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

PRODUCT ASSESSMENT REPORT OF A BIOCIDAL PRODUCT (FAMILY) FOR NATIONAL AUTHORISATION APPLICATIONS

(submitted by the evaluating Competent Authority)

GUT-YODOFILM

Product type 03

Iodine (including PVP iodine) as included in the Union list of approved active substances

Case Number in R4BP: BC-YF028488-22

Evaluating Competent Authority: SPAIN

Date: May 2024

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1 CONCLUSION

Explanatory note (only for Spain authorisation):
The conclusions reached in this PAR, which affect the category of "Professional", if appropriate, will be applicable to Professional and Trained Professional users at the Spanish level.
Therefore, regarding the category of authorized users, **ES CA will apply article 37 according to the BPR.**

Efficacy against target organisms

GUT-YODOFILM is a RTU biocidal product containing Polyvinylpyrrolidone iodine as active substance. The product is used as PT03 by professionals for the control of bacteria and yeast.

The biocidal product GUT-YODOFILM has been shown to be efficacious against bacteria as *Escherichia coli, Staphylococcus aureus, Streptococcus uberis* and yeast *Candida albicans* for all intended uses. More information is available in section 3.5 of the PAR.

Human health

GUT-YODOFILM contains Iodine (CAS 7553-56-2) that is used in biocidal products for the disinfection of teats/udder. In the products type 3, iodine is complexed with Polyvinylpyrrolidone (iodophor type 2).

The assessment of the product Gut-Yodofilm/ I-630-G-Plus presented in this report shows that the intended use of teat disinfection has no unacceptable risks for human health. The product is classified according to Regulation No. 1272/2008 (CLP) as Eye Irritant2. H319 Causes serious eye irritation.

Physical-chemical properties

GUT-YODOFILM is a brown liquid with an iodine odour. The density is 1.040 g/cm3.

The product is stable after 54ºC during 14 day. Regarding storage at low temperature the label must state: "protect from frost". The study of storage stability at long time shows that the product is stable at room temperature.
The product has shown to be non-corrosive to metals (steel and aluminium).

GUT-YODOFILM is not considered potentially explosive and nor oxidising properties.
Regarding analytical methods, all acceptance criteria were satisfied: the applied method fit the requirements of the validation for the quantitative analysis.

Environmental risk

Based on the available information related to the use of the product GUT YODOFILM, the environmental assessment is acceptable.

2 ASSESSMENT REPORT

2.1 Summary of the product assessment

2.1.1 Administrative information

2.1.1.1 Identifier of the product / product family

Identifier	**Country (if relevant)**
GUT-YODOFILM	Spain

2.1.1.2 Authorisation holder

Name and address of the authorisation holder	**Name**	TESIS GALICIA, S.L.
	Address	Alemparte de Arriba 29-A 36860 Ponteareas PONTEVEDRA
Authorisation number	ES/APP(NA)-2024-03-00938	
Date of the authorisation	13/05/2024	
Expiry date of the authorisation	13/05/2034	

2.1.1.3 Manufacturer(s) of the products of the family

Name of manufacturer	TESIS GALICIA, S.L.
Address of manufacturer	Alemparte de Arriba 29-A 36860 Ponteareas PONTEVEDRA
Location of manufacturing sites	Alemparte de Arriba 29-A 36860 Ponteareas PONTEVEDRA

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

Active substance	**Polyvinylpyrrolidone iodine**
Name of manufacturer	Ashland Services BV
Address of manufacturer	Pesetrastraat 5, 2991 XT Barendrecht, The Nethderlans
Location of manufacturing sites	ISP Chemicals LLC, 455 North Main Street, Calvert City, KY 42029.

Active substance	**Iodine**
Name of manufacturer	Ashland Services BV
Address of manufacturer	Pesetrastraat 5, 2991 XT Barendrecht, The Netherlans
Location of manufacturing sites 1	Sociedad Quimica y Minera (SQM) S.A Los militares 4290, Las Condes Santiago Chile
Location of manufacturing sites 2	Cosayach S.A. Compañía de Salitre y yodo Amunátegui 178, 7th Floor,

	Santiago Chile
Location of manufacturing sites 3	Algorta Norte. Av. El Golf 99 Of. 703, Santiago, Las Condes Chile Almonte Chile (E.T.asset number: EU-0012442-0000)

Algorta Norte is a manufacturer of owner data Ashland Services BV in Technical Equivalence (T.E. asset num. EU-0012442-0000) and Ashland Services BV is in Article 95 List.

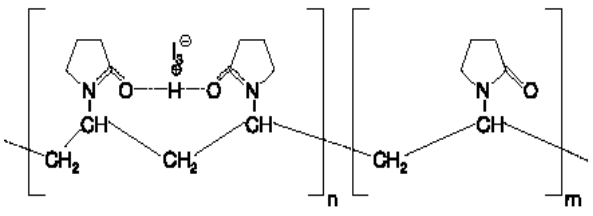
2.1.2 Product (family) composition and formulation

NB: the full composition of the product has been 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 substance

Main constituent(s)	
ISO name	Iodine
IUPAC or EC name	Iodine
EC number	231-442-4
CAS number	7553-56-2
Index number in Annex VI of CLP	053-001-00-3
Minimum purity / content	995 g/kg
Structural formula	I-I
Iodine is formulated as PVP-Iodine in the product.	
IUPAC Name	Polyvinylpyrrolidone iodine (common name PVP-iodine)
EC number	607-771-8
CAS number	25655-41-8
Minimum purity / content	10% available iodine For polyvinylpyrrolidone iodine: the iodine content shall have a purity of 995 g/kg
Structural formula	

2.1.2.2 Candidate(s) for substitution

The active substance iodine (including PVP-iodine) is not a candidate for substitution in accordance with Article 10 of the BPR (EU) Regulation 528/2012. Therefore this product has not been subject to a comparative assessment.
However, according to the note CA-September18.Doc.7.5.a-final on "Implementation of scientific criteria to determine the endocrine-disrupting properties of already approved active substances", it is proposed for iodine to trigger an early review as this active substance may have endocrine disrupting properties.
In addition, there is no indications that iodine would fulfil the exclusion criteria specified in article 5(1), nor the substitution criteria specidied in Article 10 (1) of Regulation (EU) No 528/2012.

2.1.2.3 Qualitative and quantitative information on the composition of the biocidal product

Common name	**IUPAC name**	**Function**	**CAS number**	**EC number**	**Content (%)**
PVP-Iodine (containing 10% iodine)	2-Pyrrolidinone, 1-ethenyl-, homopolymer, compd. with iodine	Active substance	25655-41-8	607-771-8	2.5
Available Iodine	Iodine		7553-56-2	231-442-4	0.25
Isopropyl Alcohol	propan-2-ol	Non-active substance	67-63-0	200-661-7	0.85

2.1.2.4 Information on technical equivalence

One of three sources of Iodine used by supplier Ashland Services BV including in PVP-Iodine is an alternative source considered technically equivalent compared to the reference source. ECHA opinion (Decision No TAP-D-1175247-23-00/F).

2.1.2.5 Information on the substance(s) of concern

Not applicable. According to the definition of a substance of concern laid down in the Guidance on the BPR Volume III Human Health-Assessment & Evaluation Part B and C (Version 4.0 December 2017), GUT-YODOFILM does not contain any substances of concern. Regarding the environmental assessment, there is a coformulant (propan-2-ol) that could be considered as SoC.
Please see the confidential annex for further details on composition.

2.1.2.6 Type of formulation

Any other liquid- Ready to use

2.1.3 Hazard and precautionary statements

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

Classification	
Hazard category	Eye irritant 2 Aquatic Chronic 3
Hazard statement	H319: Causes serious eye irritation. H412: Harmful to aquatic life with long lasting effects.
Labelling	
Signal words	Danger
Pictograms	GHS07
Hazard statements	H319: Causes serious eye irritation. H412: Harmful to aquatic life with long lasting effects.
Precautionary statements	P264: Wash … thoroughly after handling. P273: Avoid release to the environment P280: Wear protective gloves/ protective clothing/eye protection/face protection/ hearing protection/… P305+P351+P338: 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. P501: Dispose of contents/container as hazardous waste to a registered establishment or undertaking, in accordance with current regulations.

*ES CA will apply article 37 according to BPR in the authorisation of this product including in this section the P statements that are recommended and highly recommended according to the result of the risk assessment of the product and considering the Guidance on labelling and packaging in accordance with Regulation (EC) No 1272/2008 (Version 4.2 March 2021).

2.1.4 Authorised use(s)

2.1.4.1 Use description

Table 1. Use # 1 – Post-milking teat disinfection by manual dipping.

Product Type	PT3 (Veterinary hygiene)
Where relevant, an exact description of the authorised use	Teat disinfection (non-medical) by dipping. Post milking application.
Target organism (including development stage)	Bacteria, yeast
Field of use	Indoors and outdoors
Application method(s)	Manual dipping
Application rate(s) and frequency	Application rate: 10 ml/animal/event of RTU after milking The frequency of application is: 2 events/day for manual milking, after each milking event.
Category(ies) of users	Professional*
Pack sizes and packaging material	HEDP plastic containers of 10, 20, 200, 1000L

* Category of users at Spanish level: PROFESSIONAL and TRAINED PROFESSIONAL (ES CA will apply article 37)

2.1.4.1.1 Use-specific instructions for use

See section 2.1.5.2

2.1.4.1.2 Use-specific risk mitigation measures

See section 2.1.5.3

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

See section 2.1.5.4

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

See section 2.1.5.5

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

See section 2.1.5.6

2.1.4.2 Use description

Table 2. Use # 2 – Post-milking teat disinfection by automatic dipping robot.

Product Type	PT3 (Veterinary hygiene)
Where relevant, an exact description of the authorised use	Teat disinfection (non-medical) by robot. Post milking application.
Target organism (including development stage)	Bacteria, yeast
Field of use	Indoors and outdoors
Application method(s)	Automatic dipping robot
Application rate(s) and frequency	Application rate: 10 ml/animal/event of RTU after milking The frequency of application is: 3 events/day for milking systems, after each milking event.
Category(ies) of users	Professional*

Pack sizes and packaging material	HEDP plastic containers of 10, 20, 200, 1000L

* Category of users at Spanish level: PROFESSIONAL and TRAINED PROFESSIONAL (ES CA will apply article 37)

2.1.4.2.1 Use-specific instructions for use

See section 2.1.5.2

2.1.4.2.2 Use-specific risk mitigation measures

See section 2.1.5.3

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

See section 2.1.5.4

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

See section 2.1.5.5

2.1.5 General directions for use

2.1.5.1 Instructions for use

Please read the label or leaflet before use and follow all the instructions provided.

This biocidal product is specially formulated to be applied for disinfection of the teat hole after milking. It is indicated for topical use in dairy cows, sheep and goats.

Apply the product on the udder nipple covering it homogeneously. Immerse the teat in the pure product immediately after milking. Before next milking remove the remains of the biocidal product.

Respect the conditions of use of the product (concentration, contact time, temperature, pH, etc.).

Contact time: At least 5 minutes.

2.1.5.2 Risk mitigation measures

Avoid contact with eyes and skin.

During product handling phase, wear protective chemical resistant gloves (glove material to be specified by the authorisation holder within the product information).

Personal protection equipment, at least chemical googles is recommended.

It is recommended to design all work processes always so that the following is excluded: Inhalation of vapours or spray/mists. Use only in well-ventilated areas

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

IF INHALED: If symptoms occur call a POISON CENTRE or a doctor.
IF SWALLOWED: Rinse mouth. Give something to drink, if exposed person is able to swallow. Do NOT induce vomiting. Call a POISON CENTRE or a doctor.
IF ON SKIN: Wash skin with water. If symptoms occur call a POISON CENTRE or a doctor.
IF IN EYES: Rinse with water. Remove contact lenses, if present and easy to do. Continue rinsing for 5 minutes. Call a POISON CENTRE or a doctor.

IF MEDICAL ADVICE IS NEEDED, HAVE THE PRODUCT CONTAINER OR LABEL AT HAND AND CONTACT THE POISON CONTROL CENTER

Environmental precautions:
Avoid at all cost any type of spillage into an aqueous medium. Contain the product absorbed appropriately in hermetically sealed
containers. Notify the relevant authority in case of exposure to the general public or the environment.
Methods and material for containment and cleaning up:
It is recommended:
Absorb the spillage using sand or inert absorbent and move it to a safe place. Do not absorb in sawdust or other combustible absorbents.

2.1.5.4 Instructions for safe disposal of the product and its packaging

Empty containers, unused product, washing water, containers and other waste generated during application are considered hazardous waste. Deposit packaging waste at the established collection points or deliver it to a registered hazardous waste operator as agreed with the extended producer responsibility system. Deliver the other wastes to a registered establishment or undertaking for hazardous waste, in accordance with current regulations.

Code the waste according to Decision 2014/955 / EU.

Do not release to soil, ground, surface water or any kind of sewer.

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

Keep out of reach of children and non-target animals/pets.

Technical measures for storage
-Minimum Temp.: 5 ºC
-Maximum Temp.: 30 ºC

General conditions for storage
-Avoid sources of heat, radiation, static electricity and contact with food.

Shelf-life: 1 years from the date of manufacture

2.1.6 Other information

ONLY for SPAIN:

In order to adapt the category of authorized users to its national legislation, ES CA will apply Art 37 of the BPR. Definitions (Users in Spain):

Professional: User applying biocidal products in the workplace. This user has some knowledge and skills in the handling of chemicals, and is able to correctly use personal protective equipment (PPE) if necessary.

Trained professional: pest control operators, having received specific training in biocides according to the national legislation in force.

In that context, the exposure assessment will be the same for professionals and trained professional users and the difference between the two will depend on the expert judgment following "limiting criteria" below:

1. The hazardousness of the product under evaluation.
2. The use being requested.
3. The frequency of use.
4. Complexity of control measures.

2.1.7 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)
Container (e.g. jerry can, drum,..)	10, 20, 200, 1000L	PLASTIC: HEDP	screw cap, closure with Turn-lock ring / safety ring / Closure without venting system (HDPE)	professional	YES

2.1.8 Documentation

2.1.8.1 Data submitted in relation to product application

EFFICACY TEST

EN1656 Bactericide (E. coli, S. Aureus, S. Uberis) . Suspension test. Interfering substance: 10 g/l skim milk
EN 1657. Yeasticide (C. Albicans). Suspension test. Interfering substance: 10 g/l skim milk
PR EN 17422 WI 00216117 DRAFT METHOD (REVISION 2): Bactericide (E. coli, S. Aureus, S. Uberis, C. Albicans) Surface test. Interfering substance: 10 g/l skim milk

2.1.8.2 Access to documentation

TESIS GALICIA, S.L. has access to a Cover Letter and a Letter of Access from ASHLAND SERVICES B.V.

2.2 Assessment of the biocidal product (family)

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

Table 1. Intended use # 1 –Teat disinfection by dipping

Product Type(s)	PT3 (Veterinary hygiene)
Where relevant, an exact description of the authorised use	Teat disinfection by dipping Post-milking application
Target organism (including development stage)	Bacteria, yeast
Field of use	Indoors and outdoors use
Application method(s)	Dipping
Application rate(s) and frequency	Post-milking application 10 ml/event
Category(ies) of user(s)	Professional users
Pack sizes and packaging material	Please see the relevant section.

Table 1. Intended use # 2-Teat disinfection by robot

Product Type	PT3 (Veterinary hygiene)
Where relevant, an exact description of the authorised use	Teat disinfection by robot Post-milking application
Target organism (including development stage)	Bacteria, yeast
Field of use	Indoors and outdoors use
Application method(s)	Dipping
Application rate(s) and frequency	Post-milking application 10 ml/event
Category(ies) of users	Professional users
Pack sizes and packaging material	Please see the relevant section.

2.2.2 Physical, chemical and technical properties

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference

Physical state at 20 °C and 101.3 kPa	Visual assessment	100%	Liquid	-
Colour at 20 °C and 101.3 kPa	Visual assessment	100%	Brown	-
Odour at 20 °C and 101.3 kPa	Visual assessment	100%	characteristic odour of iodine	-
Acidity / alkalinity	CIPAC MT 75.3 CIPAC MT 191	100% 100% 100%	pH (100%)= 2,05 pH (1%)= 5,22 [H_2SO_4] (%, m/m)= 0,07	RENOLAB Lodi, 2022
Relative density / bulk density	OECD 109	100%	1.040 g/mL at 20ºC	RENOLAB Gazzotti, 2021
Storage stability test – **accelerated storage**	CIPAC MT46.3	100%	There was no significant change (<10% from the initial value) in the active ingredient content of the test item during storage at 54 ± 2ºC for 14 days (2 weeks) in a black plastic (opaque) container with a black plastic opaque screw on lid. It can be concluded that the product will most likely comply with a shelf life specification of 1 year. Appearance Initial: Dark amber opaque liquid in a black plastic opaque container A.s. content at 54ºC: Initial: 0.27% pH: 2.47 14d: 0.26% pH: 2.43	BIOQTHAI &BIOINGENIAL 2019
Storage stability test – **long term storage at ambient temperature**	CIPAC MT46.3	100% Batch nº: M220426	12 months at 25±2 ºC **t=0m** Parameters: - PVP content: 2,35% - pH= 2,07	LABORATORIO CONTROL MICROBIOLÓGICO Y QUÍMICO

			- Container weight: 1166g - Appearance: brown liquid orange. - Odour: characteristic **t=9m** - PVP content: 2,26% Δ= -3,83% - pH= 1,89 - Container weight: - - Appearance: brown liquid orange. - Odour: characteristic **t=12m** - PVP content: 2,22% Δ= -5,53% - pH= 2,06 - Container weight: 1166g - Appearance: brown liquid orange. - Odour: characteristic.	2023
Storage stability test – **low temperature stability test for liquids**	-	-	Protect from frost	-
Effects on content of the active substance and technical characteristics of the biocidal product - **light**	-	-	Opaque packaging, therefore no impact on content of active substance due to exposure to light expected.	-
Effects on content of the active substance and technical characteristics of the biocidal product – **temperature and humidity**	-	-	Temperature: The effect of temperature on the content of the active substance is reported in the accelerated storage reports (Storage at 30°C and for one product at 54°C). Humidity: the biocidal product are water based formulations, humidity is not expected to influence content of	-

			active substance during storage.	
Effects on content of the active substance and technical characteristics of the biocidal product - **reactivity towards container material**	-	-	In none of the test items a significant change in the appearance of the container material was observed.	-
Wettability	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of wettability is not applicable.	-
Suspensibility, spontaneity and dispersion stability	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of suspensibility, spontaneity and dispersion stability is not applicable.	-
Wet sieve analysis and dry sieve test	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to	-

			use liquid products. Thus, wet sieve analysis and dry sieve test is not applicable.	
Emulsifiability, re-emulsifiability and emulsion stability	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products Thus, testing of emulsifiability, re-emulsifiability and emulsion stability is not applicable.	-
Disintegration time	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of disintegration time is not applicable.	-
Particle size distribution, content of dust/fines, attrition, friability	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of particle size, content of dust/fines, attrition and friability is not applicable	-

Persistent foaming	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of persistent foaming is not applicable.	-
Flowability/Pourability/Dustability	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of flowability/pourability/ dustability is not applicable.	-
Burning rate — smoke generators	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of Burning rate-smoke generators is not applicable.	-
Burning completeness — smoke generators	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR),	-

			Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of Burning completeness-smoke generators is not applicable.	
Composition of smoke — smoke generators	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products. Thus, testing of composition of smoke-smoke generators is not applicable	-
Spraying pattern — aerosols	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products not appliying by spray methond. Thus, testing of spraying pattern aerosols is not applicable	-
Physical compatibility	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products,	-

			not to mixture with another products Thus, testing of physical compatibility is not applicable.	
Chemical compatibility	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. All products of this biocidal product family are ready to use liquid products, not to mixture with another products Thus, testing of chemical compatibility is not applicable.	-
Degree of dissolution and dilution stability	-	-	Not applicable according to "Guidance on the Biocidal Products Regulation, Volume I, Part A" for Regulation (EU) No 528/2012 (BPR), Version 1.1, November 2014. This ready to use liquid products. Thus, testing of degree of dissolution and dilution stability is not applicable.	-
Surface tension	EEC method A.5 OECD 115 Ring method	100%	50.6 mN/m at 20ºC	RENOLAB Gazzotti, 2021
Viscosity	OECD 114	100%	Kinematic (mm2/s) 20ºC= 945.71 40ºC= 740.12 Dinamic (mPa*s) 20ºC= 983.28 40ºC= 766.94	RENOLAB Gazzotti, 2021

Conclusion on the physical, chemical and technical properties of the product

GUT-YODOFILM is a brown liquid containing 2.5% PVP-Iodine with characteristic odour. pH of neat and 1% aqueous solution are 2,05 and 5.23 respectively. Its relative density is 1.04 g/cm3 with a suface tension of 50.6 mN/m at 20ºC and a dynamic viscosity at 40ºC of 766.94 and 983.28 mPa·s at 20ºC. Accelerated and long term life storage stability tests support the shelf life of 2 years.

2.2.3 Physical hazards and respective characteristics

Property	Guideline and Method	Purity of the test substance (% (w/w)	Results	Reference
Explosives	-	-	This is a ready to use liquid product. Due to the high water content in the formulation it is not expected that the product may explode. The products do not contain components associated with explosive properties.	-
Flammable gases	-	-	Not applicable.	-
Flammable aerosols	-	-	Not applicable.	-
Oxidising gases	-	-	Not applicable.	-
Gases under pressure	-	-	Not applicable.	-
Flammable liquids	-	-	Not applicable.	-
Flammable solids	-	-	Not applicable.	-
Self-reactive substances and mixtures	-	-	Not applicable.	-
Pyrophoric liquids	-	-	Due to high water content and known experience none of the formulation of the biocidal product is expected to have pyrophoric properties Not applicable.	-
Pyrophoric solids	-	-	Not applicable	-
Self-heating substances and mixtures	-	-	Not applicable	-
Substances and mixtures which in contact with water emit flammable gases	-	-	Due to high water content and known experience none of substances of the product is expected to emit flammable gases	-
Oxidising liquids	-	-	Not applicable.	-

Oxidising solids	-	-	Not applicable.	-
Organic peroxides	-	-	Not applicable.	-
Corrosive to metals	MT 37.4, Manual of test and Criteria of the Transport of Dangerous Goods of United nations	100%	7 days at 55ºC Corrosion rate of Aluminium: <6,25 mm/year (mass loss: (0.73-2.10)%, below the threslhold of 13.5%) Corrosion rate of Steel: <6,25 mm/year (mass loss: (0.89-4.58)%, below the threslhold of 13.5%).	RENOLAB Lodi, 2022
Auto-ignition temperatures of products (liquids and gases)	-	-	Not applicable.	-
Relative self-ignition temperature for solids	-	-	Not applicable.	-
Dust explosion hazard	-	-	Not applicable.	-

Conclusion on the physical hazards and respective characteristics of the product
GUT-YODOFILM does not have explosive, oxidizing or self-reactive properties. According to UN test C.1 criteria the product is not considered to be corrosive to metals.

2.2.4 Methods for detection and identification

As indicated in the CAR, for the determination of both purity of iodine and iodine content in preparations, there exists a well-documented method (titration with sodium thiosulfate) in the European Pharmacopeia. This method will thus be used to determine the content of the active substance in the product.

A validation study of the analytical method (indicated above) for determination of the active substance content in product GUT-YODOFILM//I-630-G is presented in IUCLID and summarized in the table below (Renolab study report 22470-01C).

The analytical method used was validated following SANCO/3030/99 rev. 5. for specificity, linearity, precision (repeatability) and accuracy.

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

substance)									
GUT-YODOFILM / I-630-G plus (iodine)	Titration with sodium thiosulphate (0.1N)	Linearity: 5 standard samples, range: 5.0018-30.0006 g (product) Equivalent to: 0.06 – 0.40 % w/w iodine	r2 = 0.9998 y= 4.8672 x + 0.2452	No interference	Accuracy: 80% and 120 % Of test nominal concentration	Accuracy: 102.9%	Precision: RSD 1.27% with Horrat of 0.39	Not required according to SANCO/3030/99	Renolab 2023, study report 22470-01C
Titration is a generally accepted, although non-specific, method for determination of the content of substances as iodine. The method and validation provided are considered adequate to ensure the active substance content can be adequately determined.									

Analytical methods for monitoring:

- Soil: Not relevant, however analytical methods for determination of iodine in soil are presented in CAR, Dec 2013, Doc III A4.
- Air: Some products are applied by spraying. Analytical methods for determination of iodine in air are presented in the AR.
- Water: Not relevant, however analytical methods for determination of iodine in water are presented in CAR, Dec 2013, Doc III A4.
- Animal and human body fluids and tissues: Not relevant, active substance not classified as toxic or very toxic.

Analytical methods for monitoring of active substances and residues in food and feeding stuff: Analytical methods for determination of iodine residues in milk are presented in the AR.

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		
Determination of iodide in milk and milk powder	HPLC with electrochemical detector (International harmo	Accuracy/precision data generated in the approximate range 0.6-4.3 µg/g (milk powder) and	The correlation coefficient was ≥ 0.99. Applicability range	Yes	75-106 % (milk powders) and 87.8 % (liqui	90.8 % (milk powder) and 87.8 % (liqui	Precision: 7-24%RSD (powder milk)	LOQ can be taken from applicability range: 0.03 µg/g (liquid milk) and	Harmonised method: ISO 14378:2009 Supporting study with

	nised method ISO 14378)	270-310 µg/L (liquid milk). Each sample analysed in blind duplicates over two days. 6-9 laboratories participated (interlaboratory tested).	of method quoted as 0.03 - 1 µg/g (liquid milk) and 0.3-10.0 µg/g (milk powders)		d milk)	d milk)	5-12%RSD (liquid milk)	0.3 µg/g (powder milk)	method validation: Sertl & Malone (1993)

Conclusion on the methods for detection and identification of the product
Analytical methods for the analysis of the product: The method published in the European Pharmacopoeia is common standard method for the determination of iodine in formulations. This method for PVP-I determination was validated for specificity, linearity, repeatability, and accuracy, in compliance with SANCO/3030/99 rev.5 (22/03/19). Based on this analytical method the active substance concentration on the product was determined to be 0.270 ± 0.003 % w/w iodine, corresponding to 2.5 % w/w PVP-I. Analytical methods for monitoring of iodine residue analysis in the environment: Analytical methods to detect the active and residues in the various environmental media are described in the CAR, with exception of monition iodine in milk. Analytical methods for monitoring of iodide in milk: A method using high performance liquid chromatography to determine the iodine content in milk (liquid) and dried milk (powder) is available and presented in this PAR. This method is the international standard ISO 14378:2009. The method has a limit of quantification of approximately 0.03 µg/g (liquid milk) and 0.3 µg/g (powder milk).

2.2.5 Efficacy against target organisms

2.2.5.1 Function and field of use

MG01: Disinfectants

PT03: Veterinary hygiene - Teat disinfection

GUT-YODOFILM is a ready to use biocidal product intended to use as nipple sealant post-milking of milk producing animals.

Field of use: Indoor and outdoor

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

The product is used to control bacteria, such as *Escherichia coli, Staphylococcus aureus and Streptococcus uberis*, and yeast as *Candida albicans* in the post-milking process of lactating animals.

Indicated for topical use in dairy cows, sheeps and goats.

2.2.5.3 Effects on target organisms, including unacceptable suffering

Available iodine is the active form. It has a high germicidal power, even at low concentrations. The action of iodine is rapid and lasts several hours. It is combined with carbohydrates and bacterial lipids and oxidizes them (binds to C = C bonds of fatty acids). Also precipitates bacterial proteins and nucleic acids, thus killing the microorganism. In proteins binds to N-H, S-H bonds and phenols, being the oxidation of S-H bonds very fast and irreversible.

Effects on target organisms:

The product is intended to produce a reduction in the number of viable bacterial cells (bactericidal activity) and of yeast cells (yeasticidal activity) of relevant test organisms under defined conditions according to the **EN 1656** and **EN 1657** (phase 2 step 1).

Since there is still no established a specific standard for teat disinfection in phase 2, step 2, the quantitative bactericidal and yeasticidal carrier test with artificial skin has been carried out according to the **PR NF EN 17422:2019** pre-standard. The test method described by the draft standard PR NF EN 17422:2019 is based on the standard EN 16437 but takes into account the practical conditions of application of teat disinfectants.

2.2.5.4 Mode of action, including time delay

The mode of action of iodine is non-selective and is based on the following mechanisms:

- Iodine rapidly penetrates into microorganisms showing a high affinity pattern of adsorption.
- Iodine combines with protein substances in the bacterial cell; these could be peptidoglycans in the cell walls or enzymes in the cytoplasm. This results in irreversible coagulation of the protein and consequent loss of function.
- Iodine is known to act on thiol groups in the cell, if a thiol enzyme is part of a metabolic chain then metabolic inhibition will result.
- Iodine reacts with key groups of proteins, in particular the free-sulphur amino acids cysteine and methionine, nucleotides and fatty acids.

The rapid penetration of iodine into microorganisms and its mode of action indicate that the time-delay i.e. contact time required for sufficient efficacy depends on the tolerance of the organism to iodine and the concentration of iodine used for treatment. Iodine is more effective at higher temperatures.

2.2.5.5 Efficacy data

PT and use number	**Test product**	**Function / Test organism(s)**	**Test method / Test system / concentrations applied / exposure time**	**Test results: effects** *[address here results related to efficacy of the test product and validity of the test]*	**Reference**	**Number in IUCLID section 6.7/Test report title**
Key studies						
PT03 Use: Post-milking teat disinfection	GUT-YODOFILM 2.5% PVP Iodine (0.25% available iodine)	Bactericidal activity / *Escherichia coli*, *Streptococcus uberis* and *Staphylococcus aureus*	EN 1656 (2010) phase 2, step 1 test Concentrations tested: 20%, 8%, 4% Contact time: 5 minutes Temperature: 30ºC Interfering substance: 10 g/l skimmed milk	Passed concentration: 8% Acceptance criteria for test results, as given in chapter 5.7 of EN 1656, fulfilled.	[redacted] Nº 190083258	6.7/ [redacted]
PT03 Use: Post-milking teat disinfection	GUT-YODOFILM	Bactericidal activity / *Escherichia coli*, *Streptococcus uberis* and *Staphylococcus aureus* Yeasticidal activity / *Candida albicans*	prEN 17422 (2019) phase 2, step 2 test Concentrations tested: 100%, 20%, 4%, 0.01% Contact time: 5 minutes Temperature: 30ºC Interfering substance: 10 g/l skimmed milk	Passed concentration: 4% Acceptance criteria for test results, as given in chapter 5.7 of prEN 17422, fulfilled.	[redacted] j003086-2 (with appendix j003240)	6.7/ [redacted]
PT03 Use: Post-milking teat disinfection	GUT-YODOFILM 2.5% PVP Iodine (0.25%	Yeasticidal activity / *Candida albicans*	EN 1657 (2016) phase 2, step 1 test Concentrations tested: 20%, 8%, 4% Contact time: 5 minutes Temperature: 30ºC	Passed concentration: 8% Acceptance criteria for test results, as given in chapter 5.7 of EN 1657, fulfilled.	[redacted] Nº 190083260	6.7/ [redacted]

	available iodine)		Interfering substance: 10 g/l skimmed milk			
Additional information						
PT03 Use: Post-milking teat disinfection	GUT-YODOFILM	Bactericidal activity / *Escherichia coli*, *Streptococcus uberis* and *Staphylococcus aureus* Yeasticidal activity / *Candida albicans*	prEN 17422 (2019) phase 2, step 2 test Concentrations tested: 100%, 20%, 4% Contact time: 5 minutes Temperature: 30ºC Interfering substance: 10 g/l skimmed milk	Passed concentration: 4%	[redacted] j003086-2	6.7/ [redacted]

Conclusion on the efficacy of the product

GUT-YODOFILM is a biocidal product intended to use post-milking application.
For efficacy testing of the GUT-YODOFILM disinfectant product a tiered approach has been provided according to the Guidance on the Biocidal Products Regulation Volume II Efficacy - Assessment and Evaluation (Parts B+C), to the Technical Agreements for Biocides Efficacy (EFF) and to the Minutes of Efficacy Working Group. The EN1656,EN 1657 and the prNF 17422 tests show that the product is bactericidal and yeasticidal at different dilutions rates, although it is a ready to use product.

The EN 1656, EN 1657 and prEN 17422 tests have shown that the biocidal product is bactericide and yeasticide at different dilutions rates, although it is a ready to use product.

According to the Guidance on the Biocidal Products Regulation – Volume II Efficacy – Assessment and Evaluation (Parts B+C), veterinary biocidal products to disinfect teats should be at least sufficiently effective against bacteria and yeasts. Efficacy tests with these organisms should always be provided.

The biocidal product has a bactericidal and yeasticidal activity, that has been demonstrated according to the international European Standards **EN 1656 and EN 1657** (phase 2, step 1), under specific test conditions for post-milking teat disinfectants.

Since there is still no established a specific standard for teat disinfection in phase 2, step 2, the quantitative bactericidal and yeasticidal carrier test with artificial skin has been carried out according to the **PR NF-EN 17422:2019** pre-standard (Chemical disinfectants and antiseptics - Quantitative surface test for the evaluation of teat disinfectants used in the veterinary area - Test method and requirements (phase 2 step 2)) under conditions suitable for post-milking disinfection, and similar to those used for the EN 1656 and EN 1657 standards, as agreed with the eCA.

The test method described by the draft standard PR NF EN 17422:2019 is based on the standard EN 16437 (Chemical disinfectants and antiseptics. Quantitative surface test for the evaluation of bactericidal activity of chemical disinfectants and antiseptics used in veterinary area on porous surfaces without mechanical action. Test method and requirements (phase 2, step 2)), but takes into account the practical conditions of application of teat disinfectants, adapting the test conditions that may influence their activity in practical application, including the test surface, contact time and temperature.

The recommended modes of application are by manual and automatic dipping.

GUT-YODOFILM has been shown to be effective diluted at a 8% against bacteria *Escherichia coli, Streptococcus uberis and Staphylococcus aureus*, in the assay conditions stablished in the UNE-EN 1656:2010 (phase 2, step 1), for post-milking teat disinfectants (30ºC, 5 minutes of contact time and 10 g/l of skimmed milk as interfering substance), and at a 4% when is carried out the quantitative carrier test according to PR NF-EN 14722:2019 (phase 2, step 2) with artificial skin, in the same conditions (at 30ºC, 5 minutes of contact time and with 10 g/l skimmed milk as interfering substance).

In addition, this biocidal product has been shown to be effective at a 8% dilution against the yeast *Candida albicans* in the assay conditions stablished in the UNE-EN 1657:2016 (phase 2, step 1), for post-milking teat disinfectants (30ºC, 5 minutes of contact time and 10 g/l of skimmed milk as interfering substance), and at 4% dilution when is carried out the quantitative carrier test according to PR NF-EN 14722:2019 (phase 2, step 2) with artificial skin, in the same conditions (at 30ºC, 5 min. of contact time and with 10 g/l skimmed milk as interfering substance).

Whereas the following matters:

Phase 2 step 2 test according to prEN 17422:2019 reference: j003086-2, which no satisfy the basic requirements of standard, is considered as additional information. Based on this, prEN 17422:2019 expound that to consider a test as valid to prove the efficacy at least one concentration per test must demonstrate a log reduction equal or greater than 5 (or 4) and at least one concentration must demonstrate a log reduction lower than 5 (or 4). As the last assumption is not fulfilled, the test is not a valid efficacy test.

As regards of phase 2 step 2 test according to prEN 17422:2019 reference: j003086-2 (with appendix j003240), which prove the efficacy of biocidal product at 4%, it was requested a clarification of neutralizer employed to secure that it is among suitable neutralizers reflected in the EN standard. This way, the applicant provided a MSL Statement for the testing undertaken on prEN17422 where it states:

- That N6 is an internal laboratory reference related to the DE NEUTRALIZING BROTH from NEOGEN PRODUCTS with code: NCM0047A.
- That the neutralizer composition is given in the Appendix and it is chosen according to point 5.5.1.2 of the norm.
- It is made on house using 5.5.9 issue 9 MSL´s internal work instruction, which is based on NEOGEN specifications (attached).
- That the preparation is checked via QC and against the specification given by the manufacturer.
- That DE NEUTRALIZNG BROTH is validated against the test product according to section 5.5.2.4.

In addition, the applicant provided also the Technical Information Sheet from NEOGEN for the DE NEUTRALIZING BROTH (NCM0047A), which states: "D/E Neutralizing Broth is used to neutralize and determine the bactericidal activity of antiseptics and disinfectants. D/E Neutralizing Broth is not intended for use in the diagnosis of disease or other conditions in humans."

This justification would considered accepted and the efficacy test is considered as valid to demonstrate the efficacy of the biocidal product.

On this basis, the assessment concludes that the biocidal product GUT-YODOFILM is effective at 8% as nipple sealant for lactating animals. Therefore, it would be considered effective at RTU.

It is considered that using the product according to the conditions as stated in the SPC, the product will be effective.

2.2.5.6 Occurrence of resistance and resistance management

Taking into account the mode of action of iodine which is non-selective, development of resistance against iodine is unlikely. Iodine / iodophors have been used for over 170 years as disinfectants for a variety of applications. Such applications include disinfection of skin in the human hygiene and medical area but also skin of animals using teat dips as well as surfaces such as milk tanks. No reduction in efficacy was reported to the producers of iodine/iodophorbased products for such applications indicating that no development of resistant microorganisms or viruses has occurred.

2.2.5.7 Known limitations

No limitations and no undesirable or unintended side-effects have been observed during these studies.

2.2.5.8 Evaluation of the label claims

Biocidal product for mammals animals nipple disinfection (post-milking). It generates a protective barrier against external microorganisms.

Mode of use:
-By immersion: Dip 2 of the nipple into the dipping cup with pure product. Leave a minimum contact time of 5 minutes.
-By Robot (automatic dipping): immerse 2/3 of the nipple with pure product. Leave a minimum contact time of 5 minutes.

Before the next milking process, eliminate the remaining product.

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

GUT-YODOFILM is not intended to use with other biocidal products.

2.2.6 Risk assessment for human health

2.2.6.1 Assessment of effects on Human Health

Skin corrosion and irritation

Conclusion used in Risk Assessment – Skin corrosion and irritation	
Value/conclusion	Neither irritant nor corrosive to the skin.
Justification for the value/conclusion	Based on the classification of the active substance and the coformulants and their respective content in the final formulation. According to CLP, taking into account the maximum concentration of corrosive and/or skin irritant components contained in the product, is not classified as corrosive or skin irritant.
Classification of the product according to CLP	No classification for skin corrosion or irritation is required.

Data waiving

Information requirement	Skin corrosion/irritation study
Justification	The composition of the product is known. Sufficient data on the intrinsic properties are available through safety data sheets and other information for each of the individual components in the product. In addition, synergistic effects between any of the components are not expected. Consequently, classification of the product can be made according to the rules laid down in Regulation (EC) No 1272/2008, therefore this study does not need to be conducted.

Eye irritation

Conclusion used in Risk Assessment – Eye irritation	
Value/conclusion	Irritating to eyes
Justification for the value/conclusion	ccording to the CAR of iodine, PVP-I is classified as Eye damage; H318. Since its concentration is above 1%, the product is classified for eye irritation.
Classification of the product according to CLP	Classification as Eye Irrit 2; H319: *"causes serious eye irritation"* is required.

Respiratory tract irritation

Conclusion used in the Risk Assessment – Respiratory tract irritation	
Justification for the value/conclusion	According to the CAR, the active substance iodine is classified for respiratory tract-irritation. However, the concentration of iodine is far below the generic concentration limit of 20%. In addition, no co-formulants are classified for respiratory tract irritation. Therefore, GUT-YODOFILM is not classified as "specific target organ toxicity single exposure, Category 3 (STOT SE 3); H335
Classification of the product according to CLP	No classification is required.

Data waiving	
Information requirement	Respiratory tract irritation.
Justification	No data available on respiratory tract irritation. According to the CAR, the active substance iodine is classified as STOT SE 3; H335. The concentration of iodine is far below the generic concentration limit of 20%. Regulation (EC) No 1272/2008 (CLP Regulation) establishes the following: *"Care shall be exercised when extrapolating toxicity of a mixture that contains Category 3 ingredient(s). A generic concentration limit of 20 % is appropriate; however, it shall be recognised that this concentration limit may be higher or lower depending on the Category 3 ingredient(s) and that some effects such as respiratory tract irritation may not occur below a certain concentration while other effects such as narcotic effects may occur below this 20 % value"* On the other hand, the Guidance on the Application of the CLP Criteria; Guidance to Regulation (EC) No 1272/2008 on classification, labelling

	and packaging (CLP) of substances and mixtures; Version 4.1; June 2015 stablishes the following: *"Classification in STOT-SE Category 3 for respiratory tract irritation and narcotic effects does not take potency into account and consequently does not have any guidance values. A pragmatic default generic concentration limit of 20% is suggested, although a lower or higher specific concentration limit may be used where it can be justified"*. Therefore, as iodine is present at a concentration below the concentration limit of 20%, it can be concluded that the product GUT-YODOFILM is not classified with regards to respiratory tract irritation properties according to the criteria set out in the Regulation (EC) No 1272/2008 (CLP Regulation).

Skin sensitization

Conclusion used in Risk Assessment – Skin sensitisation	
Value/conclusion	Not skin sensitizer.
Justification for the value/conclusion	Test for skin sensitisation with the biocidal product has not been performed. According to the CAR, PVP-I is not a skin sensitizer. This is supported by an OECD guideline 406 maximisation study. No co-formulants of GUT-YODOFILM are skin sensitizers.
Classification of the product according to CLP	No classification for skin sensitization is required.

Data waiving	
Information requirement	Skin sensitization study
Justification	The composition of the product is known. Sufficient data on the intrinsic properties are available through safety data sheets and other information for each of the individual components in the product. In addition, synergistic effects between any of the components are not expected. Consequently, classification of the mixture can be made according to the rules laid down in Regulation (EC) No 1272/2008, therefore this study does not need to be conducted.

Respiratory sensitization (ADS)

Conclusion used in Risk Assessment – Respiratory sensitisation	
Value/conclusion	Not respiratory sensitizer.
Justification for the value/conclusion	either active substance iodine (including PVP-I) nor coformulants are classified for respiratory sensitisation. Therefore, GUT-YODOFILM is not classified as respiratory sensitizer.
Classification of the product according to CLP	No classification for respiratory sensitisation is required.

Data waiving	
Information requirement	Respiratory sensitization data
Justification	No animal or human data have been provided to assess the potential for respiratory sensitization. There are valid data available on each of

	the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Regulation (EC) No 1272/2008. The active substance and the coformulants of the product are not classified as respiratory sensitisers and are not known to be respiratory sensitisers.

Acute toxicity

Acute toxicity by oral route

Conclusion used in Risk Assessment – Acute oral toxicity	
Value/conclusion	Not classified
Justification for the value/conclusion	Based on the classification of the active substance and the coformulants and their respective content in the final formulation. According to CLP criteria, taking into account the maximum concentration of components classified for acute oral toxicity, the calculated oral ATE for the product is higher than 2000mg/kg bw. Therefore, the product will not be classified according to their acute oral toxicity in accordance with Regulation (EC) No 1272/2008.
Classification of the product according to CLP	No classification for acute oral toxicity is required.

Data waiving	
Information requirement	Acute oral toxicity study.
Justification	No studies have been performed with the products contained in the biocidal family in order to avoid unnecessary testing with vertebrates. The composition of the product is known and there are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Regulation (EC) No 1272/2008 (CLP Regulation), and synergistic effects between any of the components are not expected Therefore, this study does not need to be conducted.

Acute toxicity by inhalation

Conclusion used in Risk Assessment – Acute inhalation toxicity	
Value/conclusion	Not classified
Justification for the value/conclusion	Based on the classification of the active substance and the coformulants and their respective content in the final formulation. Of all the components, only the active substance iodine is classified for acute inhalation toxicity. According to CLP criteria, the calculated inhalatory ATE for the product is higher than 5mg/l. Therefore, the product will not be classified according to their acute inhalation toxicity in accordance with Regulation (EC) No 1272/2008.
Classification of the product according to CLP	No classification for acute inhalation toxicity is required.

Data waiving	
Information requirement	Acute inhalation toxicity study.

Justification	No studies have been performed with the products contained in the biocidal family in order to avoid unnecessary testing with vertebrates. The composition of the product is known and there are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Regulation (EC) No 1272/2008 (CLP Regulation), and synergistic effects between any of the components are not expected Therefore, this study does not need to be conducted.

Acute toxicity by dermal route

Conclusion used in Risk Assessment – Acute dermal toxicity	
Value/conclusion	Not classified
Justification for the value/conclusion	Based on the classification of the active substance and the coformulants and their respective content in the final formulation. Of all the components, only the active substance iodine is classified for acute dermal toxicity. According to CLP criteria, the calculated dermal ATE for the product is higher than 2000mg/kg bw. Therefore the product will not be classified according to their acute dermal toxicity in accordance with Regulation (EC) No 1272/2008.
Classification of the product according to CLP	No classification for acute dermal toxicity is required.

Data waiving	
Information requirement	Acute dermal toxicity study
Justification	No studies have been performed with the products contained in the biocidal family in order to avoid unnecessary testing with vertebrates. The composition of the product is known and there are valid data available on each of the components in the mixture sufficient to allow classification of the mixture according to the rules laid down in Regulation (EC) No 1272/2008 (CLP Regulation), and synergistic effects between any of the components are not expected Therefore, this study does not need to be conducted.

Information on dermal absorption

Value(s) used in the Risk Assessment – Dermal absorption	
Substance	Iodine
Value(s)*	50%
Justification for the selected value(s)	Default data available in EFSA Guidance on Dermal Absorption, 2017, for water-based solutions in which the active substance is in a concentration below 5% (w/w) (EFSA Journal 2017; 15(6):4873)

Data waiving	
Information requirement	Dermal absorption study
Justification	There is no experimental data available on the dermal absorption. As a result, risk assessment calculations for human exposure have been made according to the EFSA guidance on dermal absorption (EFSA Journal, 2017;15(6):4873) using a default value of 50% dermal absorption for this biocidal family.

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

Not relevant

Available toxicological data relating to a mixture

Not relevant

Other

Not relevant

Assessment for endocrine disrupting properties

The biocidal product contains only one active substance. Assessment report (Sweden, December 2013) of Iodine indicates "*Iodine is an essential element and has a physiological function in thyroid hormone synthesis (i.e. intentionally interacts with the endocrine system). This means that both iodine deficiency as well as excess iodine can impair thyroid homeostasis/thyroid hormone levels. This is to be considered as an endocrine effect. However, it would not be justified to conclude from this that iodine should be considered to be an endocrine disruptor. In contrast to typical xenobiotic substances, which are not needed at all for the functioning of the human body, and which normally only have negative effects on man, Iodine is a physiologically essential element.*
Consequently, the concept of endocrine disruption is not meaningful for essential elements such as iodine since it neglects that they are needed for maintaining hormone homeostasis. Furthermore, neither iodine nor iodide are included in the lists of the EU on substances suspected of interfering with the hormone systems of humans and wild-life.".

Currently, the active substance Iodine was identified with 4 more substances as possible endocrine disruptors in the screening study performed "Impact Assessment Report on Criteria to identify EDs, European Commission, 2016". In this document, only the substances included in option 2 and option 3 category I match with the established ED criteria in Commission Delegated Regulation (EU) 2017/2100. Iodine was established within these options.
So, according to Doc CA-September18.Doc.7.5.a-final, the Commission considers that there are significant indications that Iodine and PVP-Iodine no longer fulfils the conditions laid down in Article 4(1) or Article 5(2), so that they are subject to the process for the early review of biocidal substances in relation to ED, since renewal is not provided according to BPR before of the end of 2020.
This process, described in Doc CA-September18.Doc.7.5.a-final, will have a specific duration and the Commission decision will depend on the conclusions on the ED properties of these substances in ECHA's opinion. Then, the conditions for granting the biocidal product authorization will be revised.

<u>Assessment of the ED properties of non-active substances (co-formulants):</u>

After reviewing the potential ED properties of co-formulants (please refer to the Confidential Annex), none of them are subject to an on-going evaluation or a decision regarding their ED properties. Based on the available information, ES CA considers that there is no concern regarding the ED properties of these co-formulants.

According to the document agreed at the CG-49 meeting on Criteria – significant indications of ED properties for non-active substances at present, non-active substances contained in the biocidal product GUT-YODOFILM should not be considered as having significant indication of ED properties.

2.2.6.2 Exposure assessment

GUT-YODOFFILM is a ready-to-use product intended to be used by professional workers to disinfect teats. It is applied by manual or automatic dipping on the teats after milking and two or three milkings per day are performed.
The concentration of the active substance iodine (as available iodine) in the product is 0.25 % (w/w).
The product is intended to be used by professional users.

Explanatory note (only for Spain authorisation):
According to national legislation (Royal Decree 830/2010), in Spain there are three user categories:

- Trained professional users (TP): pest control operators, having received specific training in biocidal product uses according to the national legislation in force.
- Professional users (P): professionals that use the biocidal products in the context of his profession, that is not pest control operator, and that are unlikely to have received any specific training in biocidal product use according to the national legislation in force. It can be expected that they have some knowledge and skills handling chemicals (if they must use it in their job) and they are able to use correctly some kind of PPE if necessary.
- Non-professional users (NP): users who are not professionals and that apply the biocidal product is in his private life. (Note: this user has not been claimed by the applicant for this product).

The conclusions reached in this PAR, which affect the category of "Professional", if appropriate, will be applicable to **Professional** and **Trained Professional users** at the Spanish level. Therefore, regarding the category of authorized users, **ES CA will apply article 37 according to the BPR.**

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**	**Nonprofessional use**	**Industrial use**	**Professional use**	**General public**	**Via food**
Inhalation*	Not applicable	No	Not applicable	Not applicable	Not expected	Not applicable	Not applicable
Dermal	Not applicable	Yes	Not applicable	Not applicable	Not expected	Not applicable	Not applicable
Oral	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Yes

*Inhalation exposure of vapour of iodine from this type of product (teat disinfectant) was a point of discussion at the HH WGIV-2017, and the *ad hoc follow-up* members agreed that inhalation exposure to vapours could be considered as negligible for this type of formulation

since iodine is fully complexed within a polymeric matrix (PVP) or emulsified (due to the other co-formulants in the formulations). Therefore, inhalation exposure to vapours does not need to be assessed.

List of scenarios

Scenario and task number	**Description of scenario and tasks**	**Exposed group**
Primary exposure		
[Scenario 1]	***Application on teats by manual dipping***	
Scenario 1.1	*Mixing and loading of RTU*	professionals
Scenario 1.2	*Application by dipping*	professionals
Scenario 1.3	*Wipping of potential remaining product before the next milking*	professionals
[Scenario 2]	***Application on teats by robot (automatic dipping)***	
Scenario 2.1	*Mixing and loading of robot*	professionals
Scenario 2.2	*Application by robot*	professionals
Scenario 2.3	*Wipping of potential remaining product before the next milking*	professionals
[Scenario 3]	***Cleaning of equipment***	
Scenario 3.1	*Cleaning of equipment*	professionals
Combined primary exposure		
[1+3]	***Application by manual dipping AND cleaning of equipment***	
[2+3]	***Application by automatic dipping AND cleaning of equipment***	

Industrial exposure

No industrial exposure is foreseen. Therefore, the assessment of industrial exposure is not relevant.

Professional exposure

The relevant tasks to the product (loading of RTU product, application by dipping cups or robot, and cleaning) are considered. The product is only applied on teats after milking (post milking application).

TA new HEAdhoc recommendation on the tasks associated to teat disinfection was agreed at the Human Health Working Group I on 19 January 2017 (Recommendation no. 13 of the BPC Ad hoc Working Group on Human Exposure).

The assessment for human health is in line with the HEAdhoc recommendation no. 13 and the exposure models used are the ones recommended in this document.

The exposure calculations presented below are conducted with the value of 0.25% of total iodine

Scenario 1. Teat disinfection by manual dipping (Post milking)

Description of Scenario [1] *Application on teats by manual dipping*

GUT-YODOFILM is used as ready-to-use product. Several tasks are necessary to applied the products on teats. They are described below.

- **Scenario 1.1: Mixing and loading of RTU**

The exposure to the ready-to-use solution can occur during the loading of the dip cups. According to Recommendation no.13, 82 cows producing milk are milked per day. Each cow has 4 teats and are milked 2 times a day. 10 ml/event after each milking are applied.
Therefore, 20 ml of product/day is needed for a cow. Considering 82 cows, 1640 ml of product/day is needed.
The mixing and loading model 4 as proposed in HeadHoc recommendation 13 was chosen as a reasonable worst-case scenario. For mixing and loading model 4, the indicative hand exposure for handling 5 L is 0.2 ml/treatment.
This scenario covers the scenario for ewes and goats which have two teats.

	Parameters	Value
Tier 1	Total iodine	0.25%.
	Density of GUT-YODOFIM product	1.040 g/ml
	Dermal penetration	50%
	Body weight	60 kg
	indicative dermal exposure value (mixing and loading model 4)	0.2 ml/event: 1640 ml are handled per day. Therefore, the value considering the handling of 5 L is used.
	No PPE	
Tier 2	gloves	90% protection

Additionally, as iodine in the product is complex-bound in the formulation, no evaporation is expected and therefore no inhalation exposure is assessed.

- **Scenario 1.2: Application by dipping**

The cup has an upper compartment for application of the dip and a lower compartment as reservoir for the dipping solution. The correct quantity of liquid to cover a teat is pushed in the top of the dip by pressure on the flexible reserve flask containing GUT-YODOFILM. During the application, the worker holds the cup at the lower compartment, so direct hand exposure to the biocide product or a treated teat is avoided. 10 mL of product are enough to treat the four teats of a cow.
Dermal exposure during use of the dip cups, based on the design of the dipping cup, is not expected. Any possible spillage exposure is considered covered by the dermal exposure as calculated by the scenario of mixing and loading. This is in line with HEAdhoc recommendation no. 13.

- **Scenario 1.3: Before, the next milking the teats are wiped.**

According to the HeadHoc recommendation 13, no exposure calculation is necessary as the exposure during cleaning of teats, removal of dried residues for post-milking applications is considered limited.

Calculations for Scenario 1.1 – Mixing and loading of RTU

The results of the calculations are provided for scenario 1.1 performed twice a day when using a **RTU 0.25% total iodine**

Summary table: estimated exposure from professional uses					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake (mg/kg bw/d)**	**Estimated oral uptake**	**Estimated total uptake (mg/kg bw/d)**
Scenario [1.1] – M/L model 4	Tier 1/ none	-	4.33E-03	-	4.33E-03
	Tier 2/Gloves	-	4.33E-04	-	4.33E-04

The exposure calculations are included in Annex 3.2.

Scenario 2. Application on teats by robot (Post milking)

Description of Scenario [2] *Application on teats by robot (automatic dipping)*

- **Scenario 2.1: Mixing and loading of robot**

RISKOFDERM toolkit for connecting lines as proposed in HeadHoc recommendation 13 was chosen. The indicative value of the RISKOFDERM toolkit for connecting lines is 0.92 mg/min. The duration is 1 minute.
This scenario covers the scenario for ewes and goats which have two teats.

	Parameters	Value
Tier 1 –	Total iodine	0.25%.
	Milking events	3 milking per day
	Dermal penetration	50%
	Body weight	60 kg
	The indicative value of the RISKOFDERM toolkit for connecting lines	0.92mg/min
	Duration task	1min
	No PPE	
Tier 2	gloves	90% protection

Additionally, as iodine in the product is complex-bound in the formulation, no evaporation is expected and therefore no inhalation exposure is assessed.

- **Scenario 1.2: Application by automatic dipping**

No exposure of professionals occurs during **automatic dipping**.

- **Scenario 1.3: Before, the next milking the teats are wiped.**

According to the HeadHoc recommendation 13, no exposure calculation is necessary as the exposure during cleaning of teats, removal of dried residues for post-milking applications is considered limited.

However, manual use exposure is considered as worst case.

Calculations for Scenario 2.1 – Mixing and loading of robot

The results of the calculations are provided for scenario 2.1 performed twice a day when using a **RTU 0.25% total iodine**

Summary table: estimated exposure from professional uses					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake (mg/kg bw/d)**	**Estimated oral uptake**	**Estimated total uptake (mg/kg bw/d)**
Scenario [2.1] – RISKOFDERM toolkit for connecting lines	Tier 1/ none	-	5.75E-05	-	5.75E-05
	Tier 2/ Gloves	-	5.75E-06	-	5.75E-06

The exposure calculations are included in Annex 3.2.

Scenario 3. Cleaning of equipment

Description of Scenario [3] *Cleaning of equipment*		
cleaning of equipment is assessed by the RISKOFDERM "loading liquid, automated or semi-automated"		
	Parameters	Value
Tier 1 –	Total iodine	0.25%
	No. cleaning of equipment	3 per day
	Dermal penetration	50%
	Body weight	60 kg
	The indicative value of the RISKOFDERM "Loading liquid, automated or semi-automated" model	0.92mg/min
	Duration task	5min
	No PPE	
Tier 2	gloves	90% protection

The results of the calculations are provided for scenario 3 performed times a day

Summary table: estimated exposure from professional uses					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake (mg/kg bw/d)**	**Estimated oral uptake**	**Estimated total uptake (mg/kg bw/d)**
Scenario [3] RISKOFDERM "loading liquid, automated or semi-automated"	Tier 1/ none	-	2.88E-04	-	2.88E-04
	Tier 2/ Gloves	-	2.88E-05	-	2.88E-05

Calculations for Scenario 1-3

Summary table: estimated exposure from professional uses					
Exposure scenario	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake (mg/kg bw/d)**	**Estimated oral uptake**	**Estimated total uptake (mg/kg bw/d)**
Scenario [1.1] – Mixing and loading of RTU	Tier 1/ none	-	4.33E-03	-	4.33E-03
	Tier 2 / gloves	-	4.33E-04	-	4.33E-04
Scenario [1.2] – application	Exposure is considered covered by the mixing and loading scenario.				

by manual dipping					
Scenario [1.3] – cleaning of teats by wiping with cloth (post-milking)	Exposure of professionals considered to be negligible during cleaning of teats by wiping with cloth: removal of dried residues from post-milking treatment.				
Scenario [2.1] – Mixing and loading of robot	Tier 1 / no PPE	-	5.75E-05	-	5.75E-05
	Tier 2 / gloves	-	5.75E-06	-	5.75E-06
Scenario [2.2] – application by robot	No exposure of professionals occurs during automated dipping				
Scenario [2.3] – cleaning of teats by wiping with cloth (post-milking)	Exposure of professionals considered to be negligible during cleaning of teats by wiping with cloth: removal of dried residues from post-milking treatment.				
Scenario [3] – cleaning of equipment	Tier 1 / no PPE	-	2.88E-04	-	2.88E-04
	Tier 2 / gloves	-	2.88E-05	-	2.88E-05

Combined scenarios

Summary table: estimated exposure from professional uses					
Scenario combined	**Tier/PPE**	**Estimated inhalation uptake (mg/kg bw/d)**	**Estimated dermal uptake (mg/kg bw/d)**	**Estimated oral uptake**	**Estimated total uptake (mg/kg bw/d)**
Scenario [1] + Scenario [3]	Tier 1/ none	-	4,62E-03	-	4,62E-03
	Tier 2/Gloves	-	4,62E-04	-	4,62E-04
Scenario [2] + Scenario [3]	Tier 1/ none	-	3,45E-04	-	3,45E-04
	Tier 2/Gloves	-	3,45E-05	-	3,45E-05

Non-professional exposure

Not applicable, non-professional exposure is not foreseen.

Exposure of the general public

Not applicable, no exposure of the general public is foreseen during mixing and loading or application phase.

Monitoring data

There are no monitoring data available on the products.

Dietary exposure

Considering the intended uses of the product GUT-YODOFILM, livestock can be exposed to active substance iodine. Residues can be found in food and food products of animal origin. As a consequence, the human dietary assessment needs to be performed in the framework of this application.

Summary table of main representative dietary exposure scenarios			
Scenario number	**Type of use**	**Description of scenario**	**Subject of exposure**
1.	Professional use	Application-manual dipping of teats after milking (see scenario professional exposure)	Milk
2.	Professional use	Application-by robot (see scenario professional exposure)	Milk

Information of non-biocidal use of the active substance

Summary table of other (non-biocidal) uses			
	Sector of use	**Intended use**	**Reference value(s)**
1.	Veterinary use: 1.-Iodine and iodine inorganic compounds including: — Sodium and Potassium iodide — Sodium and potassium iodate — Iodophors includin nylpyrrolidoneiodine 2.-Iodine organic compounds — Iodoform	All food producing species: Various iodine-containing compounds are used in veterinary medicine as antiseptics and sanitisers. Iodine compounds are used in teat dips for the prevention and control of mastitis in cattle and in topical preparations for prevention of infections in wounds. Preparations for oral and parenteral administration are also available for the treatment of iodine-deficiency.	MRL[1]: No MRL required
2.	Food & Feed additive	Iodine containing salts in animal feedingstuff	Values have been recommended by the EFSA Panel on Additives and Products or

			Substances used in Animal Feed (FEEDAP Panel)

[1] *Commission Regulation (EU) No 37/2010 of 22 December 2009 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin.*

The Committee for Veterinary Medicinal Products (CVMP) has reviewed iodine for the use in veterinary medicine as antiseptic, sanitiser, teat dip for prevention and control of the mastitis, topical preparation for preventing wounds infections. CVMP reported that "only small increases in serum iodine concentration were found after teat dipping indicating that the procedure had a negligible effect on tissue iodine concentrations", and it was concluded that no MRL is required for any food-producing species (see Commission Regulation (EU) No 37/2010). Considering the EC document "interim approach for the establishment of maximum residue limits for residues of active substances contained in biocidal products for food and feed and specific migration limits in food contact materials" adopted during Competent Authorities meetings of 17 March 2017, it was stated at the Competent Authorities meetings of 17 March and 17 May 2017, that no biocide MRL are necessary for iodine in line with CVMP assessment for iodine.

Estimating Livestock Exposure to Active Substances used in Biocidal Products

Livestock exposure estimates are required for the risk assessment on animal health as well as for determining the worst-case human exposure estimate (WCCE).
The applicant has provided a estimating livestock Exposure to Active substance in framework of this dossier according to the *Guidance on Estimating Livestock Exposure to Active Substances used in Biocidal Products* included in *Guidance on BPR Volume III Parts B+C Version 4.0, December 2017.*
However, according to the EMEA (European Agency for the Evaluation of Medicinal Products) summary report on iodine-containing products used for veterinary medicine, only small increases in serum iodine concentration have been found after teat dipping indicating that the procedure has a negligible effect on tissue iodine concentrations. These results suggest limited livestock exposure and therefore, risk assessment submitted by the applicant has not been evaluated for animal health.
This is supported by the EFSA 2013 opinion on the safety and efficacy of iodine compounds (E2) as feed additives, in which it was concluded that the iodine level in edible tissues/products is generally found to be highest in milk and not in meat. Meat was therefore not considered to be the major source of dietary iodine for the consumer.

As iodine is excreted in milk, and iodine-based teat disinfection does result in increased iodine levels in milk, a worst-case dietary exposure assessment from possible residues in milk is performed. (see "Estimating transfer of biocidal active substances into foods as a result of professional and/or industrial application(s)")**.**

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

AnA harmonised assessment methodology was agreed by the Human Health Working Group for the iodine exposure throught milk *(WG TOX II-III-IV 2017, and Webex post WG tox IV 2017 meetings)*.

The consumer exposure assessment should include the following steps:
1) exposure from teat treatment alone: (for 2 milkings/day)*

2) exposure from total milk intake (teat treatment + background from milk (200 µg/L))
3) exposure from total dietary intake (teat treatment + background from milk (200 µg/L) + dietary intake from other sources (adult = 185 µg/day, infant = 96 µg/day))

*For exposure to residues the following was concluded by eCAs from iodine based union authorisation applications (Secure Webex meeting (3-10-2017)): "The expected iodine residues in milk from two milking events per day for manual milking and from three events per day for automatic milking are considered comparable".

The assessment is based on the following data:

- The upper intake level (UL) for adults is 600 µg/day and for toddlers is 200 µg/day.
- According to EFSA (EFSA Journal 2013;11(2):3101), the iodine background in milk is 200 µg/L.
- The Working Group (IV) agreed to use the values from EFSA PRIMo revision 2, for daily milk consumption:0.45 L milk/day for adults and 0.46 L milk/day for toddlers.
- The value of the iodine dietary intake was agreed to be based on a retail survey of iodine in UK produced dairy foods, FSIS 02/08, 16 June 2008. The values 185 µg iodine/day for adults (referring to 70 kg bw) and 96 µg iodine/day for toddlers (referring to 12 kg bw) were used as the iodine intake by other sources than milk.

List of scenarios

Summary table of main representative dietary exposure scenarios		
Scenario number	**Description of scenario**	**Subject of exposure**
1.	exposure from teat treatment	Adults Toddlers
2.	exposure from total milk intake	Adults Toddlers
3.	exposure from total dietary intake	Adults Toddlers

Scenario 1: exposure from teat treatment

The residual level of iodine due to teat disinfection was investigated by O'Brien et al (2013)[1]. The results were as follows:

Study	**Iodine (%)**	**Applications**	**Mean treated residue (µg/Kg)**	**Mean control residue (µg/Kg)**	**Difference (additional iodine residues in milk) (µg/Kg)**
*O'Brien 2013**	0.5	2x post milking	461	217	244
		2x pre- and post-milking	670		453

[1] O`Brien, B., Gleeson, D. and Jordan, K. (2013): Iodine concentrations in milk. Irish Journal of Agricultural and Food Research 52: 209-216.

After 2 treatments/day with a 0.5% iodine product, the additional iodine in milk was 244 µg/kg milk. The content of iodine in milk for the cows without teat disinfection treatment with iodine (control group) was 217 µg/kg milk.

Recalculating to the 0.25% product, the iodine content in milk is assumed to be:

	0.5	0.25	0.5	0.25
Milking events	**iodine content** (µg/Kg milk)		**iodine content** (mg/L milk)*	
2 milking	244	122	0.251	0.126

*These data have been converted to mg/L based on the density of whole milk being 1030 g/L

After 2 milking events, the content of iodine in milk is 126 µg/L. The daily exposure of adults and toddlers by milk intake is:

Adults	**Toddlers**	**Adults**	**Toddlers**
iodine intake (µg/day)		**% Upper value**	
56.7	57.96	9.45	28.98

Scenario 2. exposure from total milk intake

	Adults	**Toddlers**	**Adults**	**Toddlers**
	iodine intake (µg/day)		**% Upper value**	
Milk intake due to teat treatment	56.7	57.96		
Milk background	90	92		
Total intake	146.7	149.96	24.45	74.98

Scenario 3. exposure from total dietary intake

	Adults	**Toddlers**	**Adults**	**Toddlers**
	iodine intake (µg/day)		**% Upper value**	
Milk intake due to teat treatment	56.7	57.96		
milk background	90	92		
Other sources	185	96		
Total intake	331.7	245.96	55.28	122.98

The total daily intake for toddlers, when adding the background milk, the iodine from teat disinfection and other sources, exceeds the upper limit value, representing 122.98%.

The other scenarios result in an acceptable daily intake of iodine for both, adults and toddlers.

However, the study by Serra *et al* (2003)[2] shows that children in Spain have lower milk consumption than the Dutch children population, used as a default value for the risk assessment. The study was done by a representative sample of the Spanish population (n = 3.534 individuals, 1.905 female and 1.629 male). Both a 24-hours recall and a general questionnaire with socio-economic, demographic and lifestyle items were administered. The results show that the daily intake of milk is 0.37 L/day for boys and 0.35 L/day for girls (aged 2-5 years). A median of 0.36 L/day can be used to re-assess the calculations.

The daily products consumption is also lower than in The Netherlands: according to Serra *et al* study, is 514 g for boys and 496 g/day for girls. The iodine content in daily products is estimated as 35 g/100 g (Public Heath England, 2015)[3]; therefore, the intake by other foods would be estimated as 48 µg/day, far from the assumed 96 µg/day for the calculations above.

	Toddlers	**Toddlers**
	iodine intake (µg/day)	**% Upper value**
Milk intake due to teat treatment	57.96	
milk background	72	
Other sources	48	
Total intake	177.96	**88.98**

Therefore, the total daily intake for toddlers, when adding the background milk, the iodine from teat disinfection and other sources, does not exceed the upper limit value.

A recent study (Vila et al, 2020)[4] reviews the iodine nutrition in Spain and concludes that "Although iodine nutrition in Spain has improved in recent years, the problem is not completely resolved. It is necessary that health institutions establish measures to ensure an adequate iodine nutrition of the population, especially among the highest risk groups (children and adolescents, women of childbearing age, pregnant women and nursing mothers)."
It can be inferred that the iodine intake in Spain may be of concern due to the low levels rather than excessive levels. Therefore, the contribution of milk intake to iodine nutrition is welcomed and does not represent a risk.

[2] L. Serra Majem, L. Ribas Barba, C. Pérez Rodrigo, B. Roman Viñas, J. Aranceta BartrinaDietary habits and food consumption in Spanish children and adolescents (1998–2000): socioeconomic and demographic factors Med Clin (Barc), 121 (2003), pp. 126-131

[3] Public Health England, 2015. McCance and Widdowson's composition of foods integrateddataset. Available from: https://www.gov.uk/government/publications/composition-of-foodsintegrated- dataset-cofid. (Accessed 13 November 2015).

[4] Lluís Vila, Anna Lucas, Sergio Donnay, Antonio de la Vieja, Silvia Wengrovicz, Piedad Santiago, Orosia Bandrés, Inés Velasco, Eduardo Garcia-Fuentes, Susana Ares, José Carlos Moreno Navarro, Mercedes Espada, Antonio Muñoz, Juan Carlos Galofré, Manel Puig-Domingo La nutrición de yodo en España. Necesidades para el futuro. Endocrinología, Diabetes y Nutrición, Volume 67, Issue 1, January 2020, Pages 61-69

2.2.6.3 Risk characterisation for human health

Reference values to be used in Risk Characterisation

Reference	Study	NOAEL (LOAEL)	AF	Correction for oral absorption	Value
$AEL_{short\text{-}term}$	Not derived in the CAR and not relevant for HHRA.				
$AEL_{medium\text{-}term}$	Not derived in the CAR and not relevant for HHRA.				
$AEL_{long\text{-}term}$ = Upper Intake Level (UL)	Human data				Adult: 600 µg/day (0.01 mg/kg bw/d) Toddler: 200 µg/day
ARfD	According to CAR, not applicable. Substance is not acute toxic or harmful.				
ADI	Not derived in the CAR and not relevant for HHRA. Instead of an ADI, a Recommended daily intake of 150-200 µg/day is given in the CAR.				
AEC = OEL (Occupational exposure limit)	Human data				0.1ppm / 1 mg/m^3

Risk for professional users

Scenario 1. Teat disinfection by dipping (Post milking)

Dermal exposure

			Estimated dermal exposure (mg/kg bw/d)	% UL (0.01 mg/kg bw/day)	%Acceptable (yes/no)
Use Name	**Task**	**Tier**	**Iodine**	**Iodine**	
Teat disinfection by dipping (post milking)	scenario [1.1] Mixing and loading of RTU –	1/none	4.33E-03	43.3	yes
		2/Gloves	4.33E-04	4.3	yes
	Scenario [1.2] – application by manual dipping	1/none	Exposure is considered covered by the mixing and loading scenario.		
		2/Gloves			
	Scenario [1.3] – cleaning of teats by wiping with cloth (post-milking)	1/none	Exposure of professionals considered to be negligible during cleaning of teats by wiping with cloth: removal of dried residues from post-milking treatment.		
		2/Gloves			
	combined tasks	1/none	64.33E-03	43.3	**yes**
		2/Gloves	4.33E-04	4.3	**yes**

Conclusion:

Due to the figures shown above risk is considered to be acceptable.

Scenario 2. Teat disinfection - dipping by robot (post milking application)

Dermal exposure

	Estimated dermal	% UL (0.01	Acceptable

			exposure (mg/kg bw/d)	mg/kg bw/day)	(yes/no)
Use Name	**Task**	**Tier**	**Iodine**	**Iodine**	
Teat disinfection Spraying by robot (post milking application)	Scenario [2.1] – Mixing and loading of robot	1/none	5.75E-05	0.58	yes
		2/Gloves	5.75E-06	0.06	yes
	Scenario [2.2] – application by robot	1/none	No exposure of professionals occurs during automated dipping.		
		2/Gloves			
	Scenario [2.3] – cleaning of teats by wiping with cloth (post-milking)	1/none	Exposure of professionals considered to be negligible during cleaning of teats by wiping with cloth: removal of dried residues from post-milking treatment.		
		2/Gloves			
	combined tasks	1/none	5.75E-05	0.58	**yes**
		2/Gloves	5.75E-06	0.06	**yes**

Conclusion:

Due to the figures shown above risk is considered to be acceptable.

Scenario 3. Cleaning of equipment

Dermal exposure

			Estimated dermal exposure (mg/kg bw/d)	% UL (0.01 mg/kg bw/day)	Acceptable (yes/no)
Use Name	**Task**	**Tier**	**Iodine**	**Iodine**	
Scenario [3] – cleaning of equipment	Scenario [3] – cleaning of equipment	1/ none	2.88E-04	2.88	yes
		2/ Gloves	2.88E-05	0.29	yes

Combined scenarios

			Estimated dermal exposure (mg/kg bw/d)	% UL (0.01 mg/kg bw/day)	Acceptable (yes/no)
Use Name	**Task**	**Tier**	**Iodine**	**Iodine**	
Combined scenarios	Scenario [1] + Scenario [3]	1/ none	4.62E-03	46.21	yes
		2/ Gloves	4.62E-04	4.62	yes
	Scenario [2] + Scenario [3]	1/ none	3.45E-04	3.45	yes
		2/ Gloves	3.45E-05	0.35	yes

Conclusion:

The combined exposures linked to the following biocidal uses are inferior to the UL of iodine:
- application by manual dipping + cleaning of the equipment
- application by robot + cleaning of the equipment

Risk for professional users via residues in food

Task/ Scenario	Tier/ PPE	Estimated total uptake (mg/kg bw/d)	% UL (0.01 mg/kg bw/day) due to biocidal use	% UL (0.01 mg/kg bw/day) due to biocidal use + iodine from milk due to teat treatment[1]	% UL (0.01 mg/kg bw/day) due to biocidal use + total milk intake[2]	% UL (0.01 mg/kg bw/day) due to biocidal use + total dietary intake[3]
Scenario [1.1] – Mixing and loading of RTU	1/ none	4.33E-03	43.3	52.78	67.78	98.62
	2/ Gloves	4.33E-04	4.3	13.78	28.78	59.62
Scenario [1.2] – application by manual dipping	Exposure is considered covered by the mixing and loading scenario.					
Scenario [1.3] – cleaning of teats by wiping with cloth (post-milking)	Exposure of professionals considered to be negligible during cleaning of teats by wiping with cloth: removal of dried residues from post-milking treatment.					
Scenario [2.1] – Mixing and loading of robot	1/ none	5.75E-05	0.58	10.03	25.03	55.86
	2/ Gloves	5.75E-06	0.06	9.51	24.51	55.34
Scenario [2.2] – application by robot	No exposure of professionals occurs during automated dipping.					
Scenario [2.3] – cleaning of teats by wiping with cloth (post-milking)	Exposure of professionals considered to be negligible during cleaning of teats by wiping with cloth: removal of dried residues from post-milking treatment.					
Scenario [3] – cleaning of equipment	1/ none	2.88E-04	2.88	12.33	27.33	58.16
	2/ Gloves	2.88E-05	0.29	9.74	24.74	55.57
Scenario [1] + Scenario [3]	1/ none	4.62E-03	46.21	55.66	70.66	101.49
	2/ Gloves	4.62E-04	4.62	14.07	29.07	59.90

Task/ Scenario	Tier/ PPE	Estimated total uptake (mg/kg bw/d)	% UL (0.01 mg/kg bw/day) due to biocidal use	% UL (0.01 mg/kg bw/day) due to biocidal use + iodine from milk due to teat treatment[1]	% UL (0.01 mg/kg bw/day) due to biocidal use + total milk intake[2]	% UL (0.01 mg/kg bw/day) due to biocidal use + total dietary intake[3]
Scenario [2] + Scenario [3]	1/ none	3.45E-04	3.45	12.9	27.9	58.73
	2/ Gloves	3.45E-05	0.35	9.8	24.8	55.63

[1].as worst case, derived values by recalculating from the O`Brian test.
[2] Total milk intake is the sum of the estimated additional intake resulting from the transfer into milk following teat disinfection (based the submitted field trial) and the background milk value of 200 µg/L (EFSA 2013)
[3] Total dietary intake is the sum of the estimated additional intake resulting from the transfer into milk following teat disinfection (based the submitted field trial), the background milk value of 200 µg/L (EFSA 2013) and 185 µg/d for adult or 96 µg/d for toddler based on UK data (2008).

Conclusions Post-milking application

For automated dipping, no PPE is needed for safe use. For manual dip applications, chemical resistant gloves (90% protection) should be necessary for safe use.

Local effects
The biocidal product is classified for eye irritation (H319). During application by manual dipping, the worker holds the cup at the lower compartment, so direct hand exposure to the biocide product or a treated teat is avoided The cup has an upper compartment for application of the dip and a lower compartment as reservoir for the dipping solution. The correct quantity of liquid to cover a teat is pushed in the top of the dip by pressure on the flexible reserve flask containing GUT-YODOFILM. In addition, given the design of the cup, splashes and spills can be avoided. No exposure of professionals occurs during automated dipping. However, personal protection equipment, at least chemical googles will be recommended. Also, other recommended PPE for its handling will be chemical gloves or coverall.

2.2.7 Risk assessment for animal health

There is no risk expected for the treated animal.
First, GUT-YODOFILM is classified for irritating effect on the eyes (H319). As the product will be applied to the teats of the udder, no exposure of the eyes of the animal is envisaged. Subsequently, no adverse effects due to local effects are expected for the animal due to the use of products included in the BPF.
According to the EMEA (European Agency for the Evaluation of Medicinal Products) summary report on iodine-containing products used for veterinary medicine, only small increases in serum iodine concentration have been found after teat dipping indicating that the procedure has a negligible effect on tissue iodine concentrations. These results suggest limited livestock exposure and no-detailed risk assessment was therefore performed for animal health. This

is supported by the EFSA 2013 opinion on the safety and efficacy of iodine compounds (E2) as feed additives (EFSA Journal 2013;11(2):3101), in which it was concluded that the iodine level in edible tissues/products is generally found to be highest in milk and not in meat. In addition, iodine-based teat-disinfection products have a long history as safe veterinary hygiene and medicinal products.

2.2.8 Risk assessment for the environment

GUT YODOFILM is a biocidal product for external topic use against bacteria and yeasts for use by professional users for cleaning, disinfecting and sealing of the udder/teat hole after milking in lactating females with the RTU product in dipping cups. The application method is both manual and automatic cleaning after milking.

GUT YODOFILM is a gel RTU formulation containing Polyvinylpyrrolidone Iodine as active substance (a.s.) (2.5% as PVP Iodine, 0.25% Iodine). This a.s. is classified as Aquatic Acute 1 M=1, Aquatic Chronic 1 M=1 according to their entry in Annex VI of Regulation (EC) No. 1272/2008.

GUT YODOFILM has other co-formulants in the formulation which were screened for their potential of being a SoC. Isopropanol does not have a harmonised classification and labelling according to Reg. (EC) No 1272/2008 for dangers to the aquatic environment. Therefore, isopropanol present in the product does not contribute to the C&L of the biocidal product based on its danger to the environment, nor does it meet the criteria for being a PBT or vPvB substance. However, as isopropanol is an active substance from other product types contained in the product for which a draft final Competent Authority Report is available it should be considered as SoCs according to the Guidance on the BPR, Volume IV Environment – Assessment and Evaluation (Part B+C) as it is present in the biocidal product at a concentration ≥ 0.1%. Nevertheless, exemptions are possible if the substances are contributing only to a very limited extent to the overall toxicity of the mixture and are neither EDs nor PBT - or vPvB-substances. The environmental risk assessment for this co-formulant is provided in the confidential PAR. The conclusion, to the calculations carried out for this evaluation, is that only the active substance should be regarded as relevant for the mixture toxicity assessment. Therefore, only the risk assessment for the a.s. iodine is presented in this document.

On the other hand, ES CA has analysed the information available on the co-formulants (i.e. Safety Data Sheets, C&L Inventory, REACH Registration dossiers, REACH Evaluation Reports and CARs of approved biocidal active substances). None of the co-formulants has environmental hazards classification and therefore do not contribute to the classification or possible risks of the mixture, so the product Gut-Yodofillm is classified as aquatic Chronic 3, H412: Harmful to aquatic life with long lasting effects; all calculation models used for the assessment at the Competent Authority Report (CAR) for the active substance iodine, are valid for this product. However, the figures were recalculated to be concordant with the iodine content at the commercial product.

Since the product environmental hazards could be well characterised by the known hazards from the components, no new studies were performed on the product. Data of the active substance (a.s.) iodine were evaluated by the Rapporteur Member State (RMS) Sweden (RMS SE, 2013). No new data have been required. The following data on active substance issued from Iodine Assessment Report, Sweden, December 2013 (Iodine CAR) will be used for environmental risk assessment.

An abstract of the information presented at CAR (2013), section 2.2.2, are shown below, for the reviewer convenience:

Iodine and iodine compounds are ubiquitously distributed and there is a natural cycle of iodine species in the environment (see figure below). Consequently, a lot of research has been made on the fate and distribution of iodine in the environment and all information presented in the dossier for this section is based on open literature, except for the adsorption to soil, for which a study has been conducted. Accordingly, environmental background values as presented in the table below are likely to be encountered for soil, water and air. It should be noted that the RMS has not made a comprehensive literature search but has mainly adopted the values quoted in the overview articles submitted by the applicant and in some cases added values from additional references.

Summary table of background levels	
Compartment	**Background level (as iodine)**
Soil	Typically 0.5 - 20 mg/kgdwt but with extremes up to 98 mg/kg Global mean value of 5 mg/kg
Groundwater	Mean concentration: 1 µg/L Range: < 1 - 70 µg/L with extremes up to 400 µg/L
Freshwater (river and lake)	0.5 - 20 µg/L
Marine water	45 - 60 µg/L
Rainwater	0.1 - 15 µg/L
Freshwater sediment	Typically: 6 mg/kg
Marine sediment	Typically: 3 - 400 mg/kg
Air	Atmosphere: 10 - 20 ng/m^3 Atmospheric concentration: over land 2 - 14 ng/m3; over ocean 17 - 52 ng/m3 Marine air contains: 100 µg/L (may refer to local inhalable air)

Whereas the term degradation is not applicable to an element, iodine may undergo different hydrolytical, photolytical and microbial transformation processes (i.e. speciation) in the different compartments. The presence of different forms of iodine is largely dependent on redox potential and pH. Iodide and iodate are the dominant iodine species in soil. Iodate is the dominant chemical form of iodine in the soil solution under non-flooded conditions whilst under flooded conditions iodide is the dominant chemical form.

In water, the prevalent iodine forms are iodide (I^-) and iodate (IO_3^-). In surface waters, the proportion of iodide to iodate will vary depending on microbial activity and the release of iodine species from terrestrial sources.

Microbial action converts iodide to organic forms of iodine, primarily methyl iodide (CH3I). Its high vapour pressure and limited solubility in water leads to volatilization of methyl iodide from surface waters to the surrounding atmosphere. Also, microbial activity and photochemical reactions with iodide or iodate can lead to the formation of iodine, which evaporates to the atmosphere. At ordinary pressures and temperature, methyl iodide and iodine will exist, predominately in a free gaseous form, in air. Both iodine and methyl iodide undergo photochemical reactions to form iodine radicals, which can form a number of other iodine species.

Iodine as an element does not undergo biodegradation processes and although biotic transformation processes may be involved in the formation of the different iodine species

no studies have been provided on the significance of such processes. It is likely that the magnitude of the natural occurrence of iodine species in the environment renders for example the formation of methyl iodide from biocidal use of iodine to be insignificant.

Hydrolysis of iodine takes place in a series of reactions and leads to the formation of iodide and iodate. Natural waters, particularly marine waters, contain iodine mainly in the form of iodide and iodate. Iodide (oxidation state -1) is the dominant iodine species in surface waters whilst iodate (oxidation state +5), the second most abundant form of iodine in aqueous systems, is found predominantly under alkaline and well oxidized conditions. In water, photolytic dissociation of methyl iodide can result in the formation of elemental iodine and inorganic iodine species. Also, photochemical production of iodine from a reaction between iodide and iodate upon irradiation with UV-light at sea level may occur. However, iodine production via this pathway may be regarded as insignificant.

The earth's oceans contain 8.1 x 1016 g of iodine at an average concentration of between 45 and 60 µg/L and it is estimated that iodine in the earth's surface amounts to 6.3 x 1018 g. The concentration of iodine in bedrock varies between 0.5 and 380 ppm. The major source of iodine in soil originates from the volatilization of iodine from the ocean surface transported as ocean spray, rainwater and snow to terrestrial surface, but also weathering of rock contributes to the iodine content of the terrestrial surface. Within the soil profile, the highest levels of iodine are often found in the upper layers, where also the organic content is highest. The level of iodine is generally high in peat soils and in mineral soils, the highest levels of iodine are found in the organic layers.

Adsorption data for iodine has been acquired from an adsorption screening test according to OECD 106 and from publicly available information. A geometrical mean Koc of 165.8 cm^3/g was calculated from the OECD 106 test. However, the adsorption of iodine to soil is not only attributed to organic matter, even though this type of adsorption seems to be predominant at pH > 6. A different approach is therefore applied, i.e. to use measured partitioning coefficients Kd (or Kpcomp as given in the TGD) for soil and suspended matter directly. In conclusion, and in agreement with the statement in section 2.2.5.3 in the TGD that for ionic substances measured adsorption coefficients are needed, the solids-water adsorption coefficients to be used the environmental exposure calculations are Kp_{soil} = 5.8 cm^3/g and Kp_{susp} = 2.2 x 102 cm^3/g.

When assessing the distribution of iodine species in sewage treatment plants (STP), it was established that the Simple Treat model normally used, and that resulted in a sludge retention factor of 1.93%, was not appropriate. Molecular iodine is a chemically unstable element with oxidizing properties, and it is assumed that when iodine reaches the wastewater stream it will speciate into iodate and iodide. Therefore, sludge retention factors are based on literature data laboratory and field experiments, which range between 20 and 80% retention. Considering that iodide is not highly adsorbed to sludge under typical conditions and iodate can form complexes with calcium which easily adsorb to negatively charged particle surfaces, the majority of the iodine that passes an STP will most probably not be retained in sludge and a sludge retention factor of 20% is chosen for the risk assessment (i.e. 80% of the iodine discharged to the STP remains in the effluent). Exposure to air is not considered as iodide and iodate are assumed not to be volatile.

Bioaccumulation (BCF) values for iodine are generally low, although values up to 10000 have been found. However, the reported values should be treated with caution, since they are not acquired from bioaccumulation studies, but are merely a comparison of iodine content in the source and in the organism. Estimation of Kow and bioaccumulation potential for an inorganic substance such as iodine is not considered relevant. High intracellular iodine concentrations may have other explanations, e.g. physiological processes like active transport and intracellular enzymatic reactions.

2.2.8.1 Effects assessment on the environment

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

Aquatic compartment

For the aquatic compartment, three OECD guideline studies have been submitted, namely on fish, invertebrates and algae. In addition, two disinfection efficacy tests with fish have been performed, which partly may be used to evaluate ecotoxicity, but they have not been used in the risk assessment. The most sensitive aquatic organism was the invertebrate *Daphnia*, for which the lowest EC50 0.59 mg/L was derived with iodine. In addition, a *Daphnia* study with PVP iodine (PT1 product Yodi Cura) resulted in an even lower EC50 of 0.315 mg/L.

Aquatic tests	**Results, L/EC50 (mg/kg dwt)**		
	iodide	**iodate**	**iodine**
Oncorhynchus mykiss, acute toxicity, 96 h LC_{50}	3780	220	1.67
Daphnia magna, acute toxicity/immobilisation, 48 h L/EC_{50}	0.83	58.5	0.59
Daphnia magna, acute toxicity/immobilisation, 48 h L/EC_{50}	-	-	0.315
Desmodesmus subspicatus, growth inhibition, 72 h ErC_{50}	-	-	1.3

STP

A respiration inhibition test with sewage sludge micro-organisms has been submitted.

	Results, L/EC50 (mg/L)		
	iodide	**iodate**	**iodine**
Activated sewage sludge micro-organisms, respiration inhibition, 3 h EC_{50}	-	-	290

Terrestrial compartment

Acute terrestrial toxicity tests have been submitted for earthworms, non target plants and soil micro-organisms with non target plants being most sensitive. In the study on terrestrial plants six different species were tested and the results were rather similar for all six, the EC_{50} values ranging between 13.4 and 26.6 mg/kg. The most sensitive species was *Avena sativa*, with an EC_{50} of 13.4 mg iodine/kg dry soil for the most sensitive parameter shoot fresh weight. The results are summarised in table below and the effect values are expressed as mg iodine/kg dry soil.

Terrestrial tests	Results, L/EC50 (mg/kg dwt)		
	iodide	iodate	iodine
Eisenia fetida, acute test, 14 d LC50	-	-	>1000
Avena sativa, seedling emergence & growth, 21 d EC50 (key study)	-	-	13.4
Soil microorganisms, respiration inhibition, 28 d EC50	-	-	148.7
Soil microorganisms, nitrate formation, 28 d EC50	-	-	82.6

At TMII-12, which was held in June 2012 in Somma Lombardo, Member States expressed concern that the ecotoxicity data set was rather limited, and that additional tests are available in the literature, e.g. on fish toxicity. However, it was concluded that these tests do not add information that would lead to a modification of the PNEC. It was also concluded that at the moment it was unnecessary to perform new tests. It was further concluded that it is desirable to gain insight into natural background levels of iodine in relation to the background levels in the ecotoxicity studies. An attempt to do this has been done by RMS, which is reported in Doc IIIA7.
The conclusion was that the background levels used in the tests are not likely to have affected the outcome of the tests.

Atmosphere

In view of the high background values of iodine in air, emission to air resulting from application of iodine as disinfectant is not considered to be relevant.

Secondary poisoning

As the amounts of iodine potentially released into the environment through biocidal uses are within the natural occurring background levels, there is no concern with respect to secondary poisoning.

Endocrine disruption activity of non-active substances
The Commission Delegated Regulation (EU) 2017/2100 specifying the scientific criteria for the determination of endocrine-disrupting properties (ED criteria) under Regulation (EU) No 528/2012 (BPR) establishes that the ED criteria become applicable by 7 June 2018 for biocides.

No further ecotoxicological studies are available for GUT YODOFILM. The product was not tested for potential endocrine disruption properties. GUT YODOFILM contains the active substance iodine and various co-formulants (see confidential PAR).

For the active substance, as discussed in the Assessment Report for iodine (December 2013), Iodine is an essential element and has a physiological function in thyroid hormone synthesis (i.e. intentionally interacts with the endocrine system). This means that both iodine deficiency as well as iodine excess can impair thyroid homeostasis/thyroid hormone levels. This is to be considered as an endocrine effect.

For the co-formulants a screening was performed by consulting:
• ECHA data for identification of ED and PBT, under REACH, BPR or CLP

• Identified as ED by United States EPA (https://comptox.epa.gov/dashboard/)
• Identified as ED by the United Nations Environment (July 2017) Programme (http://wedocs.unep.org/bitstream/handle/20.500.11822/25634/edc_report2.pdf?sequence=1&isAllowed=y and https://wedocs.unep.org/bitstream/handle/20.500.11822/25635/edc_report2_factsheet.pdf?sequence=1&isAllowed=y)

During screening performance none of the co-formulant triggered an alert for ED property thus, ES CA considered that there is no concerned regarding the ED properties of this coformulants.

Fate and behaviour in the environment

New environmental fate and behaviour on the a.s. or product specific data are not available as they are not considered necessary. All agreed endpoints have been taken from the CAR of the a.s. in PT 3.

Route and rate of degradation in water

Hydrolysis of active substance and relevant metabolites (DT50) (state pH and temperature)	Hydrolysis reaction of iodine occurs to a very small extent because iodine is sparingly soluble. Hydrolysis of I2 as the reactant is a pH-dependent dynamic equilibrium reaction with iodide (I-) and iodate (IO3) as products. At pH values between 4 and 9, iodide is the predominant species. In alkaline and well oxidized waters iodate is the predominant specie.
Photolytic / photo-oxidative degradation of active substance and resulting relevant metabolites	In water, iodide and iodate are the predominant species. In addition, a natural background level of methyl iodide might also be found in water. Photolytic dissociation of these compounds can result in the formation of elemental iodine and inorganic iodine species.
Readily biodegradable (yes/no)	Not applicable because iodine is an element
Biodegradation in seawater	Not applicable because iodine is an element
Non-extractable residues	Not applicable because iodine is an element
Distribution in water / sediment systems (active substance)	In natural water/sediment system, iodide would be the predominant species under aerobic conditions. Iodine can enter sediments through accumulation of plant matter or fixation of iodide in water to humic substances. Weaker and reversible binding of iodide to inorganic components in sediments may also occur (Kd values ranging from -0.22 mL/g for chlorite minerals to 15.14 mL/g for iolite minerals).
Distribution in water / sediment systems (metabolites)	See above.

Additional data on distribution and dissipation in soil of the a.s. or the biocidal product are not necessary. New data are not available.

Route and rate of degradation in soil

Mineralization (aerobic)	Not applicable due to the fact that iodine is an element

Laboratory studies (range or median, with number of measurements, with regression coefficient)	DT50lab (20ºC, aerobic): Not applicable
	DT90lab (20ºC, aerobic): Not applicable
	DT50lab (10ºC, aerobic): Not applicable
	DT50lab (20ºC, anaerobic): Not applicable
	degradation in the saturated zone: Not applicable
Anaerobic degradation	Not applicable
Soil photolysis	No data available and no data required
Non-extractable residues	No data available and no data required
Relevant metabolites	Not applicable due to the fact that iodine is an element

Additional data on distribution and dissipation in soil of the a.s. or the biocidal product are not necessary. New data are not available.

Fate and behaviour in air

Direct photolysis in air	Rapid photolysis of I2 takes place in the lower atmosphere due to its strong absorption of light in the visible wavelengths (400 < λ < 700 nm). Lifetime = 5-10 s for an overhead sun
Photo-oxidative degradation in air	Methyl iodide and molecular iodine are the predominant iodine species in air. Both iodine and methyl iodide undergo photochemical reactions to form iodine radicals, which can then go on to form a number of other iodine species through a complex series of reaction pathways.
Volatilization	Iodine is volatilised in several forms with methyl iodide (CH3I) probably being the most important one.

However, the Iodine in the BP is in the form of complexing-bounded with Polyvinylpyrrolidone, and then is not expected to be volatile.

Additional data on distribution and dissipation in air of the a.s. or the biocidal product are not necessary. New data are not available.

PBT assessment

The RMS considers that a comprehensive PBT assessment is not relevant in the case of iodine. The term persistence is not appropriate, since iodine is an element and not degradable.

Estimation of bioaccumulation potential for iodine is not considered relevant. In the concerned environmental compartments iodine speciates into the ionic forms iodide and iodate. In line with what has been discussed for inorganic metals (e.g. Ni and Zn), bioaccumulation is not relevant because these substances (and iodine) are regulated in animals of several taxonomic groups. The acute toxicity to mammals is low, but iodine is very toxic to aquatic organisms.

However, the screening T criterion ($L(E)C_{50}$ to aquatic organisms less than 0.1 mg/L) is not fulfilled, and there is no chronic data available, which is needed to assess the T criterion.

PNEC derivation:

The derivation of PNEC values has been done as described in Document II-A with the exception of the PNECaquatic for iodine in PT1, which was derived from a product study, presented at CAR (2013). The PNEC values used in the risk assessment are summarised in table below.

Environmental compartment		**Iodine species**	**PNEC**
Aquatic, freshwater	Surface water	iodine (I_2)	0.00059 mg/L
		iodine (I_2 in product)	0.00032 mg/L (PT1)
		iodate(IO_3^-)	0.0585 mg/L
		iodide(I^-)	0.00083 mg/L
	Freshwater sediment	-	not used in the risk assessment
Aquatic, marine	Seawater	iodine (I_2)	0.000059 mg/L
		iodine (I_2 in product)	0.000032 mg/L (PT1)
		iodate(IO_3^-)	0.00585 mg/L
		iodide(I^-)	0.000083 mg/L
	Marine sediment	-	not used in the risk assessment
Terrestrial		iodine (I_2)	0.0118 mg/kg_{wwt}
		iodate(IO_3^-)	0.304 mg/kg
		iodide(I^-)	0.0043 mg/kg
STP		iodine (I_2)	2.9 mg/L

	Values for Iodine		**Values for Iodide**	**Values for Iodate**
Via manure/slurry application (10 years applications)	**Background**	**PNEC**	**PNEC**	**PNEC**
Surface Water-grass (µg/L)	0.5 <-> 20	0,5900	0,8300	58,5000
Surface Water-arable (µg/L)		0,5900	0,8300	58,5000
Soil arable (mg/Kg *wwt*)	0.565 <-> 22.6 extremes up to 110.74	0,0118	0,0043	0,3040
Soil grassland (mg/Kg *wwt*)		0,0118	0,0043	0,3040
Groundwater-grass (µg/L)	1<->70	>0,1	>0,1	>0,1
Groundwater-arable (µg/L)		>0,1	>0,1	>0,1
Via STP				
STP (mg/L)	-	2,9000	not relevant	not relevant
Surface Water (µg/L)	0.5 <-> 20	0,5900	0,8300	58,5000
Soil (mg/Kgwwt)	0.565 <-> 22.6 extremes up to 110.74	0,0118	0,0043	0,3040
Groundwater (µg/L)	1<->70	>0,1	<0,1	>0,1

PECs for sediments have not been calculated as no predicted no effect concentrations (PNECs) are available. As it is stated on the iodine AR (December 2013), no further risk assessment has been performed as both the PEC and PNEC values for sediment would have been calculated using the equilibrium partitioning method, and consequently the resulting risk quotient would be the same as described for surface water.

Further Ecotoxicological studies

No additional studies are deemed necessary on the product.

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

No additional data was deemed as necessary.

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

Exposure to the environment is described in the ESD for PT3. The route of exposure of iodine to the environment is either via application of manure/slurry to agricultural land or by release from the facility drain to an STP and subsequent compartments. Relevant receiving compartments are soil, groundwater and surface water.

Release to seawater may occur in the case of teat dip use and disinfection of milking equipment through runoff after sewage sludge application, but the calculated PEC's are negligible compared to the natural background levels in seawater of 40-65 µg/L and are thus not explicitly summarised here.

2.2.8.2 Exposure assessment

The intended use of the product is the post-milking teats disinfection by manual dipping and automatic dipping robot.

General information

Assessed PT3	PT3. Animal disinfectant
Assessed scenarios	1.Post-milking teat disinfection by manual dipping 2.Post-milking teat disinfection by automatic dipping (robot).
ESD(s) used	* Emission Scenario Document for Product Type 3 (ESD PT3): Veterinary hygiene biocidal products, 2011 * Technical Agreements for Biocides Environment (ENV), October 2022
Approach	Average consumption
Distribution in the environment	Calculated based on ECHA- Guidance on the biocidal Products Regulation - Volume IV Environment - Part B Risk Assessment (active substances) Version 2.0; October, 2017
Groundwater simulation	Not relevant
Confidential Annexes	No
Life cycle steps assessed	Production: No Formulation: No Use: Yes Service life: No

Remarks	Since Euses 2.1.2 does not implement the "PT3-Disinfection for veterinary hygiene: non-medical teat dips" scenario, the calculations were implemented in a Excel® sheet following the equations and intermediate outputs posed in the ESD PT3 document.

Fate and distribution in exposed environmental compartments

Iodine is used in veterinary hygiene biocidal products (PT3) for the purpose of manual and automatic non-medical teat disinfection. Application methods are spraying and dipping of teats, with dipping being most commonly used. In this last case, the teats are immersed before and/or after milking using a cuplike container that holds the disinfectant. At least the lower third of the teats should be immersed. Dip solution remaining in the cuplike container should be discharged. After application through spraying or dipping, the applied teat disinfectant is left to dry on the teat surface and remains there as a protective film, otherwise the worker wipes the treated teats after application.

Two emission pathways are possible: emission to waste water or to the slurry. This depends on whether the cows are milked in the stable (emission to slurry) or in a milking parlour outside the stable (emission to waste water). When the product is discharged in manure, indirect emission will occur to agricultural soil through fertilization with manure. The amount of manure to be used for fertilization is controlled by nitrogen and phosphorus emission standards. When the product is discharged to waste water, indirect emission to surface water and agricultural soil occurs (fertilization with sewage sludge).

Air exposure route
Concerning emissions to air, iodine has a low vapour pressure (40.7 Pa at 25°C) and in view of the high background values of iodine in air, emission to air resulting from application of iodine as disinfectant is not considered to be relevant. This approach is in line with the one taken in the CAR (2013).

STP exposure route
The PEC and PNEC values were calculated based on the assumption that 100% iodine (I2) is transferred either to two iodide (I^-) or iodate ($IO3^-$) ions. The molecular weight of two iodide ions corresponds to the molecular weight of iodine, consequently the PECs for iodide are the same as for iodine. The molecular weight of two iodate ions is a factor of 1.382 higher than the molecular weight of iodine, therefore the PECs for iodate were calculated by multiplying the PECs of iodine by this factor. No degradation is considered for any of the PEC values. The concept of degradation is not applicable as iodine is an element.

Manure/slurry exposure route
Manure and slurry applications were considered on 10 years applications following the WGIC-2017 discussions. The equations of the Addendum to the OECD SERIES ON EMISSION SCENARIO DOCUMENTS, Number 14: Emission Scenario Document for Insecticides for Stables and Manure Storage Systems were applied following the WG-I-2018 recommendations (and its available spread sheets in the document), it has been taking into account the dissipation via leaching process in soil with a DT_{50} of 643 days for grassland and 2571 days for arable land as agreed at the European level.

Note that dairy cows produce three times more nitrogen than phosphor (0.3389 vs. 0.1047 kg/animal/d), while the nitrogen emission standards are about a factor of two higher. Consequently, the phosphate emission standards combined with the dairy's cows phosphate production allows more manure per hectare and therefore higher PECs. Therefore, only the

predicted environmental concentrations (PECs) based on the nitrogen emission standards are presented in the current PAR.

Soil exposure route

The PEC_{soil} values have been calculated according to the legal standards for phosphate and nitrogen loading in the appendix. In the case of dairy cows, the nitrogen emission standard limits the emission to the environment. Only the results regarding to nitrogen is presented in this ERA.

In summary, direct emissions of iodine to manure/slurry and STP are assumed. Air emissions are negligible. Possible exposures to environmental compartments are summarised in the table below:

Identification of relevant receiving compartments based on the exposure pathway									
Scenario	**Fresh - water**	**Freshwater sediment[1]**	**Sea water**	**Sea water sediment**	**STP**	**Air**	**Soil**	**Groun d- water**	**Birds/ mammals**
via STP	yes	yes	n.r.	n.r.	yes	n.r.	yes	yes	no
via slurry-manure– 10 year appl.	yes	yes	n.r.	n.r.	no	n.r.	yes	yes	no

[1] PEC's calculated for freshwater sediments are negligible compared to the natural background levels and not used in the risk assessment. Moreover, no risk assessment has been performed for sediments as both the PEC and PNEC values for sediment would have been calculated using the equilibrium partitioning method, and consequently the resulting risk quotient would be the same as described for surface water.

Input parameters for calculations are summarised in the table below:

Input parameters for calculating the fate and distribution in the environment			
Parameters for iodine	**Value**	**Unit**	**Remarks**
Molecular weight	253.81	g/mol	CAR (2013)
Melting point	113.5-113.7	ºC	CAR (2013)
Boiling point	184.24-184.5	°C	CAR (2013)
Vapour pressure (at 0ºC)	4	Pa	CAR (2013)
Vapour pressure (at 25ºC)	40.7	Pa	
Vapour pressure (at 50ºC)	287	Pa	
Water solubility (at 20ºC)	0.29	g/L	CAR (2013)
Water solubility (at 25ºC)	0.30-0.33	g/L	
Water solubility (at 50ºC)	0.78	g/L	
Log Octanol/water partition coefficient	Not relevant to a purely inorganic substance like iodine	Log 10	CAR (2013)
Organic carbon/water partition coefficient (Koc)	165.8	cm3/g	CAR (2013)

			Inorganic substance
Henry's Law Constant (at 25ºC)	34.43	Pa m3 mol-1	CAR (2013)
Biodegradability	Not biodegradable		Inorganic substance
Solids-water partition coefficient in suspended matter (Kp, susp)	220	[l.kg-1]	CAR (2013)
Solids-water partition coefficient in soil (Kp, soil)	5.8	[l.kg-1]	CAR (2013)
Soil-water partition coefficient (Ksoil-water)	8.90	(m3/m3)	Calculated
Susp-water partition coefficient (Ksusp-water)	55.9	(m3/m3)	Calculated
DT_{50} for biodegradation in surface water	Iodine as an element does not undergo biodegradation processes and although biotic transformation processes may be involved in the formation of the different iodine species no studies have been provided on the significance of such processes.		CAR (2013)
DT_{50} for hydrolysis in surface water	Hydrolysis reaction of iodine occurs to a very small extent because iodine is sparingly soluble. Hydrolysis of I2 as the reactant is a pH-dependent dynamic equilibrium reaction with iodide (I-) and iodate (IO3) as products. At pH values between 4 and 9, iodide is the predominant species. In alkaline and well oxidized waters iodate is the predominant specie.	d or hr (at 12ºC)	CAR (2013)
DT_{50} for photolysis in surface water	In natural water, I-, IO3 -, and I2 are coexisting whereas iodide strongly prevails. Molecular iodine may photolytically be formed from iodide or iodate in water.	d or hr (at 12ºC)	CAR (2013)
DT_{50} for degradation in soil	Not applicable due to the fact that iodine is an element. A value of DT50 soil = 1E06 days is taken only for calculations based on the recommendation of the BPC Ad hoc Working Group on Environmental Exposure (agreed at the Environment Working Group V on November 26, 2015).	d	
DT_{50} for degradation in air	Rapid photolysis of I2 takes place in the lower atmosphere due to its strong absorption of light in the visible wavelengths (400 < λ < 700 nm). Lifetime = 5-10 s for an overhead sun.	d or hr (at 12ºC)	CAR (2013)

	Methyl iodide and molecular iodine are the predominant iodine species in air. Both iodine and methyl iodide undergo photochemical reactions to form iodine radicals, which can then go on to form a number of other iodine species through a complex series of reaction pathways.		

Parameters for iodide	**Value**	**Unit**	**Remarks**
Transformation rate in surface water iodine to iodide (%)	100		
Transformation rate in soil iodine to iodide via the STP (%)	14		
Transformation rate in soil iodine to iodide via manure (%)	100		
Molecular equivalent iodide/iodine	1		
Parameters for iodate	**Value**	**Unit**	**Remarks**
Transformation rate in surface water iodine to iodide (%)	100		
Transformation rate in soil iodine to iodide via the STP (%)	100		
Transformation rate in soil iodine to iodide via manure (%)	100		
Molecular equivalent iodate/iodine	1.382		

Calculated fate and distribution in the STP		
Compartment	**Percentage [%]**	**Remarks**
Air	0	Molecular iodine is a chemically unstable element with oxidizing properties and it is assumed that when iodine reaches the wastewater stream it will speciate into iodate and iodide. Exposure to air is not considered as iodide and iodate are assumed not to be volatile.
Water	80	Considering that iodide is not highly adsorbed to sludge under typical conditions and iodate can form complexes with calcium which easily adsorb to negatively charged particle surfaces, the majority of the iodine that passes an STP will most probably not be retained in sludge and a sludge retention factor of 20% is chosen for the risk assessment (i.e. 80% of the iodine discharged to the STP remains in the effluent).
Sludge	20	
Degraded in STP	0	

Emission estimation

The product GUT YODOFILM is applied manually two times a day, but three times in milking robots so the scenario 2: "Teat disinfection by automatic dipping robot (Post milking)" is therefore the worst-case and consequently applied in the environmental risk assessment.

Scenario 2. Teat disinfection by automatic dipping robot (Post milking)

According to the ESD for PT3 (2011), the following assumptions apply to this scenario:

- After automatic dipping (Robot), the remaining solution is discharged. Two pathways are possible: emission to waste water or to the slurry. This depends on whether the cows are milked in the stable (emission to slurry) or in a milking parlour outside the stable (emission to waste water).

- The lactation period for dairy cows is normally 270 to 300 days. Dairy cows are regularly milked twice per day (DVG 2009). Potentially spilled solution can either reach the slurry or the wastewater. The fraction of disinfectant remaining on teats depends on the viscosity of the application solution. Many products are quickly drying on the teats. As a conservative approach, the fraction of disinfectant remaining on teats ($F_{teat)}$ is considered to be 0.5 as a worst case.

- According to TAB October 2022, ENV 63 (WG-I-2018), the value for the number of milk producing cows (N_{mp_animal}) is refined to 82, so the equation for calculation of the amount of active ingredient ($Qai_{i1,i2,i3,i4}$) in the relevant stream i4 = slurry/manure after one application for all animals has been also modified.

Three milking events are considered according to TAB October 2022, ENV 64 (WG-I-2018).

According to TAB October 2022, ENV 61 (WG-V-2016) the emission estimation for dairy cows is considered as worst-case with reference to teat disinfection and covers therefore also buffaloes, sheep and goats.

The assessment of GUT YODOFILM has been calculated by considering that the application on the udder/teat hole is by dipping cup with 10 ml of pure product for 2600 mg/L of iodine (based on 2.5 % (w/w) content in the product and density of 1.04 g/cm3).

Calculations for Scenario

The local emission was calculated using ESD for PT 3 (2011) and according with HEAdhoc Recommendation no. 13 and the TAB October 2022.

According to ESD for PT 3 (2011), two pathways are possible: emission to waste water or to the slurry. This depends on whether the cows are milked in the stable (emission to slurry) or in a milking parlour outside the stable (emission to waste water).

The input parameters and the resulting calculation of emissions to manure/slurry and STP are listed in the table below.

Variable/parameter	Unit	Symbol	S/D/O/P	Value	Remark
Type of housing/manure storage (for application of the notification)	[--]		D	i1 = 1 (dairy cows)	ESD (appendix 1, table 7)
Type of biocide	[--]		D	i2 = 1 Disinfectant)	ESD (appendix 1, table 7)
Type of application	[--]		D	i3 = 2 (dipping)	ESD (appendix 1, table 7)

Relevant emission stream	[--]		P	I4=1, 3 (manure/slurry) and I4= 2 (wastewater)	ESD (appendix 1, table 7)
Concentration of active substance in formulation **Iodine**	[g/l]	Fbioc	S	2.6	Information provided by the applicant
Amount of product prescribed to be used for one treatment (dipping of the four teats) of one animal	[l]	Vprod	S	0.01	Information provided by the applicant
Dilution factor (for preparation of the working solution from the formulation (product))	[--]	F_{dil}	S	1	S
Fraction of the active ingredient release	[--]	$F_{stp} = F_{ww}$	D	0.5	ESD, table 3a
	[--]	$F_{slurry/manure}$	D	0.5	ESD, table 3a
	[--]	F_{air}	D	0	ESD, table 3a
	[--]	F_{teat}	D	0.5	ESD, table 3a
Number of teat dipping events for one animal and one day (dipping of the four teats of one animal = one disinfectant application)	[--]	Napp-teat	D/S	3	Only post-milking application and 3 milking events per day TAB-ENV 64 (WG-I-2018)
Number of days of lactation period (corresponds to number of emission days)	[--]	Nday-lact (= Temission)	D	300	ESD, table 3a
Number of disinfectant applications in one year (equals number of disinfectant applications in one lactation period)	[--]	Napp-bioc	O	900	=Napp-teat × Nday-lact TAB-ENV 64 (WG-I-2018)
Interval between two disinfectant applications (dipping events)	[d]	Tbioc-int	O	0.33	= 1d/ Napp-teat TAB-ENV 64 (WG-I-2018)
Number of manure applications for grassland	[--]	Nlapp-grass	D	4	ESD, table 3a
Number of manure applications for arable land	[--]	Nlapp-arab	D	1	ESD, table 3a
Manure application time interval for grassland	[d]	Tgr-int	D/S	53	ESD (appendix 1, table 12)
Manure application time interval for arable land	[d]	Tar-int	D/S	212	ESD (appendix 1, table 12)
Number of animals in housing	[--]	N	D/S	100	ESD PT 3, Table 8

Number of milk producing animals per day	[--]	Nmp_animal	D/S	82	Nmp-animal = N * Temission/365 = 82 HEAdhoc Recommendation 13 and TAB-ENV 63 (WG-I-2018)
Amount of nitrogen per animal for category/subcategory i1 =1	[kg.d^{-1}]	$Qnitrog_{i1}$	D	0.33890	ESD (appendix 1, table 11)
Nitrogen immission standard for one year on grassland	[kg.ha^{-1}]	QN,grass	D	170	ESD (appendix1: Table 13)
Nitrogen immission standard for one year on arable land	[kg.ha^{-1}]	QN,arab	D	170	ESD (appendix1: Table 13)
Mixing depth with soil, grassland	[m]	DEPTHgrass	D	0.05	ESD (Table 3a)
Mixing depth with soil, arable land	[m]	DEPTHarab	D	0.2	ESD (Table 3a)
Density of wet bulk soil	[kg.m^{-3}]	RHOsoilwet	D	1700	ESD (Table 3a)

Output:

$Edirect_{manure\ storage}$ = Emission to manure/slurry during storage period [kg a.i.] = Qai slurry/manure

Local emission to a standard STP or an on-site waste water treatment plant (Qai-stp = Elocal wastewater)

Calculations:		
Quantity of active substance used per application: *Qai-prescr*$_{i1,i2,i3}$ = 10^{-3} * Fbioc * Vprod *Fdil	= 2.6E-05 kg	**Iodine**
$Qai_{slurry/manure}$ = $F_{slurry/manure}$ * *Qai-prescr*$_{i1,i2,i3}$ * N_{mp_animal}	**= 1.07E-03 kg**	**Iodine**
Qai_{stp}= Fstp * Qai-prescr$_{i1,i2,i3}$ * N * Napp-teat * Temission / 365	**= 3.21E-03 kg/d**	**Iodine**

S = Value set based on information provided by the applicant, D = Default value according to the ESD, O =Output (= calculated value), P = Value derived from a pick-list

*Calculation of Napp-manure (Addendum to ESD PT 18 stables (TAB ENV 212)):
Arable land:
*T*ar-int = *T*bioc-int
*N*app-manure$_{ar}$ = *T*ar-int / *T*bioc-int = 1.
Grassland:
1. Determine number of biocide applications in one manure storage period:
Napp-manure-gr = Tgr-int/Tbioc-int
2. Check if total calculated number of applications per year does not exceed the prescribed maximum number of applications per year and correct if required:
If Nlapp-gr x Napp-manure-gr > Napp-bioc, then Napp-manure-gr = Napp-bioc/Nlapp-gr

The **emission of iodine to the waste water** was calculated to be 3.21E-03 kg/d.

The value of 3.21E-03 kg/d of iodine was used as input parameter for the exposure assessment, i.e. for the calculation of the iodine influent concentration in the STP.

The **emission of iodine to the manure/slurry tank** was calculated to be 1.07E-03 kg during the storage period of manure/slurry.

This calculated amount of iodine was used as input parameter ($Qai_{slurry/manure}$) in calculation for concentration in soil due to land application of manure.

Calculated PEC values

It should be noted that the nitrogen standard is the most relevant in Europe notably in Spain. Therefore, regarding emission via manure application, PEC values were calculated for application to grassland and arable land on the nitrogen standard.

According to the Technical Agreements on Biocides 2022 (ENV-63):
- In the emission to STP, the value for the number of milk producing cows is refined to 82.
- In the emission to slurry, the value for the number of milk producing cows is 100.

According to the assessment report for iodine (I2), iodate (IO3-) may be considered to be the dominant chemical form of iodine in the soil solution under aerobic non-flooded soil conditions, while iodide (I-) appears mainly under anaerobic conditions. In surface water, however, both species may appear depending on the acidity (pH) and oxygen concentrations (redox) of the receiving fresh water body. In general iodate is the dominant species in oxygen rich water, while iodide is present in water low in oxygen contents. Predicted environmental concentrations were therefore calculated assuming no transformation (100% iodine) and 100% transformation into iodide or iodate. Only for PECs in soil were recalculated taking into account the following: for spreading of sewage sludge on arable land it is assumed that 100% of iodine is transformed into iodate and 14% into iodide (according to CAR). Limited information on the behaviour of iodate and iodide in environmental compartments is available. Therefore, the physical-chemical properties for iodine were applied to these two transformation products as well. PECs for iodate were derived by multiplying those for iodine with 1.382 (differences in molar weight).

According to BPR Guidance of Risk Assessment Vol IV, Part B, active substances with a Koc lower than 500 L/Kg are not probable to be adsorbed by the sediment. Therefore, and following Iodine's CAR, PEC value for this compartment was not evaluated.

- ***Local PEC values for the emission pathway via manure/slurry***

The PEC calculated with ESD PT3 represents the concentration after manure application on arable land and grassland (PIEC). Since fertilizers are applied repeatedly, iodine would accumulate in the soil after consecutive manure applications. This accumulation is counteracted by the effect of degradation and leaching. Concentrations in soil after ten years were calculated according to the Addendums for PT18 (TAB ENV 212, version 2: (AHEE-6)) and for nitrogen standard application rates only. The emission to soil from the application of slurry/manure has been determined taking degradation and leaching to deeper soil layer into account for a period of 10 years (agreed at BPC WGIV2017). Also, the PEC values have been calculated based on the latest decisions and agreements of the WG ENV WG-I-2021, WG-II-2022 (e.g. ENV 237: PECgw based on PEClocalsoil 180d TWA and PECsw based on PEClocalsoil 30d TWA, ENV 161: for Tar-int=Tbioc-int).

Based on the biodegradation data of iodine in soil and leaching, the experimentally derived water-solids distribution coefficient for soils is 5.8 L/kg, iodine is practically eliminated from

the soil by leaching, maintaining half-lives for topsoil leaching of 2571 days in arable land (20 cm) and 643 days in grassland (5 cm). Due to the value for kleach is derived from the soil depth, this value is different for arable and grassland. These two values have been validated in WG for Union Authorisations containing iodine.

Input parameters for the $PECsoil_{10years}$ calculations considering degradation and leaching of iodine to deeper soil layers are listed in the table below:

Parameters	Symbol	Value	Unit	S/D/O/R
Fraction of rain water that infiltrates into soil	Finf_soil	0.25	-	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (55)
Rate of wet precitipation (700 mm/year)	RAINrate	1.92E-03	m/d	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (55)
Half-life for biodegradation in bulk soil	DT50biosoil	1.00E+6	d	CAR
First order rate constant for volatilisation from soil layer (grassland)	kvolat_gr	3.17E-04	d^{-1}	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (54)
First-order rate constant for leaching from soil layer (grassland)	kleach_gr	1.08E-03	d^{-1}	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (55)
Half-life for leaching from soils (grassland)	DT50soil_gr	642.71	d	BPC WGIV2017
First order rate constant for volatilisation from soil layer (arable land)	kvolat_ar	3.17E-04	d^{-1}	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (54)
First-order rate constant for leaching from soil layer (arable land)	kleach_ar	2.70E-04	d^{-1}	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (55)
Half-life for leaching from soils (arable land)	DT50soil_ar	2570.82	d	BPC WGIV2017
First-order rate constant for removal from top soil layer (grassland)	ktot_gr	2,47E-03	d^{-1}	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (56)
First-order rate constant for removal from top soil layer (arable land)	ktot_ar	8,56E-04	d^{-1}	Guidance on BPR:Vol IV Environment (ECHA, 2017) Equation (56)

Summary table on calculated PEC soil values for Iodine, Iodide and Iodate (via slurry / manure)			
Soil, arable land (mg.kgwwt)			
	Iodine	**Iodide**	**Iodate**
Concentrations after one manure application event per year, removal processes from soil not taken into account.			
arable land	4,72E-03	4,72E-03	6,52E-03
Concentrations after one manure application event per year, after 10 consecutive years, taking removal processes from soil into account.			
arable land	1,68E-02	1,68E-02	2,32E-02

Time weighted average concentration during 30 days in arable land (used for calculation of surface water concentration)			
arable land	1,66E-02	1,66E-02	2,29E-02
Time weighted average concentration during 180 days in arable land (used for calculation of groundwater concentration)			
arable land	1,56E-02	1,56E-02	2,15E-02
Soil, grassland (mg.kgwwt)			
Concentrations after one manure application event, removal processes from soil not taken into account.			
grassland	4,72E-03	4,72E-03	6,52E-03
Concentrations after four manure application events, removal processes from soil not taken into account.			
grassland	1,89E-02	1,89E-02	2,61E-02
Concentrations after four manure application events, taking removal processes from soil into account.			
grassland	1,57E-02	1,57E-02	2,17E-02
Concentrations after the last of four manure applications per year, after 10 consecutive years, taking removal processes from soil into account.			
grassland	2,64E-02	2,64E-02	3,64E-02
Time weighted average concentration during 30 days in grassland (used for calculation of surface water concentration)			
grassland	2,54E-02	2,54E-02	3,51E-02
Time weighted average concentration during 180 days in grassland (used for calculation of groundwater concentration)			
grassland	2,13E-02	2,13E-02	2,94E-02

Summary table on calculated PEC groundwater and surface water values for Iodine, Iodide and Iodate (via slurry / manure)			
Groundwater			
	Iodine	**Iodide**	**Iodate**
Local concentration in pore water (=groundwater) due to spreading of treated manure (µg.L-1)			
arable land	2,98E-03	2,98E-03	4,11E-03
grassland	4,06E-03	4,06E-03	5,61E-03
Surface water			
Local concentration in surface water due to run-off (mg.L-1)			
arable land	3,17E-04	3,17E-04	4,38E-04
grassland	4,85E-04	4,85E-04	6,70E-04

Summary table on calculated PEC groundwater and surface water values for Iodine, Iodide and Iodate (via slurry / manure)
Groundwater

	Iodine	Iodide	Iodate
Local concentration in pore water (=groundwater) due to spreading of treated manure (µg.L-1)			
arable land	2,98E-03	2,98E-03	4,11E-03
grassland	4,06E-03	4,06E-03	5,61E-03
Surface water			
Local concentration in surface water due to run-off (mg.L-1)			
arable land	3,17E-04	3,17E-04	4,38E-04
grassland	4,85E-04	4,85E-04	6,70E-04

The concentration of Iodate was calculated by multiplying the PIEC's of iodine/iodide by the factor 1.382.

- ***Local PEC values for the emission pathway via STP***

PECs in soil were recalculated taking into account the following: for spreading of sewage sludge on arable land it is assumed that 100% of iodine is transformed into iodate and 14% into iodide (according to CAR). The molecular weight of 2 iodate ions is a factor of 1.3782 higher than the molecular weight of iodine, therefore the PECs for iodate were calculated by multiplying the PEC's of iodine by this factor.

Summary table on calculated PEC values for Iodine, Iodide and Iodate (via STP)			
	Iodine	**Iodide**	**Iodate**
Elocal (kg/d)	3,21E-03		
STP (mg/L)	1,28E-03	1,28E-03	1,77E-03
Surfacewater (µg/L)	1,28E-01	1,28E-01	1,77E-01
Soil (mg/kgwwt)	7,73E-03	1,08E-03	1,07E-02
Groundwater (µg/L)	1,48E+00	2,07E-01	2,04E+00

Finally, according to the CAR, all considered compartment with PEC/PNEC ratio above 1 will be assessed by a comparison between PEC values for iodine and background level determined for each compartment.

Summary table on calculated PEC and background levels (as iodine)				
	Values for Iodine		**Values for Iodide**	**Values for Iodate**
	Background	**PEC**	**PEC**	**PEC**
Via manure application (10 years applications)				
Surface water grassland (µg.L^{-1})	0.5-20	4,85E-01	4,85E-01	6,70E-01
Surface water arable (µg.L^{-1})		3,17E-01	3,17E-01	4,38E-01
Soil grassland (mg.kg_{wwt})	0.565-22.6	2,64E-02	2,64E-02	3,64E-02
Soil arable (mg.kg_{wwt})	extremes up to 110.74	1,68E-02	1,68E-02	2,32E-02

Groundwater grassland (µg.L^{-1})	1-70	4,06E+00	4,06E+00	5,61E+00
Groundwater arable (µg.L^{-1})		2,98E+00	2,98E+00	4,11E+00
Via STP				
Elocal (kg/d)	3,21E-03			
STP (mg/L)	-	1,28E-03	1,28E-03	1,77E-03
Surface water (µg/L)	0.5-20	1,28E-01	1,28E-01	1,77E-01
Soil (mg/kg$_{wwt}$)	0.565-22.6 extremes up to 110.74	7,73E-03	1,08E-03	1,07E-02
Groundwater (µg/L)	1-70	1,48E+00	2,07E-01	2,04E+00

For spreading of sewage sludge on arable land it is assumed that 14% of iodine is transformed into iodide (according to CAR).

Primary and secondary poisoning

Primary poisoning

Not relevant. A direct exposure of different animals (birds or mammals) other than treated animal to the biocidal product is considered negligible since there is no direct release of the product in the environment.

Secondary poisoning

As iodine is an essential element, internal concentrations are expected to be regulated within small boundaries. Moreover, because iodine is not hydrophobic (log Kow < 3), passive uptake by partitioning to lipid and other hydrophobic phases is not expected. Therefore, accumulation and biomagnification in higher tropic levels cannot be expected. As iodine is an essential element, internal concentrations are expected to be regulated within small boundaries. A log Kow of 2.49 was determined for iodine, which is below the relevant trigger value of 3 as stated in the Guidance BPR IV ENV B (2015). It can be assumed that the potential for iodine to bio-accumulate is low. As the amounts of iodine potentially released into the environment through biocidal uses are within the natural occurring background levels, there is no concern with respect to secondary poisoning. (CAR, 2013)

2.2.8.3 Risk characterisation

The ratio PEC/PNEC for each relevant compartment as well as the summation of PEC/PNEC ratios for iodine (and the iodine species iodide and iodate) were calculated.

In addition to the classical risk assessment approach (PEC/PNEC ratios), the PEC values for iodine were compared to natural background levels to assess the environmental risk.

Atmosphere

Exposure to air is not considered as iodine is assumed to speciate into non-volatile iodide and iodate in the different compartments it is released to. It cannot be expected that airborne iodine will significantly increase the already high background values in air (1.10E-2 to 2.10E-2 µg/m³, according to the CAR on iodine). There are no indications that iodine contributes to depletion of the ozone layer as iodine or organic-bound iodine are not listed

as 'controlled substance' in Annex I of Regulation (EC) No 1005/2009 of the European Parliament.

Aquatic and terrestrial compartment (STP, surface water, soil and grounwater)

The table below represents the risk assessment via manure application after 10 years applications and via Sewage treatment plant (STP) to Aquatic compartment and Terrestrial compartment with the background levels (as Iodine).

Summary table on calculated PEC and background levels (as iodine)							
	Values for Iodine			**Values for Iodide**		**Values for Iodate**	
	Background	**PEC**	**PEC/PNEC**	**PEC**	**PEC/PNEC**	**PEC**	**PEC/PNEC**
Via manure application (10 years applications)							
Surface water grassland ($\mu g.L^{-1}$)	0.5-20 µg/L	4,85E-01	8,22E-01	4,85E-01	5,84E-01	6,70E-01	1,15E-02
Surface water arable ($\mu g.L^{-1}$)		3,17E-01	5,37E-01	3,17E-01	3,82E-01	4,38E-01	7,49E-03
		In the background level for iodine					
Soil grassland ($mg.kg_{wwt}$)	0.565-22.6 mg/kgdwt extremes up to 110.74 mg/kgdwt	2,64E-02	**2,23E+00**	2,64E-02	**6,13E+00**	3,64E-02	1,20E-01
Soil arable ($mg.kg_{wwt}$)		1,68E-02	**1,42E+00**	1,68E-02	**3,91E+00**	2,32E-02	7,64E-02
		Lower the background level for iodine					
Groundwater grassland ($\mu g.L^{-1}$)	1-70 µg/L with extremes up to 400 µg/L	**4,06E+00**	>0,1 µg/L	**4,06E+00**	>0,1 µg/L	**5,61E+00**	>0,1 µg/L
Groundwater arable ($\mu g.L^{-1}$)		**2,98E+00**	>0,1 µg/L	**2,98E+00**	>0,1 µg/L	**4,11E+00**	>0,1 µg/L
		In the background level for iodine					
Via STP							
Elocal (kg/d)	3,21E-03						
STP (mg/L)	Not relevant	1,28E-03	4,42E-04	1,28E-03	Not relevant	1,77E-03	Not relevant
Surface water (µg/L)	0.5-20 µg/L	1,28E-01	2,17E-01	1,28E-01	1,54E-01	1,77E-01	3,02E-03
		Lower to the background level for iodine					
Soil (mg/kg_{wwt})	0.565-22.6 mg/kgdwt extremes up to 110.74 mg/kgdwt	7,73E-03	6,55E-01	1,08E-03	2,52E-01	1,07E-02	3,51E-02
		Lower the background level for iodine					
Groundwater (µg/L)	1-70 µg/L with extremes up to 400 µg/L	**1,48E+00**	>0,1 µg/L	**2,07E-01**	>0,1 µg/L	**2,04E+00**	>0,1 µg/L
		In the background level for iodine					

**Values in bold indicate a risk quotient (PEC/PNEC) > 1.*

Conclusion concerning the risk assessment via manure application after 10 years applications:

In surface water

The PEC/PNEC ratio for the surface water was found to be less than 1 and thus not indicating an unacceptable risk to the surface water.

In soil

The individual PEC / PNEC ratios for the relevant compartment are higher than 1 for iodine and iodide in grassland and arable land. Iodine is a natural substance, and PEC / PNEC values greater than 1 are acceptable since PEC values are within background concentrations. Iodine is not a xenobiotic substance and is naturally present in soil. Its background concentrations are in the range of 0.565 – 22.6 mg/kgdwt (expressed as iodine).

For cases where it is greater than 1, the highest PEC for iodine is 2.64E-02 mg/l, so it is within the lower range of background iodine concentrations in soil.

Therefore, the emission to soil is considered acceptable.

In groundwater

The concentration in the soil pore water derived by equilibrium partitioning according to the guidance are above the limit values of 0.1 µg/L provided for pesticides in the Drinking Water Directive 98/83/EC.

However, it is stated in the CAR (2013) that the trigger value of 0.1 µg/L is limited to organic substances and their relevant metabolites and degradation products. Since iodine and its species are inorganic substances, which are not xenobiotic but essential nutrients, it is concluded in the CAR that the concentration limit of 0.1 µg/L for pesticides is not applicable to iodine.

The predicted concentrations were compared to natural background concentrations. The PECs are expected to be within the natural background level of iodine in groundwater that ranges between 1 and 70 µg/L with extremes up to 400 µg/L. Therefore, emission to groundwater is considered acceptable and no risk mitigation measures are necessary.

Conclusion concerning the risk assessment via STP:

In STP

The individual PEC/PNEC ratio for the assessed scenario is below 1 for iodine, iodide and iodate in the aquatic compartment, exposed via STP. Therefore, there is no unacceptable risk to this compartment for the proposed use of the teat disinfectant product.

In surface water

PEC/PNEC values in surface water are all below 1 in this compartment, which indicates that emission to surface water is considered acceptable.

In soil

All the PEC/PNEC ratios are below 1, so there are no unacceptable risks for soil.

In groundwater

The same approach used previously can be applied. PECsgw are below the maximum natural background concentration of 70 µg/L for iodine. Therefore, emission to groundwater is considered acceptable.

Mixture toxicity

The mixture toxicity approach is not applicable. See the confidential annex for further details concerning substances of concern.

Aggregated exposure (combined for relevant emmission sources)

Aggregated exposure is not relevant for this use.

Overall conclusion on the risk assessment for the environment of the product
The use of GUT YODOFILM can be considered acceptable for the environment according to the results of the risk assessment. Release via manure results in a PEC:PNEC ratio >1 for soil. The expected concentrations are however within the natural background. The accompanied risks are therefore considered acceptable. When residues are released to the sewer, no unacceptable risks are expected for micro-organisms in the sewage treatment plant, and aquatic organisms in surface water as all predicted environmental concentrations (PECs) are well below the predicted no-effect concentrations (PNECs). Distribution of sewage sludge on agricultural land does not result in unacceptable risks either considering that all iodine is transformed into iodate as soils are aerobic. It may also be noted that iodine is an essential element to both animals and plants in rather high concentrations (higher than what corresponds to a trace element). It can thus be concluded that the actual risks arising from the use of iodine-containing product should be considered acceptable.

2.2.9 Measures to protect man, animals and the environment

The BP has been classified as: Eye Irrit. 2, and Aquatic Chronic 3, with the next hazard phrases:

H319: Causes serious eye irritation

H412: Harmful to aquatic life with long lasting effects

The risk is acceptable for professional users during the handling of the product.

The use of the product by professional users presents a low potential of exposure for a frequency 3 milking events /day, and 300 days/year. Therefore, with the RMMs included (see section 2.1.5.2), the risk is acceptable including without wear gloves.

The product is classified as Harmful to aquatic life with long lasting effects, it will be recommended in the label the following phrases:

P273: Avoid release to the environment

P501: Dispose of contents and / or containers in accordance with regulations on hazardous waste or packaging and packaging waste respectively.

Finally, it has been demonstrated that this BP at the dose recommended is safe because presents an acceptable risk to man and the environment.

2.2.10 Assessment of a combination of biocidal products

For biocidal products that are intended to be authorised for the use with other biocidal products.

Not applicable

2.2.11 Comparative assessment

No relevant

3 ANNEXES[5]

3.1 List of studies for the biocidal product (family)

Author (s)	Year Report date	Reference No. *(Annex III requirement)* / IUCLID Section No.	IUCLID Document name	Title. Report No.	Type of publication	Source (where different from company) Study sponsor	GLP (Yes /No)	Data Protection Claimed (Yes/No)
[redacted]	[redacted]	3.	11.- ENSAYOS VISCOSIDAD DENSIDAD Y TENSIÓN SUPERFICIAL 21317-01C	Determination of the physical-chemical properties of GUT-YODOFILM/I-360-G-PLUS Product	APCP Test	Tesis Galicia, S.L.		Y
[redacted]	[redacted]	3.	05B.- CoA GUT-YODOFILM	Informe modificado de ensayo	APCP Test	Tesis Galicia, S.L.		Y
[redacted]	[redacted]	3.	10.- Protocolo_estabilidad_ GUT-YODOFILM _300420	Estudio de estabilidad acelerada	APCP Test	Tesis Galicia, S.L.		Y
[redacted]	[redacted]	3.	FR22145-01C	Determination of the physical-chemical properties of GUT-YODOFILM/I-360-G-PLUS Product	APCP Test	Tesis Galicia, S.L.		Y
[redacted]	[redacted]	3.	TESIS GALICIA.220048266.Estabilidad tiempo real 12M.PVP-IODINE	ESTUDIO DE ESTABILIDAD A TEMPERATURA AMBIENTE PRODUCTO: GUT YODOFILM / I-630-G-PLUS	APCP Test	Tesis Galicia, S.L.		Y

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

[redacted]	[redacted]	Nº 190083258 / 6.7	UNE-EN 1656 BACTERICIDA GUT-YODOFILM	Valoración de la actividad bactericida según norma UNE EN 1656:JUNIO 2010 (ERRATUM OCTUBRE 2010). Nº 190083258	Efficacy test	Tesis Galicia, S.l.		Y
[redacted]	[redacted]	Nº 190083260 / 6.7	UNE-EN 1657 LEVURICIDA GUT-YODOFILM	Valoración de la actividad levuricida según norma UNE EN 1657:NOVIEMBRE 2016. Nº 190083260	Efficacy test	Tesis Galicia, S.l.		Y
[redacted]	[redacted]	j003086-2 (with appendix j003240) / 13	06.- GUT-YODOFILM-I-630-G-PLUS J003086 (With appendix J003240) Post milking Teat Dip Draft method	Chemical disinfectants and antiseptics- Quantitative surface test for the evaluation of teat disinfectants used in the veterinary area - Test method and requirements (phase 2 step 2). j003086-2 (with appendix j003240)	Efficacy test	Tesis Galicia, S.l.		Y
[redacted]	[redacted]	j003086-2 / 6.7	15. GUT-YODOFILM I-630-GPLUS J003086-2 Post milking Teat Dip Draft method	Chemical disinfectants and antiseptics - Quantitative surface test for the evaluation of teat disinfectants used in the veterinary area - Test method and requirements (phase 2 step 2)	Efficacy test	Tesis Galicia, S.l.		Y

	2022			Determination of the Physical Chemical Properties of GUT-YODOFILM/I6 30-G-PLUS Product		TESIS GALICIA, S.L		
	2021			Determination of the Physical-Chemical Properties of GUT-YODOFILM/I6 30-G-PLUS Product		TESIS GALICIA, S.L		
	2019			PNT-Determinación de yodo		TESIS GALICIA, S.L		
	2019			Estabilidad GUT-YODO		TESIS GALICIA, S.L		

3.2 Output tables from exposure assessment tools

Calculations for human health assessment are included in the following excel sheet:

exposición Gut-Yodofilm.xlsx

Justification regarding inhalation exposure towards vapour of Iodine complex-bounded.

In the iodine Assessment Report for PTs, 1, 3, 4 and 22 (Sweden 2013) it is clearly detailed in the identity chapter 2.1.1, that an iodophor is a preparation containing iodine complexed with a carrier and/or a solubilizing agent, such as polycarbonic acids, surfactants or polymers as povidone (PVP, Polyvinylpyrrolidone).

According to G. Görtz, K. Reimer, H. Neef, 1996[6]:

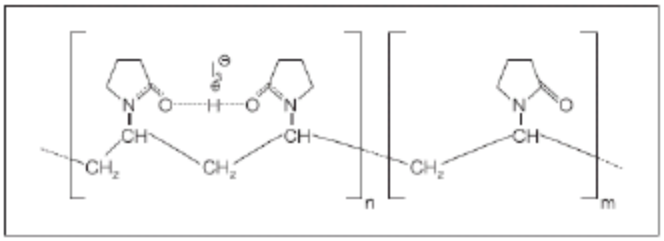
"PVP-iodine belongs to the group of iodophors. Iodophors are substances which are capable of taking up iodine and transport it. The carrier does not react with the substance taken up via a stable chemical bond but rather takes it up due to its electrochemical configuration in its scaffold. The chemical properties of the individual substances are essentially maintained, the physical properties, i.e. solubility, can in contrast change."

6 G. Görtz, K. Reimer, H. Neef (1996): Topische Infektionstherapie und Prophylaxe: aktueller Stellenwert von PVP-Iod. Kapitel: Entwicklung, Eigenschaften und Bedeutung von PVP-Iod. Hrsg. von C. Hierholzer ... Unter Mitarb. von R. Achatzy... - Stuttgart; New York : Georg Thieme Verlag

In this way, a controlled release of iodine, that is regarded as the active substance, is accomplished thereby preventing negative effects such as irritation, but keeping sufficient free iodine in the formulation to ensure its efficacy.

Despite the clear description in the iodine dossier, more details on the structure of iodophors and the release of complex-bound iodine from these iodophors are included below.

The predicted structure of solid PVP-iodine as provided in the iodine dossier:



were m/n=ca 18.

As can be seen from the figure, iodine is complex-bound to the carrier in the form of I_3^-, which is an ionic species resulting from the reaction of molecular iodine (I_2) and iodide (I^-). Of note, it is not bound as molecular iodine I_2, reason why solid PVP-iodine does not smell of iodine and also indicating a tight bound of I_3^- to the carrier molecule.

When discussing iodophor structures and release of complex-bound iodine out of it, the following terms are important to explain first[7]:

- Available iodine (av I_2) = iodine that can be titrated with sodium thiosulphate; also the complex bound iodine fraction can be determined

- **Iodide (I^-)** = reaction partner of available iodine in the iodophor

- **Triiodide (I_3^-)** = iodine species bound in iodophor-complex, reaction product of I_2 and I^-

- **Total iodine** = sum of available iodine + iodide content

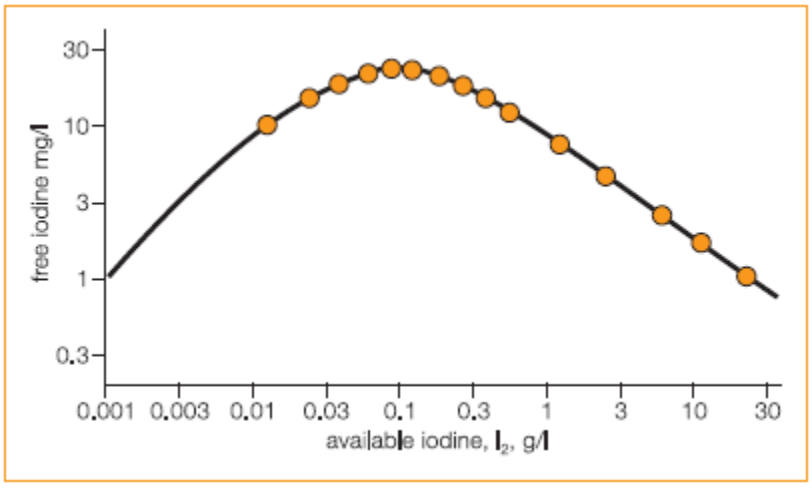
- **Free iodine (free I_2)** = non-complexed iodine that can be determined via dialysis test or in an electrochemical model.

In aqueous solutions of iodophors, an equilibrium between I_2, I^-, I_3^- and the polymeric organic molecules are stablished and the high amount of carrier molecules results in the content of free molecular iodine (I_2) being greatly reduced in such preparations[8].

The Relationship between the free iodine concentration and the concentration of available iodine in aqueous solution with the commonly used concentrations of PVP-Iodine preparations (1 – 10% PVP-Iodine = 1 – 10 g available iodine/l), is shows below[15].

7 TDS BASF – PVP-Iodine grade (2017)

8 Tatsuo Kaiho, 2015, Iodine Chemistry and Applications, Wiley, p. 387



Looking at this curve, two facts stand out:

1. The free iodine content is extremely low at 1 – 8 ppm in aqueous solutions of 1 – 10% PVP-Iodine (1-10 g av I_2/l)
2. The free iodine content is inversely proportional to the concentration of PVP-Iodine or available iodine in aqueous solutions of more than 0.1 g/l of available iodine.

And tests on micro-organisms have shown that the rate of microbicidal activity is proportional to the free iodine content, the only responsible for disinfection[15,16].

Then, at a typical concentration of 0.3% available iodine (3 g/l available I_2), only about 0.0015% free iodine (15 mg/L) are present in solution. Only this minor fraction may contribute to vapour above the solution.

So, the content of free iodine (I_2) in solid iodophor complexes is predicted to be zero based on the inverse relationship between available iodine and free iodine. Consequently, no iodine is expected to evaporate from dried residues. In other words: no secondary exposure of the professional user towards iodine vapour is possible when all the water has been evaporated.

Finally, in the chapter 8.3.3.2 Uptake via inhalation of the Iodine Final Doc II-B2 PT3 document for the approval Iodine dossier (please see LoA) the following is mentioned: "*The evaporation of iodine from water-based products is assumed to be very low. Iodine is supposed to react immediately with organic matter (microorganisms, protein substances etc.), also by formation of different iodine species (iodide etc.). For these reasons and with respect of the natural background values in the air (ambient air: 10 to 20 ng/m3. marine air: 100 µg/m3), iodine evaporation and – consequently - contamination of the air is regarded as negligible due to teat disinfection*."

In conclusion:

- The iodine used for teat disinfection in PT3 is complexed to iodophors in the form of triiodide (I_3^-).
- In aqueous solutions, bound triiodide releases only minute fractions of free (molecular) iodine (I_2).
- Free iodine (I_2), the only responsible for disinfection, reacts immediately with organic matter and forms ionic iodine species such as iodide (I^-) that do not tend to evaporate.

Residual free iodine (I_2) in aqueous solutions, if present, is considered to lead to negligible exposure to iodine vapor.

3.3 New information on the active substance

Not applicable.

3.4 Residue behaviour

Not applicable.

3.5 Summaries of the efficacy studies (B.5.10.1-xx)[9]

Summaries of efficacy studies are provided in section 2.2.5.5 and in IUCLID6 part 6.7.

3.6 Confidential annex

Please see confidential annex.

3.7 Other

Not relevant.

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