

(4) $E_{application,air} = N_{appl,building} \times F_{appl.,air} \times Q_{prod} \times F_{AI} \times AREA_{treated}$
(5) $E_{application,applicator} = N_{appl,building} \times F_{appl.,applicator} \times Q_{prod} \times F_{AI} \times AREA_{treated}$
(6) $E_{application,floor} = N_{appl,building} \times F_{appl.,floor} \times Q_{prod} \times F_{AI} \times AREA_{treated\ floor}$
(7) $E_{application,treated} = N_{appl,building} \times F_{appl.,treated} \times Q_{prod} \times F_{AI} \times AREA_{treated}$

Releases to wastewater and STP

(8) $E_{applicator,ww} = (E_{prep,applicator} + E_{appl.,applicator}) \times F_{applicator,ww}$
(9) $E_{treated,ww} = (E_{prep,floor} + E_{appl.,floor} + E_{appl.,treated}) \times F_{ww} \times F_{CE}$
(10) $E_{waste\ water} = E_{applicator,ww} + E_{treated,ww}$
(11) $Elocal_{waste\ water,total} = ((E_{waste\ water} \times N_{houses}) + (E_{waste\ water} \times N_{larger\ buildings})) \times F_{simultaneity}$

An overview on the Scenarios inputs to derive $E_{local\ water}$ for the different uses is presented in the following table.

Use scenario	Application rate	Product per application	Application frequency	ERA Scenario assumptions on product Application
Use #1	30 g/m³	[redacted]	2/a	[redacted]
Use #2	8 g/m²	[redacted]	1/a	[redacted]

				[redacted]
Use #3	4 g/m²	[redacted]	1/a	[redacted]
Use #4	4 g/m²	[redacted]	1/a	[redacted]
Use #5	4 g/m²	[redacted]	1/a	[redacted]

Scenario 1 (Use # 1 – Clothes moth control in wardrobes)

Scenario 1 describes the worst case scenario of Use # 1. The product, 30g/m^3, is sprayed from a distance of about 30 cm on surfaces or onto clothes within wardrobes to prevent clothes within the wardrobes for damages by clothes moths. The active substances continuously evaporate from the treated surfaces into the wardrobe air during the duration of efficacy of three months (action as diffuser). NO (wet) cleaning is allowed for the treated area during this time to maintain efficacy.

[redacted]

[redacted]

[redacted]

[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

Calculations of Total local Emissions of the a.i. for Use 1 – Clothes moth control in wardrobes

Resulting total local emission of *Transfluthrin* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.002E-04	Remarks Assuming zero emissions from the treated area

Resulting total local emission of *Piperonyl butoxide* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.021E-04	Remarks Assuming zero emissions from the treated area

Scenario 2 (Use # 2 – Clothes moth control on carpets and moquettes)

Scenario 2 describes the worst case scenario of Use # 2. Carpets are vacuumed or steam clean before application. They are sprayed for about 9 seconds every square meter before they are stored in plastic bags for storage until the next winter season begins.

[redacted]

[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			

[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			

Calculations of Total local Emissions of the a.i. for Use 2 – Clothes moth control on carpets and moquettes

Resulting total local emission of *Transfluthrin* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	2.92E-04	Remarks

Resulting total local emission of *Piperonyl butoxide* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	2.97E-04	Remarks

Scenario 3 (Use # 3 – Mites and ticks control on machine washable articles)

Scenario 3 describes the worse case of Use # 3. The application rate of product is 4g/m^2.

[redacted]

[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			

[redacted]			
[redacted]	[redacted]	[redacted]	
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

Calculations of Total local Emissions of the a.i. for Use 3 – Mites and ticks control on machine washable articles

Resulting total local emission of *Transfluthrin* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.02-04	Remarks

Resulting total local emission of *Piperonyl butoxide* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.04E-04	Remarks

Scenario 4 (Use # 4 – Mites and ticks control on mattresses)

Scenario 4 describes the worst case scenario of Use # 4. The application rate of the product is 4g/m2 [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			

[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

Calculations of Total local Emissions of the a.i. for Use 4 – Mites and ticks control on mattresses

Resulting total local emission of *Transfluthrin* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.28E-04	Remarks

Resulting total local emission of *Piperonyl butoxide* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.31E-04	Remarks

Scenario 5 (Use # 5 – Mites and ticks control on carpets and moquettes)

Scenario 5 describes the worst case scenario of Use # 5. The application rate of the product is 4g/m^2.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]		[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			

Calculations of Total local Emissions of the a.i. for Use 5 - Mites and ticks control on carpets and moquettes

Resulting total local emission of *Transfluthrin* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.46E-04	Remarks

Resulting total local emission of *Piperonyl butoxide* to wastewater		
Local emission ($Elocal_{ww}$) [kg/d]	1.49E-04	Remarks

Overview on total local emissions of the two active substances

	AS	Elocalwaste water, total
USE #1	TFL	1.002E-04
USE #1	PBO	1.021E-04
USE #2	TFL	2.918E-04
USE #2	PBO	2.974E-04
USE #3	TFL	1.025E-04
USE #3	PBO	1.045E-04
USE #4	TFL	1.283E-04
USE #4	PBO	1.308E-04
USE #5	TFL	1.459E-04
USE #5	PBO	1.487E-04

Fate and distribution in exposed environmental compartments

Fate and distribution of active substances in exposed environmental compartments were estimated using the Guidance on the Biocidal Products Regulation, Volume IV Environment -Assessment & Evaluation, Part B+C, Version 2.0 (October 2017). Fate and distribution in the STP was estimated using Simple Treat 4 (EUSES 2.2.0).

Transfluthrin

Input parameters (only set values) for calculating the fate and distribution in the environment			
Input	Value	Unit	Remarks
Molecular weight	371.2	g/mol	Transfluthrin Assessment Report (NL, 2014)
Melting point	32	°C	
Boiling point	242	°C	
Vapour pressure (at 20°C)	0.0009	Pa	
Water solubility (at 20°C)	0.057	mg/l	
Log Octanol/water partition coefficient	5.94	Log 10	
Organic carbon/water partition coefficient (Koc)	**50119**	l/kg	Koc at pH=6, (considers most relevant for the Env. Assessment)
Henry's Law Constant (at 20 °C)	5.86	Pa/m3/mol	-
Biodegradability	Not biodegradable		-
Rate constant for STP *[if measured data available]*	**0.118****	h^{-1}, at 21.7 ºC DT50=**0.284d**	CAR_NL of transfluthrin, 2019,

			updated with the OECD314B study
DT_{50} for biodegradation in surface water	1E+06	d (at 12ºC)	d, DT50 at 12°C
DT_{50} for hydrolysis in surface water	1E+06	d (at 12ºC /pH)	d, DT50 at 12°C
DT_{50} for photolysis in surface water	1E+06	d	d, DT50 at 12°C
DT_{50} for degradation in soil	**5.17**	d (at 12ºC)	d, DT50 at 12°C, WG-IV-2017
DT_{50} for degradation in air	2.4	d	d, DT50

** Used for the calculation of the fate and distribution in the relevant environmental compartments (OECD314B study).

Piperonyl Butoxide

Input parameters (only set values) for calculating the fate and distribution in the environment			
Input	Value	Unit	Remarks
Molecular weight	338.43	g/mol	-
Melting point	< -10	°C	-
Boiling point	203	°C	-
Vapour pressure (at 25°C)	0.0000133	Pa	-
Water solubility (at 20.4°C)	28.9	mg/l	-
Log Octanol/water partition coefficient	4.8	Log 10	-
Organic carbon/water partition coefficient (Koc)	**2506.5**	ml/gr	NEW ENDPOINTS WG 2019_ENV_7-2 UPDATED CAR ON PBO 1(12)
Henry's Law Constant (at 20 °C)	0.0001648	$Pa/m^3/mol$	-
Biodegradability	Not biodegradable		-
Rate constant for STP *[if measured data available]*	0	h^{-1}	Calculated from biodegradability
DT_{50} for biodegradation in surface water	1E+06	d (at 12ºC)	d, DT50 at 12°C
DT_{50} for hydrolysis in surface water	1E+06	d (at 12ºC /pH)	d, DT50 at 12°C
DT_{50} for photolysis in surface water	1E+06	d	d, DT50 at 12°C
DT_{50} for degradation in soil	**58.3**	d (at 12ºC)	d, DT50 at 12°C
DT_{50} for degradation in air	3.597	h	h, DT50

Estimates of fate and distribution of transfluthrin & PBO in wastewater treatment plant were calculated using SimpleTreat 4.0. For transfluthrin, the DT_{50} of activated sludge of 0.284 days was used (according to the OECD314B study) giving a rate constant of 0.118 h^{-1} (temperature being specified as 294.85 K). The value was entered into the software corrected to the environmental standard, 288.15K (ENV 9 (TAB)-ENV v.2.1, December, 2019). The resulting rate constant was 0.0548 h^{-1}. This value was used to calculate a

refined estimate of fate of transfluthrin in STP. The model was also run with a modified parameterisation, assuming values for BOD (Mass of O2-binding material in sewage per day) and SLR (sludge loading rate) as specified in SimpleTreat 4.0, in combination with the value for concentration of suspended solids in effluent as implemented in the 3.1 version (see table below). It should be noted that this is a worst-case parameterisation, which does not reflect the current state of the art regarding suspended solid concentrations in waste water effluent, as described in the manual for SimpleTreat 4.0 (RIVM, 2014). In reality, modern wastewater treatment plants are more efficient at removing suspended solids, which would lead to reduced emission to surface water for strongly absorbing substances such as pyrethroid insecticides, e.g., transfluthrin.

The relevant model parameters of SimpleTreat 4.0 are summarised in the following table.

Simple Treat 4.0 Model Parameters -- ENV_9, TAB-ENV v.2.1, December 2019			
Symbol	**Description**	**Value**	**Units**
BOD	Mass of O2-binding material in sewage per day, per PE	0.06	kg BOD.d^{-1}.PE^{-1}
k_SLR	Sludge loading rate (aka food-to-mass ratio)	0.1	kg O_2.kg^{-1}.d^{-1}
C_SO.SLS	Concentration of suspended solids in effluent (from SLS)	0.03	kg.m^{-3}

Calculated fate and distribution in the STP for Transfluthrin		
Compartment	Percentage [%]	Remarks
Air	0.242	
Water	1.306	
Sludge	59.92	
Degraded in STP	38.52	

Calculated fate and distribution in the STP for PBO		
Compartment	Percentage [%]	Remarks
Air	0.00002	
Water	75.82	
Sludge	24.182	
Degraded in STP	0	

Transfluthrin + Piperonyl Butoxide

Identification of relevant receiving compartments based on the exposure pathway								
	Fresh-water	Freshwater sediment	Sea-water	Seawater sediment	STP	Air	Soil	Groundwater
Scenario 0	Yes, via STP	Yes, via STP	No	No	Yes	Not relevant	Yes, via STP	Yes, via STP
Scenario 1	Yes, via STP	Yes, via STP	No	No	Yes	Not relevant	Yes, via STP	Yes, via STP
Scenario 2	Yes, via STP	Yes, via STP	No	No	Yes	Not relevant	Yes, via STP	Yes, via STP
Scenario 3	Yes, via STP	Yes, via STP	No	No	Yes	Not relevant	Yes, via STP	Yes, via STP
Scenario 4	Yes, via STP	Yes, via STP	No	No	Yes	Not relevant	Yes, via STP	Yes, via STP
Scenario 5	Yes, via STP	Yes, via STP	No	No	Yes	Not relevant	Yes, via STP	Yes, via STP

Calculated PEC values for transfluthrin & PBO in all exposed environmental compartments

The following Summary Tables report the PEC values calculated for the above mentioned scenarios for transfluthrin and piperonyl butoxide (PBO).

General Notes:

(1) In all scenarios, the OECD 314B study was used in Simple Treat 4 to assess the fate and distribution of transfluthrin in the STP (as data for the degradation constant and DT50 in the activated sludge are already included in the updated version of Transfluthrin's CAR).

(2) The highest PEC concentrations were presented for Scenario 2, which are used as worst-case parent concentration (PECparent) for metabolite PEC calculations.

PECs for Transfluthrin

Summary of PEC values of transfluthrin in all exposed environmental compartments

PEC	**Scenario 1 adapted**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**
	Fsim=0,204%	**Fsim=0,204%**	**Fsim=0,204%**	**Fsim=0,204%**	**Fsim=0,204%**
PECSTP [mg/L]	6.543E-07	1.905E-06	6.633E-07	8.379E-07	9.527E-07
PECsurface water [mg/L]	6.543E-08	1.772E-07	6.170E-08	7.793E-08	8.861E-08

PECsediment [mg/kg wwt]	7.134E-05	1.932E-04	6.727E-05	8.497E-05	9.661E-05
PECsoil, 1 (0) * [mg/kg]	1.119E-04	3.259E-04	1.135E-04	1.433E-04	1.630E-04
PECsoil, 10 (0) ** [mg/kg]	1.269E-04	3.259E-04	1.135E-04	1.433E-04	1.630E-04
PECsoil, 10 (30) # [mg/kg]	3.098E-05	7.958E-05	2.770E-05	3.499E-05	3.979E-05
PECsoil, 10 (180) ## [mg/kg]	5.258E-06	1.351E-05	4.702E-06	5.939E-06	6.753E-06
PECsoil,porewater [mg/L]	5.945E-09	1.527E-08	5.315E-09	6.714E-09	7.634E-09
PECair	negligible	negligible	negligible	negligible	negligible

* = immediately after the first application = Csludgesoil (0)

** = immediately after the tenth application = Csludgesoil 10 (0)

= average concentration over 30 days after the tenth application = Csludgesoil 10 (30)

=average concentration over 180 days after the tenth application = Csludgesoil 10 (180)

- PECgw values for all the Scenarios are <0.1 µg/l set by the EU Drinking Water Directive (98/83/EC)

PECs for PBO

PEC	**Scenario 1 adapted**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**
	Fsim=0,204%	**Fsim=0,204%**	**Fsim=0,204%**	**Fsim=0,204%**	**Fsim=0,204%**
PECSTP [mg/L]	3.873E-05	1.127E-04	3.924E-05	4.957E-05	5.636E-05
PECsurface water [mg/L]	3.873E-06	1.127E-04	3.924E-06	4.957E-06	5.636E-06
PECsediment [mg/kg wwt]	2.141E-04	6.230E-04	2.169E-04	2.740E-04	3.115E-04
PECsoil, 1 (0) * [mg/kgwwt]	4.597E-05	1.339E-04	4.660E-05	5.887E-05	6.693E-05
PECsoil, 10 (0) ** [mg/kg]	4.657E-05	1.357E-04	4.721E-05	5.964E-05	6.781E-05
PECsoil, 10 (30) # [mg/kg]	3.915E-05	1.140E-04	3.971E-05	5.017E-05	5.704E-05
PECsoil, 10 (180) ## [mg/kg]	1.920E-05	5.592E-05	1.947E-05	2.460E-05	2.797E-05
PECsoil,porewater [mg/L]	4.329E-07	1.262E-06	4.391E-07	5.547E-07	6.307E-07

PECair	negligible	negligible	negligible	negligible	negligible

* = immediately after the first application = Csludgesoil (0)

** = immediately after the tenth application = Csludgesoil 10 (0)

= average concentration over 30 days after the tenth application = Csludgesoil 10 (30)

=average concentration over 180 days after the tenth application = Csludgesoil 10 (180)

- PECgw values for all the Scenarios are <0.1 µg/l set by the EU Drinking Water Directive (98/83/EC)

PEC for the relevant metabolites of transfluthrin & PBO

The Guidance on the Biocidal Products Regulation. Volume IV Environment - Assessment and Evaluation (Parts B + C), Version 2.0, October 2017, Info-box states: "*In general, an environmental risk assessment for the relevant compartments needs to be performed for all major metabolites. However, as a first step a qualitative or semi-quantitative assessment of these metabolites using the available data and expert judgement to fill data gaps may be sufficient.*"

It furthermore states that only if the assessment indicates a potential risk, a quantitative assessment should be performed.

Since the PNECs of the metabolites are all equal or higher than the PNECs for Transfluthrin and PBO, it is therefore determined whether the estimated PECs for metabolites for the identified worst case (Use #2) are lower or equal to the PECs for the respective active substances, a quantitative risk assessment is not considered to be required.

Local PEC values for the metabolites of each a.i have been calculated and presented below for the relative compartments. Metabolite exposures in water, sediment, soil and groundwater compartments were calculated based on the estimated emissions for the parent, taking into account the molecular weight difference between parent and metabolites along with the maximum observed levels of the metabolites, according to the equation:

$$\mathbf{PEC_{metabolite} = PEC_{parent} \times (Max\ \%\ AR) \times (Molar\ Weight\ fraction)}$$

For transfluthrin and piperonyl butoxide, PECs for their metabolites have been calculated using the highest PECs for their parent multiplied by a formation factor and corrected for the molecular weight. The highest PECs are those calculated with scenario 1.

For groundwater, formation factor of soil has been used.

Metabolites of Transfluthrin (TFL) in the relevant environmental compartments

MW TFB-OH = 180.1 g/mol
MW TFB-COOH = 194.8 g/mol
MW Transfluthrin = 371.16 g/mol

$PEC_{surface\ water}$ of Transfluthrin metabolites

Metabolite / parent	Max % AR	Molar mass	PECsw [mg/L]
Transfluthrin	**-**	**371.2**	**1.772E-07**
TFB-COOH	59	194.8	5.487E-08
TFB-OH	38	180.1	3.267E-08

$PEC_{sediment}$ of Transfluthrin metabolites

Metabolite / parent	Max % AR	Molar mass	PECsed [mg/kg ww]
Transfluthrin	**-**	**371.2**	**1.932E-04**
TFB-COOH	26	194.8	2.636E-05
TFB-OH	2.9	180.1	2.719E-06

PEC_{soil} & PEC_{gw} of Transfluthrin metabolites

Metabolite / parent	Max % AR	Molar mass	PECsoil [mg/kg]	PECgw [mg/L]
Transfluthrin	-	**371.2**	**3.259E-04**	**1.527E-08**
TFB-COOH	61.9	194.8	1.059E-04	4.960E-07
TFB-OH	36.5	180.1	5.772E-05	2.704E-07

Information on Max % AR and molar mass from Blondaz (2019)

Information on Max % AR and molar mass from Blondaz (2019); molar mass for TFB-OH based on TFB-COOH as worst case.

- All PECgw values for soil metabolites are below 0.1 µg/l set by the EU Drinking Water Directive (98/83/EC)

Metabolites of PBO in the relevant environmental compartments

$PEC_{surface\ water}$ of PBO metabolites

Metabolite / parent	Max % AR	Molar mass	PECsw [mg/L]
PBO	**-**	**338.45**	**1.127E-05**
M2	40.7	296.32	4.017E-06
EN 1-93/3 (M12)	6.6	208.22	4.577E-07
M1	7.6	252.29	6.386E-07

PEC_{soil} & PEC_{gw} of PBO metabolites

Metabolite / parent	Max % AR	Molar mass	PECsoil [mg/kg]	PECgw [mg/L]
PBO	**-**	**338.45**	**1.339E-04**	**1.262E-06**
EN 1-93/3 (M12)	19.4	208.22	1.598E-05	1.506E-07
M2	14.4	296.32	2.714E-06	1.591E-07
M1	6	252.29	4.482E-07	5.643E-08
EN 1-101/4 (metabolite F)	6.6	340.38	8.745E-08	8.375E-08
M8	9	356.38	1.787E-08	1.196E-07

Information on Max % AR and molar mass from AR, DocIIA

It can be concluded that not only PNECs of the metabolites are all equal or higher than the PNECs for Transfluthrin and PBO, but also the estimated PECs for metabolites for the identified worst case (Use #2) are lower or equal to the PECs for the respective active substances.

A quantitative risk assessment for metabolites is not considered to be required.

Primary and secondary poisoning

Primary poisoning

Not applicable. Use of the product will not result in primary poisoning of mammals and birds.

Secondary poisoning

Chemicals showing bioaccumulation and biomagnification may pose an additional threat due to exposure of organisms higher in the food chain (secondary poisoning), e.g. top predators. This has to be addressed if a chemical fulfils several criteria, e.g. indication of a bioaccumulation potential.

According to BPR (2017) a substance has bioaccumulation potential, if it has a log Kow ≥ 3 or BCF/BAF ≥ 100 L/kg_{wwt} or BMF ≥ 1 or is highly adsorptive or belongs to a class of substances known to have a potential to accumulate in living organisms or there are indications from structural features and there is no mitigating property such as hydrolysis (half-life less than 12 hours). Thus, a risk assessment for secondary poisoning have to be performed for both active substances (transfluthrin and piperonyl Butoxide).

The calculations of PEC values for secondary poisoning for each active substance are presented in the following tables for worst case Use 2.

Transfluthrin

$PEC_{oral,\ fish\text{-}eating\ predator} = PECwater \times BCF_{fish} \times BMF$

Where:

Variable/parameter (unit)	Symbol	Unit	Value	Source
Predicted Environmental Concentration in fish-eating predators	$PEC_{oral,\ fish\text{-}eating\ predator}$	[$mg.kg_{wet\ fish}^{-1}$]	3.16E-04	Output
Predicted Environmental Concentration in water	PEC_{water}	[$mg.L^{-1}$]	1.772E-07 [1]	Input
Bioconcentration Factor for fish on wet weight basis	BCF_{fish}	[$L.kg_{wet\ fish}^{-1}$]	1783 [2]	Input
Biomagnification factor in fish	*BMF*	[-]	1 [3]	Default

[1] Worst case PEC_{water} 1.772E-07$mg.L^{-1}$ for Use 2.
[2] According to the TFL AR.
[3] According to TFL CAR

$PEC_{oral,\ earthworm\text{-}eating\ predator}$=
$C_{earthworm}=(BCF_{earthworm} \times C_{porewater} + C_{soil} \times F_{gut} \times CONV_{soil}) / (1 + F_{gut} \times CONV_{soil})$

Where:

Variable/parameter (unit)	Symbol	Unit	Value	Source
Predicted Environmental Concentration in earthworm-eating predators	$PEC_{oral,\ earthworm\text{-}eating\ predator}$	[$mg.kg_{wet\ earthworm}^{-1}$]	1.45E-04	Output
Concentration in earthworm on wet weight basis	$C_{earthworm}$	[$mg.kg_{wet\ earthworm}^{-1}$]	1.45E-04	Output
Bioconcentration Factor for earthworms on wet weight basis	$BCF_{earthworm}$	[$L.kg_{wet\ earthworm}^{-1}$]	10452 [1]	Input
Concentration in porewater	$C_{porewater}$	[$mg.L^{-1}$]	1.527E-08 [2]	Input
Concentration in soil	C_{soil}	[$mg.kg_{wwt}^{-1}$]	1.351E-05 [3]	Input
Fraction of gut loading in worm	F_{gut}	[$kg_{dwt}.kg_{wwt}^{-1}$]	0.1 [4]	Default
Conversion factor for soil concentration wet-dry weight soil	$CONV_{soil}$	[$kg_{wwt}.kg_{dwt}^{-1}$]	1.13 [4]	Default

[1] According to TFL AR.
[2] Worst case $PEC_{porewater}$ 1.527E-08 mg/L in Use 2.
[3] Worst case PEC_{soil} (180 days TWA) 1.351E-05 mg/kg in Use 2.
[4] Default values were obtained from ECHA Guidance on the BPR (October 2017)

PBO

$PEC_{oral,\ fish\text{-}eating\ predator} = PECwater \times BCF_{fish} \times BMF$

Where:

Variable/parameter (unit)	Symbol	Unit	Value	Source
Predicted Environmental Concentration in fish-eating predators	$PEC_{oral,\ fish\text{-}eating\ predator}$	[$mg.kg_{wet\ fish}^{-1}$]	3.27E-03	Output
Predicted Environmental Concentration in water	PEC_{water}	[$mg.L^{-1}$]	1.127E-05 [1]	Input
Bioconcentration Factor for fish on wet weight basis	BCF_{fish}	[$L.kg_{wet\ fish}^{-1}$]	290 [2]	Input
Biomagnification factor in fish	BMF	[-]	1 [3]	Default

[1] Worst case PEC_{water} 1.127E-05 $mg.L^{-1}$ for Use 2
[2] According to the PBO AR.
[3] According to PBO CAR.

$PEC_{oral,\ earthworm\text{-}eating\ predator}$=
$C_{earthworm}=(BCF_{earthworm} \times C_{porewater} + C_{soil} \times F_{gut} \times CONV_{soil}) / (1 + F_{gut} \times CONV_{soil})$

Where:

Variable/parameter (unit)	Symbol	Unit	Value	Source
Predicted Environmental Concentration in earthworm-eating predators	$PEC_{oral,\ earthworm\text{-}eating\ predator}$	[$mg.kg_{wet\ earthworm}^{-1}$]	8.64E-04	Output
Concentration in earthworm on wet weight basis	$C_{earthworm}$	[$mg.kg_{wet\ earthworm}^{-1}$]	8.64E-04	Output
Bioconcentration Factor for earthworms on wet weight basis	$BCF_{earthworm}$	[$mg.kg_{wet\ earthworm}^{-1}$]	757 [1]	Input
Concentration in porewater	$C_{porewater}$	[$mg.L^{-1}$]	1.262E-06 [2]	Input
Concentration in soil	C_{soil}	[$mg.kg_{wwt}^{-1}$]	5.592E-05 [3]	Input
Fraction of gut loading in worm	F_{gut}	[$kg_{dwt}.kg_{wwt}^{-1}$]	0.1 [4]	Default
Conversion factor for soil concentration wet-dry weight soil	$CONV_{soil}$	[$kg_{wwt}.kg_{dwt}^{-1}$]	1.13 [4]	Default

[1] According to PBO AR.
[2] Worst case $PEC_{porewater}$ 1.262E-06 mg/L in Use 2.
[3] Worst case PEC_{soil} (180 days TWA) 5.592E-05 mg/L in Use 2.
[4] Default values were obtained from ECHA Guidance on the BPR (October 2017)

Based on the above, the Predicted Environmental Concentration in fish-eating and earthworm-eating predators is summarized in the following tables.

Summary table on estimated theoretical exposition values (ETE) via food chain - Transfluthrin		
Use	***PEC*$_{oral,\ fish\text{-}eating\ predator}$**	***PEC*$_{oral,\ earthworm\text{-}eating\ predator}$**
2	3.16E-04	1.45E-04

Summary table on estimated theoretical exposition values (ETE) via food chain - PBO		
Use	***PEC*$_{oral,\ fish\text{-}eating\ predator}$**	***PEC*$_{oral,\ earthworm\text{-}eating\ predator}$**
2	3.27E-03	8.64E-04

2.2.8.3 Risk characterisation

STEP 5: Determination of PEC/PNEC ratios

Atmosphere

No ecotoxicity data are available based on atmospheric exposures and a PEC air /PNEC air ratio cannot be calculated. According to the ESD, the concentration in air will be not relevant because of instant dilution.

Conclusion: Emission to air is considered to be negligible from an environmental point of view.

Sewage treatment plant (STP)

Tranfluthrin

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	6.543E-07	0.057	1.148E-05
Use #2	1.905E-06	0.057	3.343E-05
Use #3	6.633E-07	0.057	1.164E-05
Use #4	8.379E-07	0.057	1.470E-05
Use #5	9.527E-07	0.057	1.671E-05

PBO

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	3.873E-05	2.89	1.340E-05
Use #2	1.127E-04	2.89	3.900E-05
Use #3	3.924E-05	2.89	1.358E-05
Use #4	4.957E-05	2.89	1.715E-05
Use #5	5.636E-05	2.89	1.950E-05

Risk characterisation of the product

Use	PEC / PNEC Transfluthrin	PEC / PNEC PBO	Σ product
Use #1	1.148E-05	1.340E-05	2.49E-05
Use #2	3.343E-05	3.900E-05	7.24E-05
Use #3	1.164E-05	1.358E-05	2.52E-05
Use #4	1.470E-05	1.715E-05	3.19E-05
Use #5	1.671E-05	1.950E-05	3.62E-05

Conclusion:
Risk characterisation ratios for the STP are below 1 for all uses of Aroxol Antimoth Antiacari Spray; therefore, there is no risk for microorganisms of sewage treatment plant when the product is used as detailed on the label.

Aquatic compartment

Surface water

Transfluthrin

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	6.543E-08	1.75E-06	3.739E-02
Use #2	1.772E-07	1.75E-06	1.013E-01
Use #3	6.170E-08	1.75E-06	3.525E-02
Use #4	7.793E-08	1.75E-06	4.453E-02
Use #5	8.861E-08	1.75E-06	5.063E-02

PBO

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	3.873E-06	0.00148	2.617E-03
Use #2	1.127E-05	0.00148	7.616E-03
Use #3	3.924E-06	0.00148	2.651E-03
Use #4	4.957E-06	0.00148	3.349E-03
Use #5	5.636E-06	0.00148	3.808E-03

Risk characterisation of the product

Use	PEC / PNEC Transfluthrin	PEC / PNEC PBO	Σ product
Use #1	3.739E-02	2.617E-03	4.00E-02
Use #2	1.013E-01	7.616E-03	1.09E-01
Use #3	3.525E-02	2.651E-03	3.79E-02
Use #4	4.453E-02	3.349E-03	4.79E-02
Use #5	5.063E-02	3.808E-03	5.44E-02

Conclusion:
Risk ratios for both active substances and their sum (i.e. Σ product) are below 1 for all uses.
Thus, the use of Aroxol Antimoth Antiacari Spray indicates **no risk for aquatic organisms** when the product is used according to label instructions.

Sediment

Transfluthrin

Use	PEC (mg/kg wwt)	PNEC (mg/kg wwt)	PEC / PNEC
Use #1	7.134E-05	0.000356	2.004E-01
Use #2	1.932E-04	0.000356	5.428E-01
Use #3	6.727E-05	0.000356	1.890E-01
Use #4	8.497E-05	0.000356	2.387E-01
Use #5	9.661E-05	0.000356	2.714E-01

PBO

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	2.141E-04	0.00933	2.295E-02
Use #2	6.230E-04	0.00933	6.677E-02
Use #3	2.169E-04	0.00933	2.325E-02
Use #4	2.740E-04	0.00933	2.936E-02
Use #5	3.115E-04	0.00933	3.339E-02

Risk characterisation of the product

Use	PEC / PNEC Transfluthrin	PEC / PNEC PBO	Σ product
Use #1	2.004E-01	2.295E-02	2.23E-01
Use #2	5.428E-01	6.677E-02	6.10E-01
Use #3	1.890E-01	2.325E-02	2.12E-01
Use #4	2.387E-01	2.936E-02	2.68E-01
Use #5	2.714E-01	3.339E-02	3.05E-01

Conclusion:
Risk ratios and their sums (i.e. ∑ product) are below 1 for all uses for transfluthrin and PBO.
Thus, the use of Aroxol Antimoth Antiacari Spray indicates **no risk for sediment organisms** when the product is used according to label instructions.

Terrestrial compartment

Transfluthrin

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	1.269E-04	0.0882	1.439E-03
Use #2	3.259E-04	0.0882	3.695E-03
Use #3	1.135E-04	0.0882	1.286E-03
Use #4	1.433E-04	0.0882	1.625E-03
Use #5	1.630E-04	0.0882	1.848E-03

TFB-COOH

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #2 [1]	1.059E-04	0.012 [2]	8.822E-03

[1] As use 2 is has the highest PEC values it is considered worst case
[2] TFB-COOH has a lower PNEC value than the a.s.

PBO

Use	PEC (mg/L)	PNEC (mg a.s./L)	PEC / PNEC
Use #1	4.657E-05	0.098	4.752E-04
Use #2	1.357E-04	0.098	1.384E-03
Use #3	4.721E-05	0.098	4.817E-04
Use #4	5.964E-05	0.098	6.086E-04
Use #5	6.781E-05	0.098	6.919E-04

Risk characterisation of the product

Use	PEC / PNEC Transfluthrin	PEC / PNEC PBO	Σ product
Use #1	1.439E-03	4.752E-04	1.91E-03
Use #2	3.695E-03	1.384E-03	5.08E-03
Use #3	1.286E-03	4.817E-04	1.77E-03
Use #4	1.625E-03	6.086E-04	2.23E-03
Use #5	1.848E-03	6.919E-04	2.54E-03

Conclusion:

Risk ratios and their sums (i.e. ∑ product) are below 1 for all uses for transfluthrin and PBO.
Thus, the use of Aroxol Antimoth Antiacari Spray indicates **no risk for terrestrial organisms** when the product is used according to label instructions.

Groundwater

Risk characterisation of the product

Conclusion:

Independent of scenario, the predicted environmental concentration for groundwater for the parent substances, transfluthrin & PBO, and for the metabolites, did not exceed the maximum permissible concentration laid down by the EU Drinking Water Directive 98/83/EC of 0.10 µg/l.

Primary and secondary poisoning

Primary poisoning

Not relevant.

Secondary poisoning

Calculations of risk assessment for secondary poisoning of each active substance is presented in the following tables (*where X is the relevant value/active substance name/scenario):

Transfluthrin

Summary table on secondary poisoning via the aquatic food chain					
Scenario	***PEC*$_{oral,\ fish\text{-}eating\ predator}$**	**PNEC$_{birds}$ [1]**	**PNEC$_{mammals}$ [2]**	**PEC/PNEC$_{birds}$**	**PEC/PNEC$_{mammals}$**
Use #2	3.16E-04	Not available	6.67	- [1]	4.74E-05
Summary table on secondary poisoning via the terrestrial food chain					
Scenario	***PEC*$_{oral,\ earthworm\text{-}eating\ predator}$**	**PNEC$_{birds}$ [1]**	**PNEC$_{mammals}$ [2]**	**PEC/PNEC$_{birds}$**	**PEC/PNEC$_{mammals}$**
Use #2	1.45E-04	Not available	6.67	- [1]	2.17E-05

[1] Following the approach presented in transfluthrin CAR, the concentration in fish is calculated to be 3.16E-04 mg/kg, the concentration in worms is 1.45E-04 mg/kg. In the absence of short-term or long-term dietary toxicity data for birds, a PNECoral, bird cannot be derived. However, for the PNECoral,bird to fall below the PEC, the NOEC should be lower than the PECoral,bird x 30, and should thus be < 9.48E-03 mg/kg feed in case of fish and < 4.34E-03 mg/kg feed in case of earthworms. Following a similar reasoning for short-term tests, the LC50 should be < 9.48E-01 and 4.34E-01 mg/kg feed, respectively (< PECoral,bird x 3000). In view of the absence of acute toxicity to birds at doses up to 1890 mg/kg bw, it is not expected that chronic toxicity levels as low as 0.03 mg/kg feed will be reached. Furthermore, there are several reasons to assume that the calculated PECs in water and soil (and therefore the concentrations in fish and earthworms) may be worst-case estimates. In view of this, a risk of secondary poisoning of birds is not expected.

[2] PNECmammal is 6.67 mg/kg food based on AR

PBO

Summary table on secondary poisoning via the aquatic food chain					
Scenario	***PEC*$_{oral,\ fish\text{-}eating\ predator}$**	**PNEC$_{birds}$ [1]**	**PNEC$_{mammals}$ [2]**	**PEC/PNEC$_{birds}$**	**PEC/PNEC$_{mammals}$**
Use #2	3.27E-03	10	20	3.27E-04	1.63E-04
Summary table on secondary poisoning via the terrestrial food chain					
Scenario	***PEC*$_{oral,\ earthworm\text{-}eating\ predator}$**	**PNEC$_{birds}$ [1]**	**PNEC$_{mammals}$ [2]**	**PEC/PNEC$_{birds}$**	**PEC/PNEC$_{mammals}$**
Use #2	8.64E-04	10	20	8.64E-05	4.32E-05

1 PNECbird is 10 mg/kg food based on AR

2 PNECmammal is 20 mg/kg food based on AR

Conclusion: All PEC/PNEC ratios are clearly below 1. Thus, no effects on predators through secondary poisoning are expected when using the biocidal product as intended.

Mixture toxicity

Screening step

Screening Step 1: Identification of the concerned environmental compartments

All compartments exposed by the STP including the STP itself are likely to be at risk. These are the STP (micro-organisms), the aquatic (fresh water, fresh water sediment), the terrestrial (soil) compartment and birds and mammals via secondary posisoning.

Screening Step 2: Identification of relevant substances

Relevant substances for mixture toxicity are the two active substances Transfluthrin and Piperonyl Butoxide.

Isopropyl alcohol was not considered for mixture toxicity in the ERA, as it is not classified for the environment. Furthermore, it can be assumed to evaporate before it can reach any of the relevant compartments.

Screening Step 3: Screen on synergistic interactions

PBO enhances the toxicity of pyrethroid-type insecticides like TFL. However, no synergism between PBO and TFL is expected to occur in realistic exposure situations towards non target organisms (Moores and Thom, 2018).

Screening step	
	Significant exposure of environmental compartments? YES
	Number of relevant substances >1? YES
	Indication for synergistic effects for the product or its constituents in the literature? NO

Tiered approach

Tier 1. PEC/PNEC summation

All relevant calculations are found under "*Risk characterisation of the product"* in the risk assessment of all the relevant compartments.

Conclusion: All RQ products of the tier 1 mixture toxicity approach are below 1 (or below 0.1 µg/l (groundwater)).

Aggregated exposure (combined for relevant emmission sources)

Not relevant.

[N.B.: This part of the PAR will be further elaborated as soon as the guidance on aggregated exposure is available.]

Overall conclusion on the risk assessment for the environment of the product
The exposure assessment was performed based on the guidance documents, default and adapted Scenarios. For the PEC calculations of Transfluthrin, its degradation in the activated sludge was taken into account, as reported in the kinetic analysis of the OECD314 study, already evaluated and agreed, the outcome of which has been addended to the TFL-CAR endpoints (CAR_NL of transfluthrin, 2019, list of endpoints updated with the OECD314B study). All PEC/PNEC ratios for the two individual active substances are below 1 All RQ products of the tier 1 mixture toxicity approach are below 1 (or below 0.1 µg/l (groundwater)). No risk of secondary poisoning via the food chain is identified. The PNECs for the metabolites were equal or higher and the PECs were equal or lower than for the parent active substances and thus no quantitative risk assessment was conducted with the exception of TFB-COOH for terrestrial compartment for which risk assessment was performed. **Overall**, the risk for all relevant environmental compartments is acceptable when the product is used according to label instructions.

2.2.9 Measures to protect man, animals and the environment

It is referred to chapter 2.1.5 on General directions for use and to the Safety data sheet provided in Section 13 of the IUCLID file.

2.2.10 Assessment of a combination of biocidal products

The biocidal product is not intended to be authorised for the use with other biocidal products.

2.2.11 Comparative assessment

The biocidal product does not contain active substances that meet the exclusion criteria or that are candidates for substitution.

3 ANNEXES[33]

3.1 List of studies for the biocidal product (attached to the IUCLID dossier)

[redacted] (2019a) Statement on Physical and technical properties. Viscosity.

[redacted](2019b) Statement on Physical and technical properties. Classification/Labelling flammable aerosols, Explosives, Oxidizing gases, Self-reactive substances, Pyrophoric liquids and mixtures, Substances and mixtures which in contact with water emit flammable gases, Corrosiveness to metals, Oxidizing liquids, Self-ignition.

[redacted] (2020a) Efficacy of an Anti-moth / Anti-acari product against Ticks, *Ixodes ricinus* and House dust mites, *Dermatophagoides pteronyssinus* upon direct spray (lab – test). [redacted], unpublished.

[redacted] (2020b) Efficacy of an Anti-moth / Anti-acari product against Ticks *Ixodes ricinus* and House dust mites *Dermatophagoides pteronyssinus* on treated fabrics (Simulated-use / Choice test). [redacted], unpublished.

[redacted] (2016a) Efficacy of an Anti-moth / Anti-acari product against Clothes moth *Tineola bisselliella* in a cabinet by spraying on cloths. [redacted], unpublished.

[redacted] (2016b) Efficacy of an Anti-moth / Anti-acari product against Clothes moth *Tineola bisselliella* in a cabinet by spraying on the cabinet surface. [redacted], unpublished.

[redacted] (2016c) Efficacy of an Anti-moth / Anti-acari product against Ticks *Ixodes ricinus* and House dust mites *Dermatophagoides pteronyssinus* on treated fabric. [redacted], unpublished.

[redacted] (2018a). Efficacy of an Anti-moth / Anti-acari product against Clothes mothes, *Tineola bisselliella*, tested fresh, 1month, 30, 60 and 90 days after treatment. Old formulation ([redacted]) vs. new formulation ([redacted]) of Aroxol Anti-moth Anti-acari Spray. [redacted], unpublished.

[redacted] (2018b) Efficacy of an Anti-moth / Anti-acari product against Clothes mothes, *Tineola bisselliella*, tested fresh, 60 and 90 days after treatment, without direct contact to treated surface. Old formulation ([redacted]) vs. new formulation ([redacted]) of Aroxol Anti-moth Anti-acari Spray. [redacted], unpublished.

[redacted] (2018c) Efficacy of an Anti-moth / Anti-acari product against Clothes mothes, *Tineola bisselliella*, tested fresh, 30, 60 and 90 days after treatment on carpet. [redacted], unpublished.

[redacted] (2018d) Efficacy of an Anti-moth / Anti-acari product against Clothes mothes, *Tineola bisselliella*, tested as simulated-use-test on carpet, fresh, 60 and 90 days after treatment. [redacted], unpublished.

33 When an annex in not relevant, please do not delete the title, but indicate the reason why the annex should not be included.

[redacted] (2018e) Efficacy of an Anti-moth / Anti-acari product against Ticks, *Ixodes ricinus* and House dust mites, *Dermatophagoides pteronyssinus* on treated surfaces. New formulation ([redacted]) of Aroxol Anti-moth Anti-acari Spray. Biogenius GmbH, Bergisch Gladbach, Germany, Report No. BIO042a-18, unpublished.

[redacted] (2020a) Determination of physico-chemical properties and storage stability tests for Aroxol Antimoth Antiacari Spray: 2 weeks at 54 °C and 36 months at 20 °C - 24 months interim report. [redacted], unpublished.

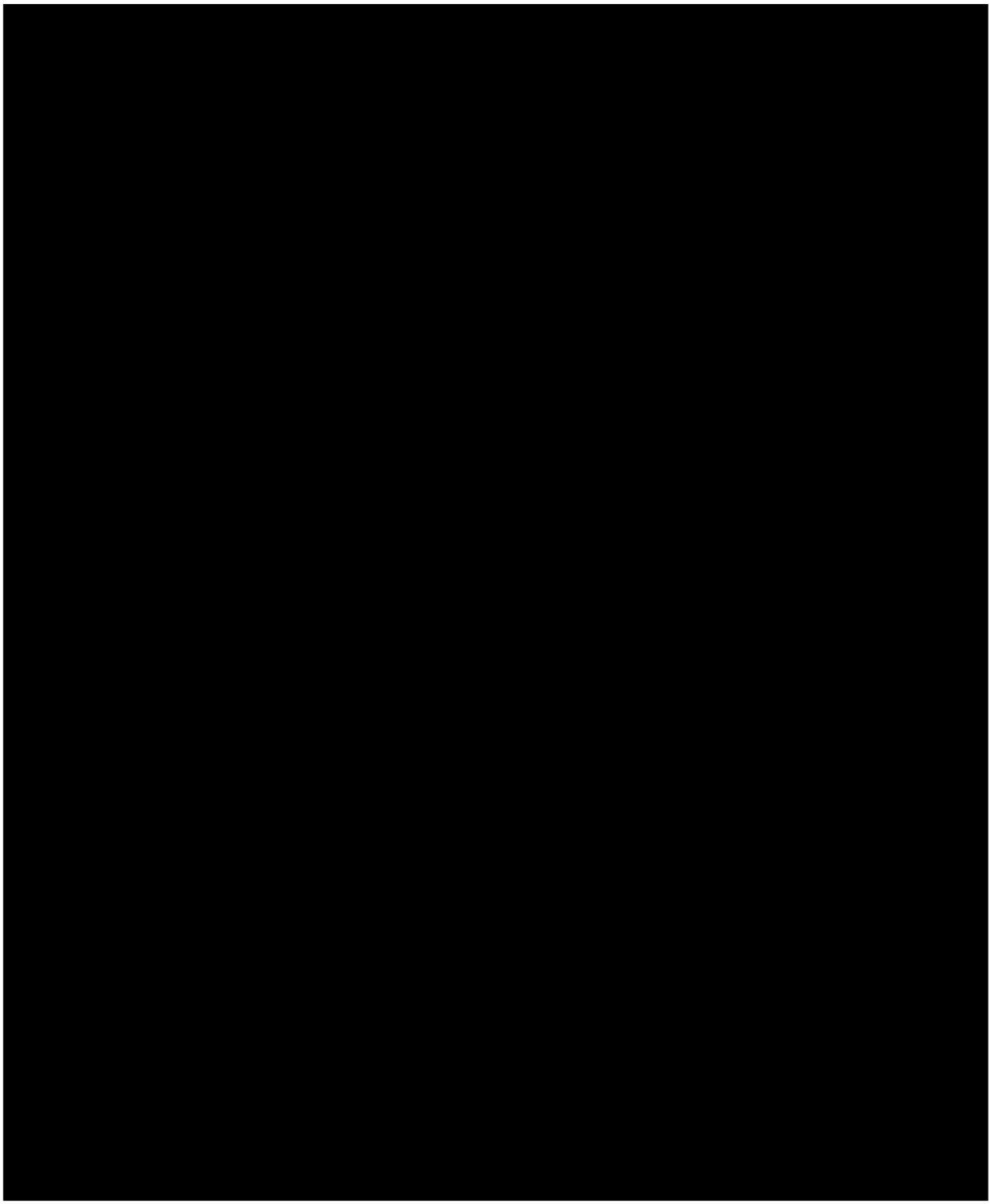
[redacted] (2020b) Determination of the Metal Corrosive Properties for "Aroxol Antimoth Antiacari Spray Liquid Phase". [redacted], unpublished.

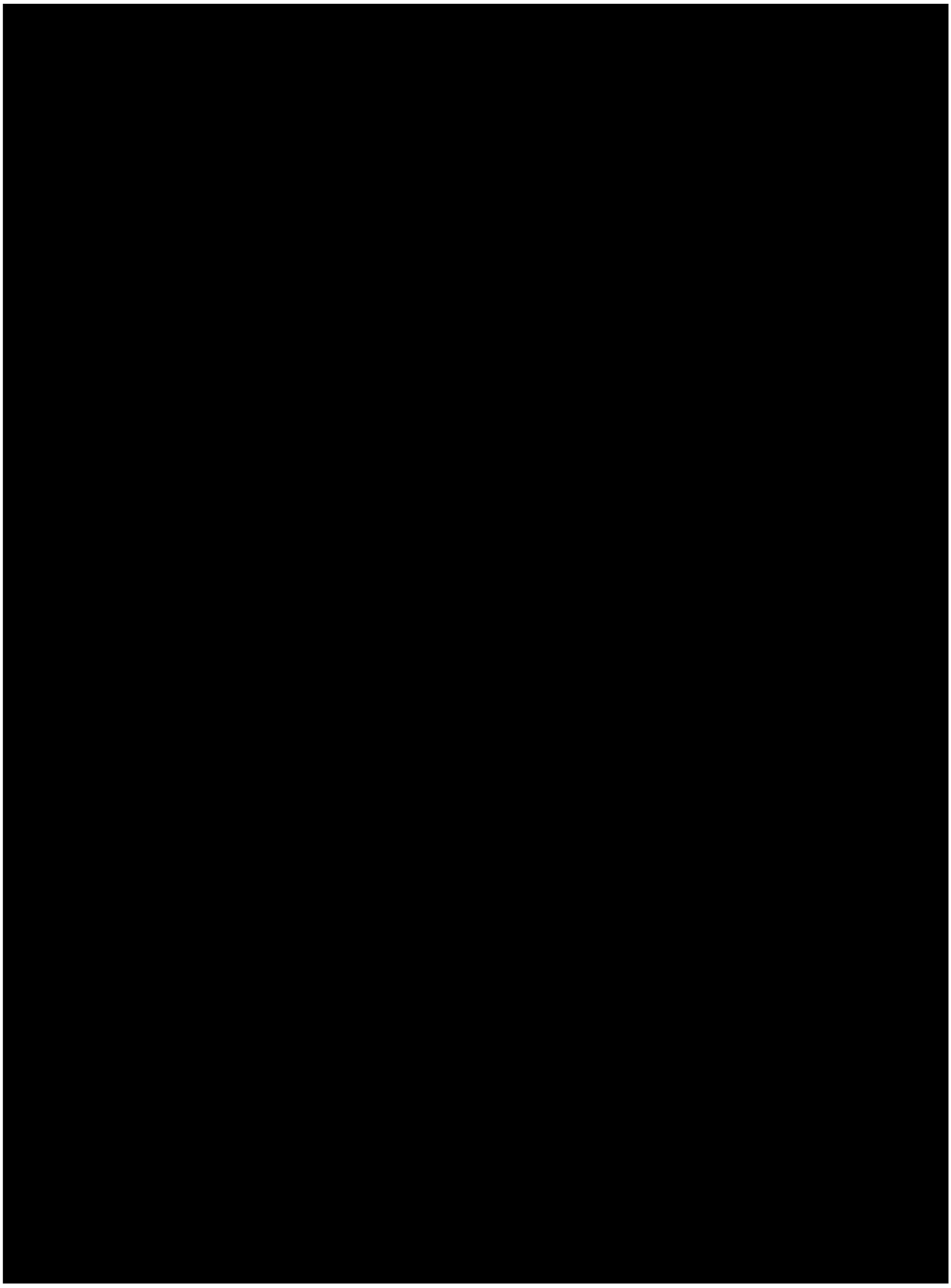
[redacted] (2018a) Determination of physico-chemical properties and storage stability tests for Aroxol Antimoth Antiacari Spray: 2 weeks at 54 °C°C and 24 months at 20 °C°C – 2 weeks interim report. [redacted], unpublished.

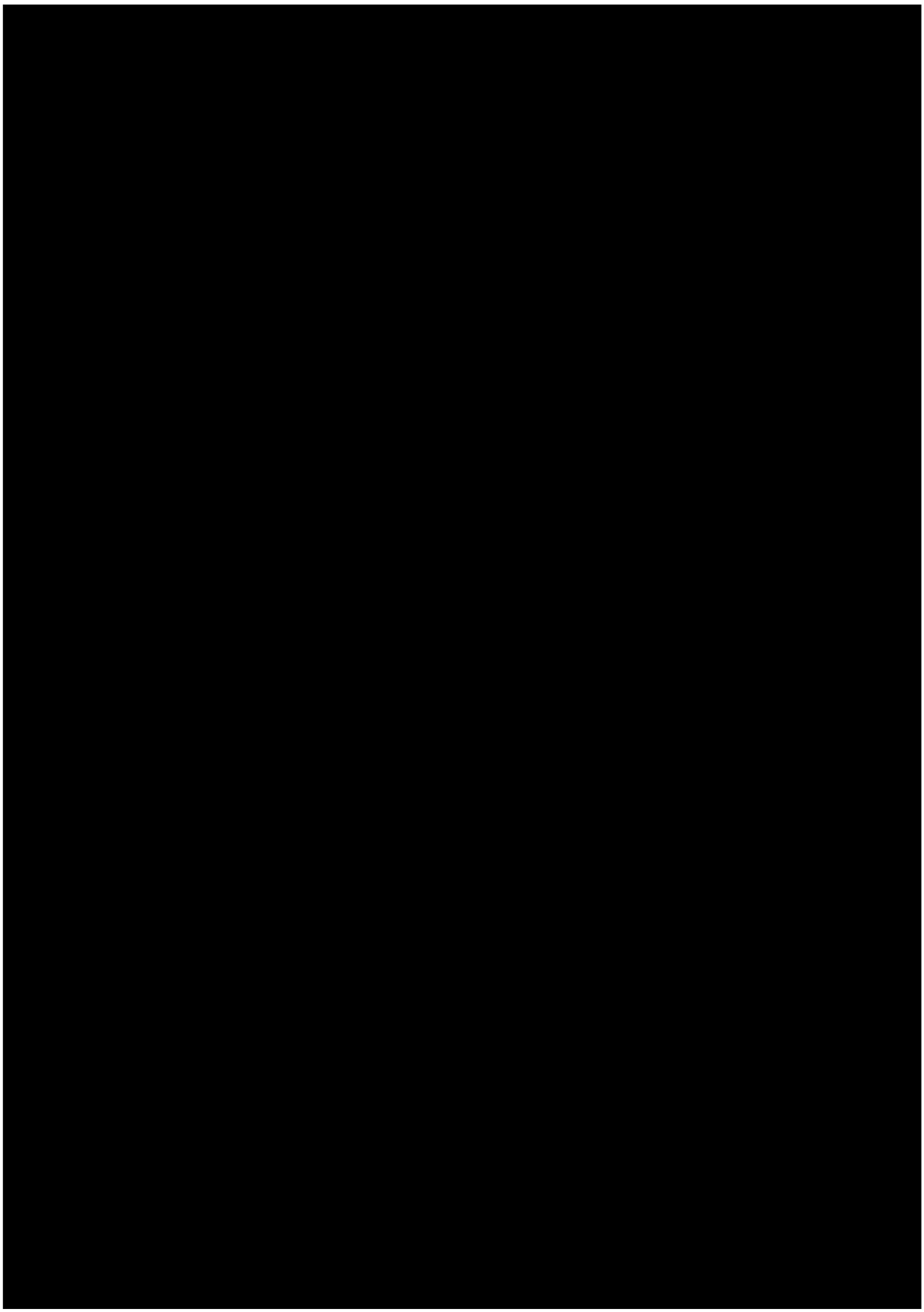
[redacted] (2018b) Validation of Method MV182: EKA: GC-Determination of Transfluthrin and Piperonyl Butoxide in Aroxol Antimoth Antiacari Spray. [redacted], unpublished.

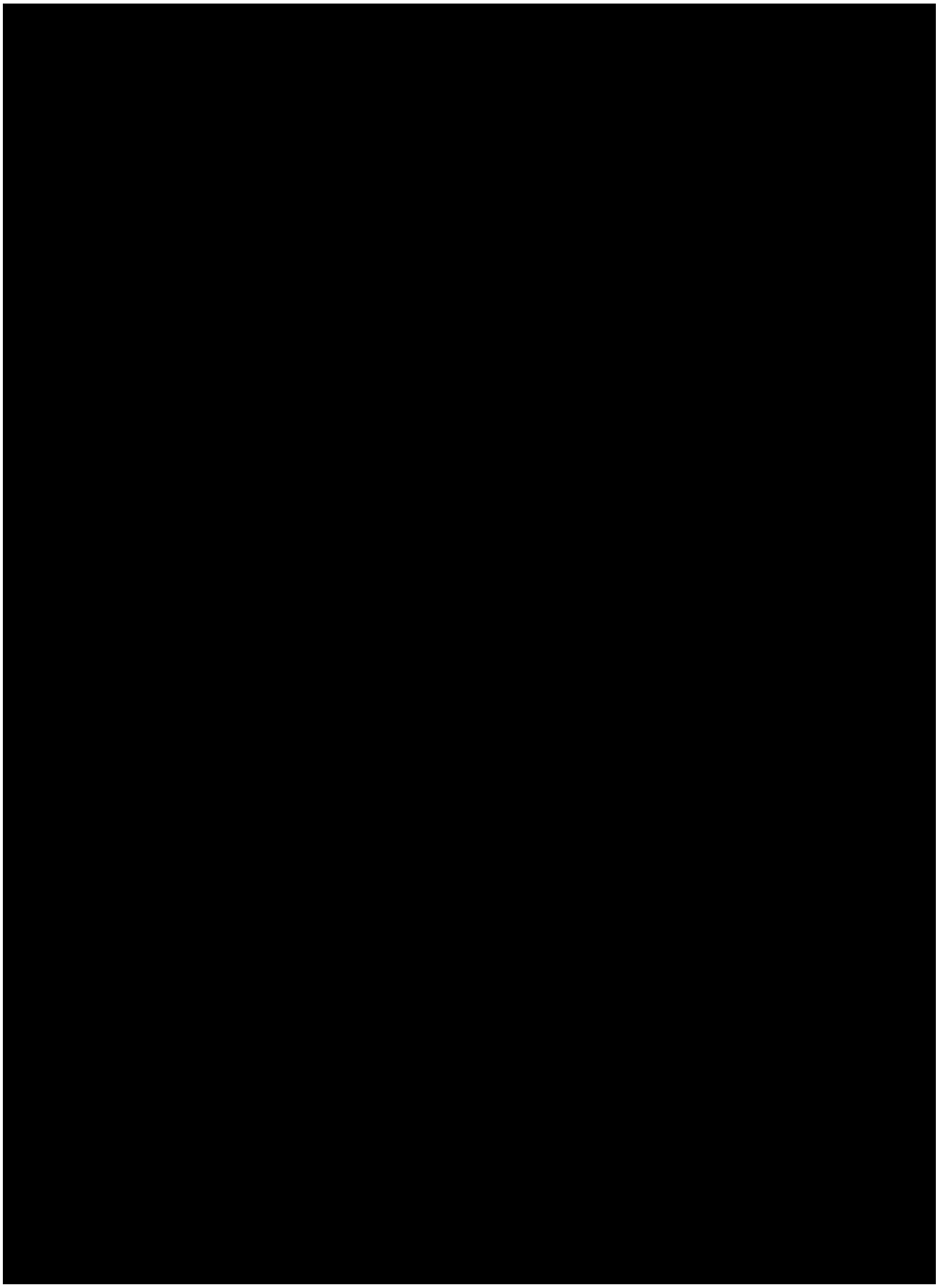
3.2 Output tables from exposure assessment tools

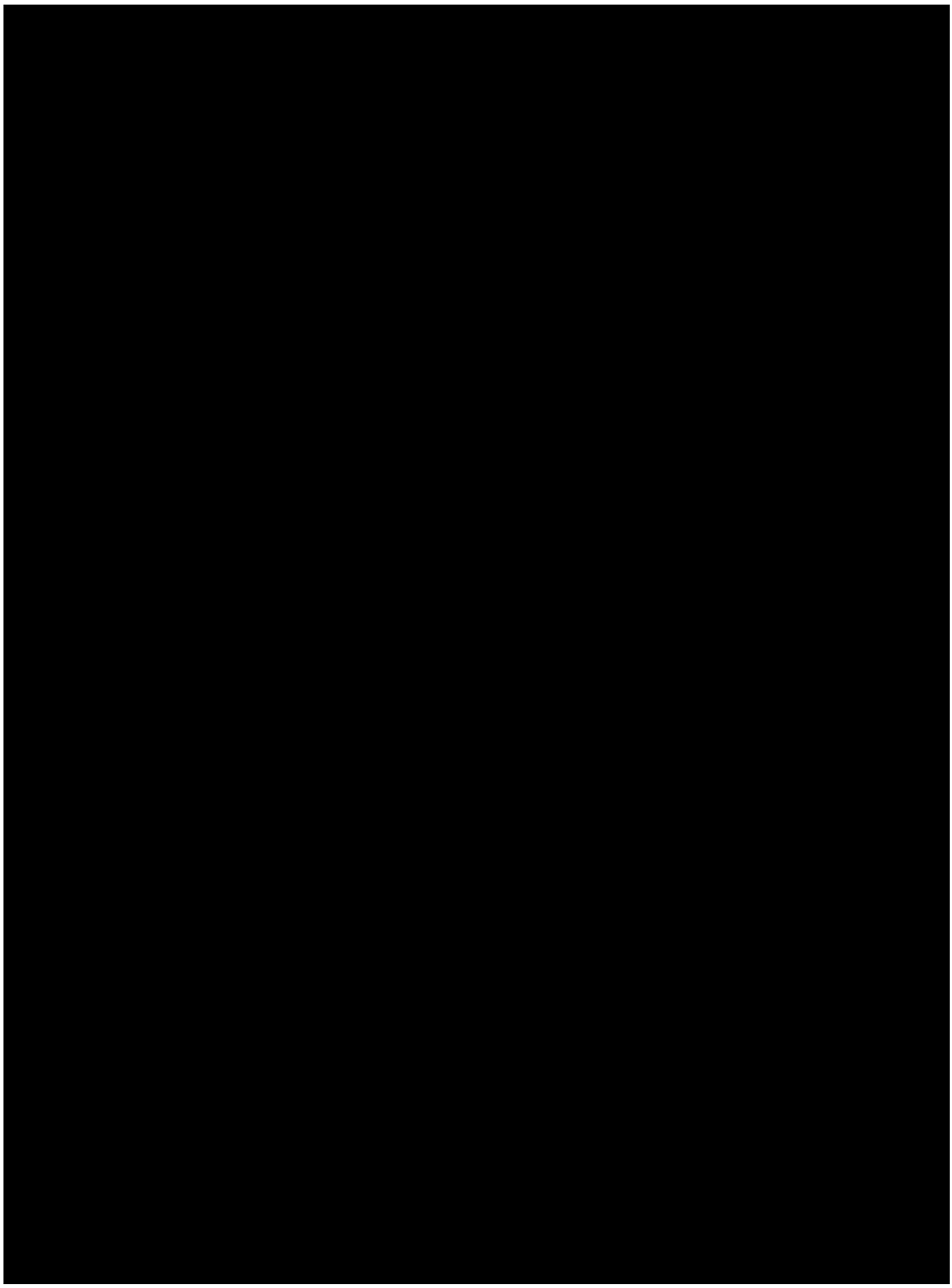
3.2.1 Human Health Risk Assessment

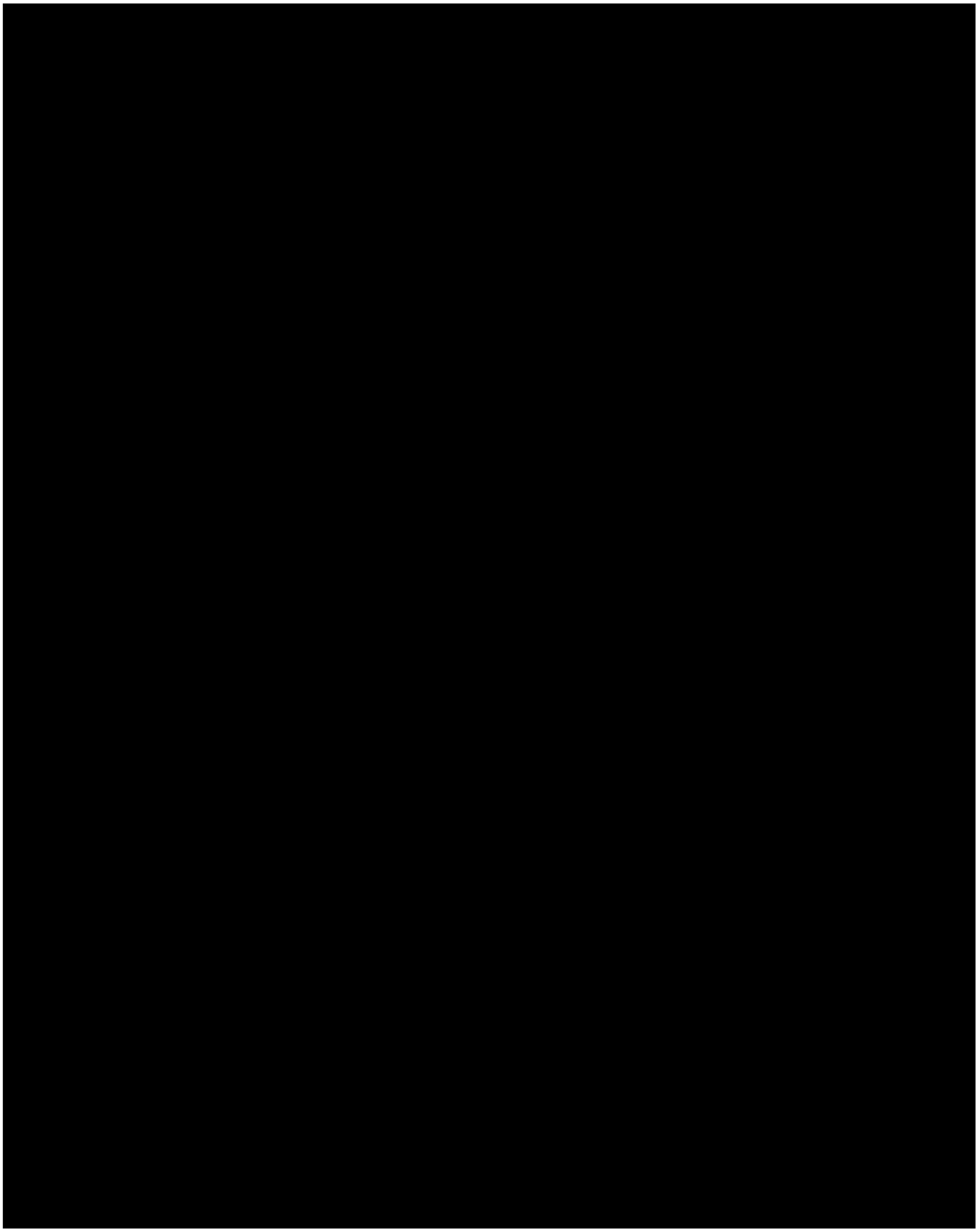


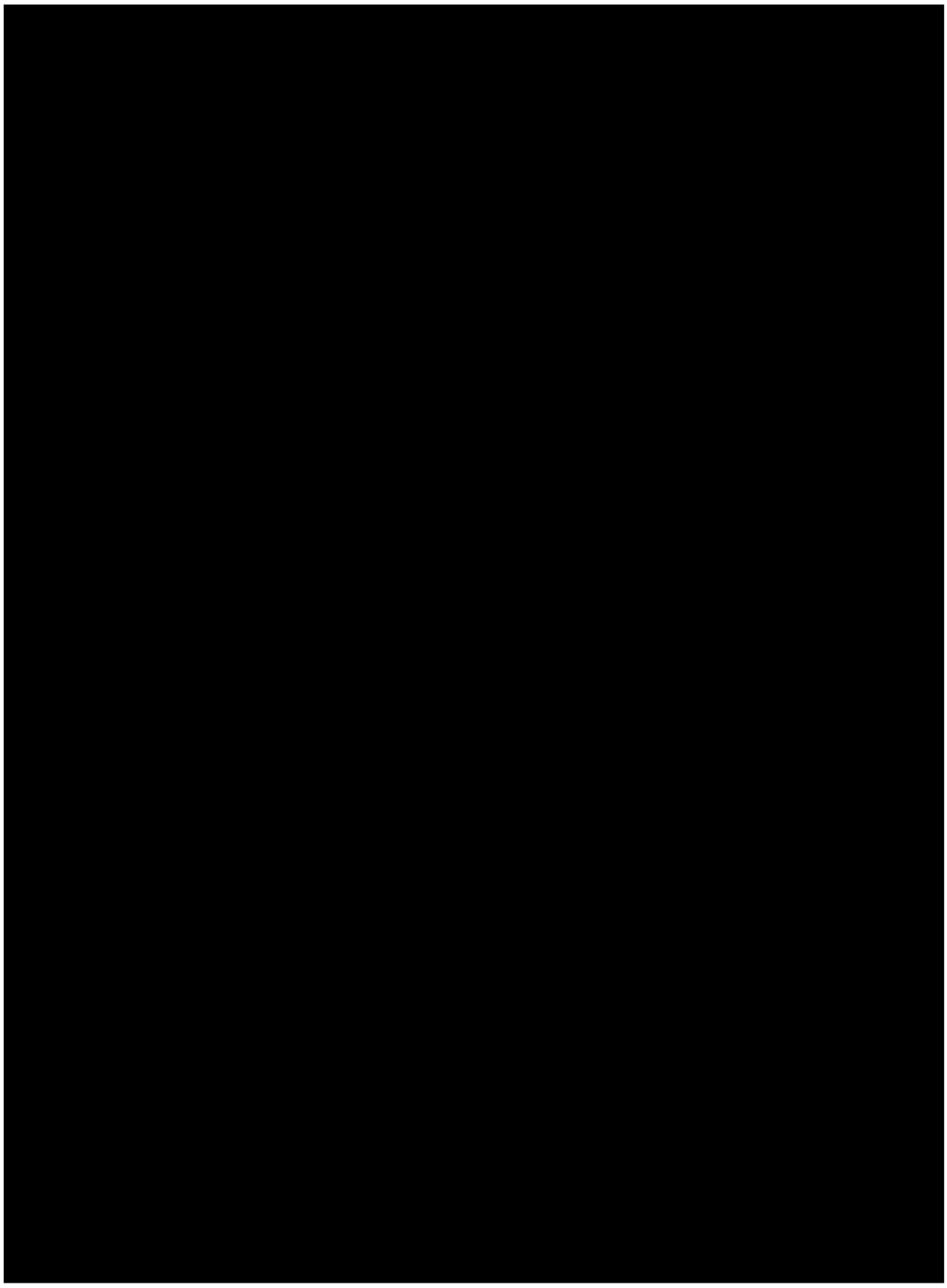


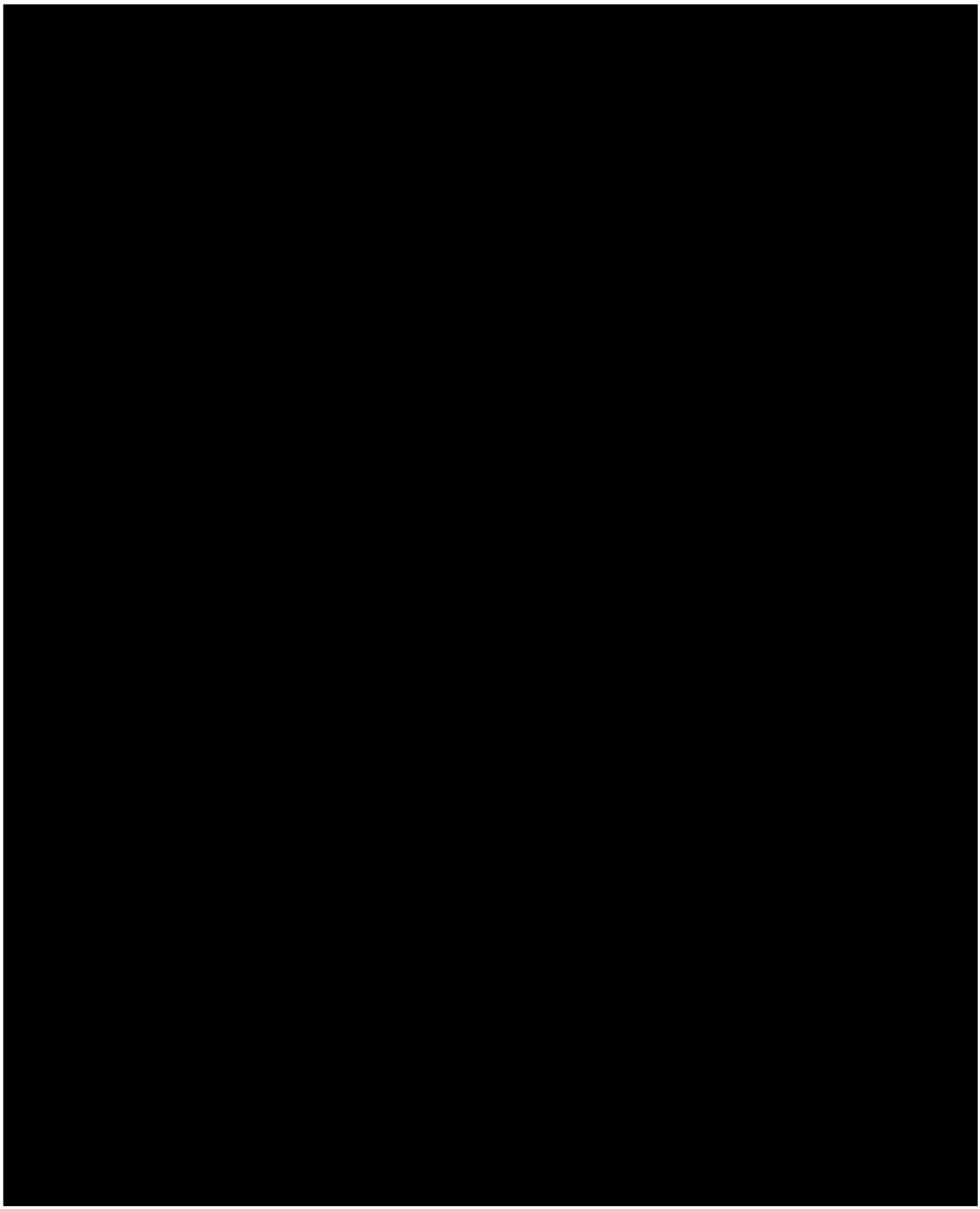


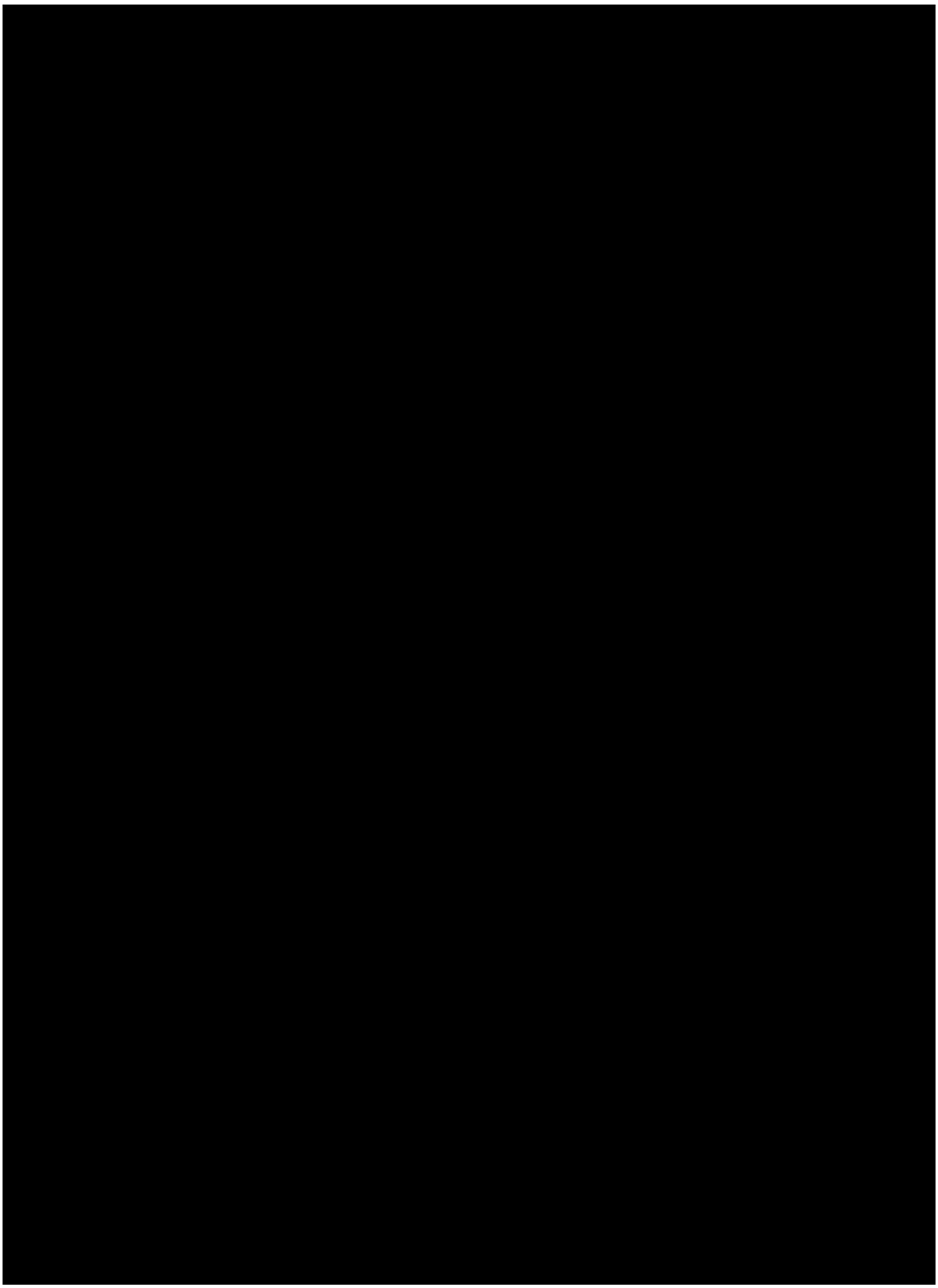


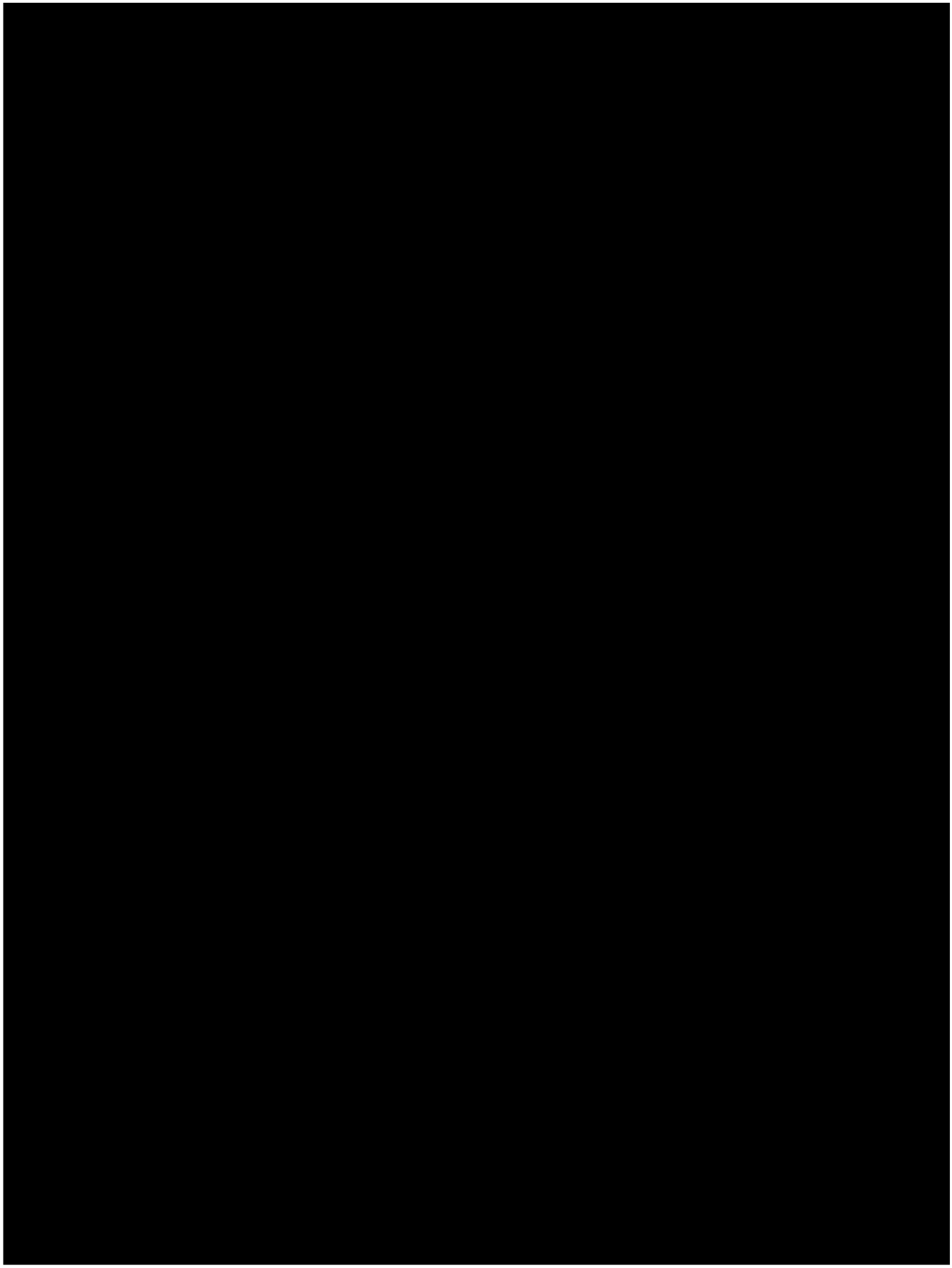


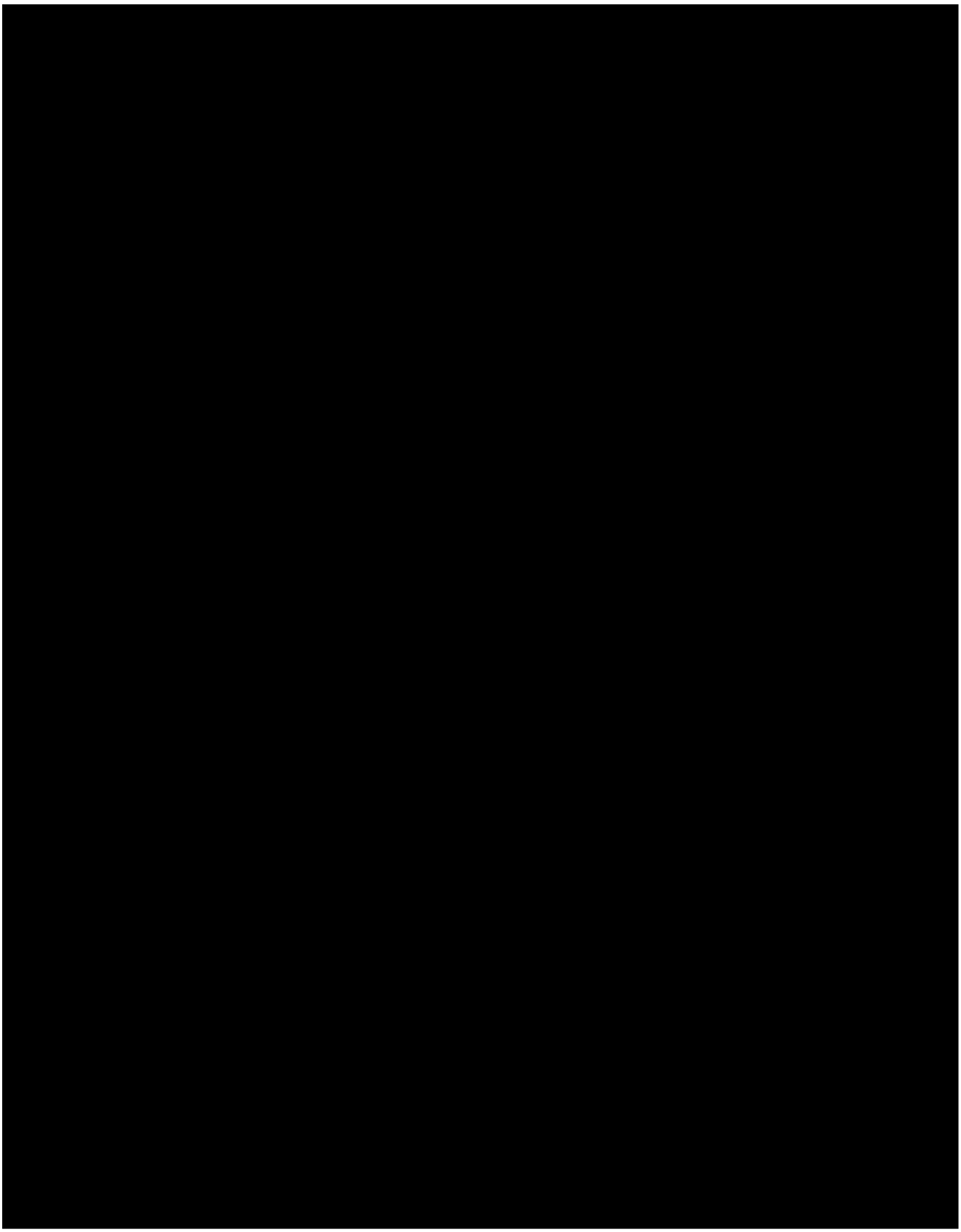


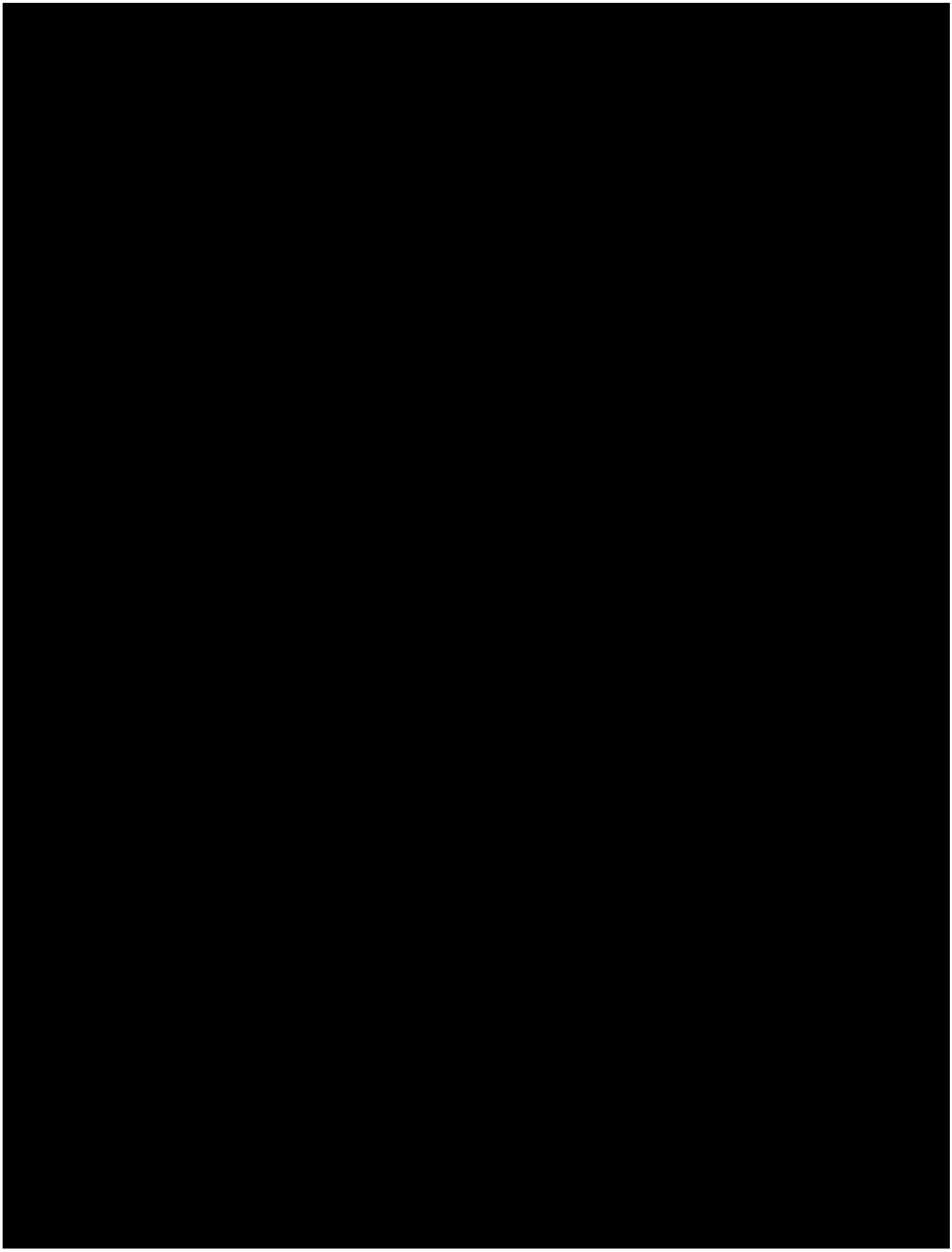












3.2.2 Enviromental Risk Assessment

[redacted]

[redacted]

3.3 New information on the active substance (attached to the Substance Data Sets in the IUCLID dossier)

[redacted] (2019). TFL-PAI-2019-v2. Relevant endpoints and PNEC derivation Environment & Ecotoxicity, Substance: Transfluthrin CAS No.: 118712-89-3. Completed on: 2019-10-09. [redacted].

[redacted] (2020) Piperonyl butoxide – Manufacturing plant postal code. [redacted]

[redacted] (2018) Piperonyl butoxide – Methyl dihydrosafrole level. [redacted]

[redacted]. (2015). [methylene-14C] transfluthrin: Aerobic Degradation / Metabolism in Four Soils. [redacted]. Cited in [redacted], 2019.

IRAC (2010) Insecticide Resistance Management Global Guidelines for IRAC Group 28 (Diamide) Insecticides, March 2010 Version: 2.1, Prepared by: IRAC Group 28 (Diamide) Working Group.

[redacted] (2020) SoCs formation and stability: BUTANE PROPANE 80/20 and ISOPROPYL ALCOHOL. [redacted].

[redacted]. (2015). Chironomus riparius 28-day chronic toxicity test with transfluthrin (tech.) in a water-sediment system using spiked sediment. [redacted]. Cited in [redacted], 2019.

[redacted](2015): Chronic Toxicity of Transfluthrin Technical to Daphnia magna Under Flow-Through Conditions. [redacted]. Cited in [redacted], 2019.

[redacted] (2018) Piperonyl butoxide: Synergism with natural pyrethrins and synthetic pyrethroids. Version 1.0. [redacted].

[redacted] (2014). Transfluthrin a.s. (BCS-AW53131): Effects on the activity of soil microflora (Nitrogen transformation test), [redacted] Cited in [redacted], 2019.

3.4 Residue behaviour

[redacted]

3.5 Summaries of the efficacy studies (B.5.10.1-xx)[34]

[redacted]

[34] If an IUCLID file is not available, please indicate here the summaries of the efficacy studies.

Other

General information on active substances

Assessment report (2017), Piperonyl Butoxide, Product-type 18 (insecticides, acaricides and products to control other arthropods), January 2017, Greece.
Assessment report (2014), Transfluthrin (insecticides, acaricides and products to control other arthropods) 13 March 2014, the Netherlands.

Regulations/Guidance used

[redacted]

Software used