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

Evaluation of active substances

Assessment Report

L(+) lactic acid

Product-type 6
(In-can preservatives)

July 2021

eCA: DE

CONTENTS

1. STATEMENT OF SUBJECT MATTER AND PURPOSE

1.1. Procedure followed

This assessment report has been established as a result of the evaluation of the active substance L(+) lactic acid for product-type 6 (in-can preservative), carried out in the context of the work programme for the review of existing active substances provided for in Article 89 of Regulation (EU) No 528/2012, with a view to the possible approval of this substance.

L(+) lactic acid (CAS no. 79-33-4) was notified as an existing active substance, by Purac Biochem, hereafter referred to as the applicant, in product-type 6.

Commission Regulation (EC) No 1062/2014 of 4 August 2014[1] lays down the detailed rules for the evaluation of dossiers and for the decision-making process.

On 17 July 2007, DE competent authorities received a dossier from Purac Biochem. The evaluating Competent Authority (eCA) accepted the dossier as complete for the purpose of the evaluation on 25 February 2008.

On 03 September 2020, the eCA submitted to the Agency (ECHA) and the applicant a copy of the evaluation report, hereafter referred to as the competent authority report.

In order to review the competent authority report and the comments received on it, consultations of technical experts from all Member States (peer review) were organised by ECHA. Revisions agreed upon were presented at the Biocidal Products Committee and its Working Groups meetings and the competent authority report was amended accordingly.

1.2. Purpose of the assessment report

The aim of the assessment report is to support the opinion of the Biocidal Products Committee and a decision on the approval of L(+) lactic acid for product-type 6, and, should it be approved, to facilitate the authorisation of individual biocidal products. In the evaluation of applications for product-authorisation, the provisions of Regulation (EU) No 528/2012 shall be applied, in particular the provisions of Chapter IV, as well as the common principles laid down in Annex VI.

For the implementation of the common principles of Annex VI, the content and conclusions of this assessment report, which is available from the Agency web-site shall be taken into account.

However, where conclusions of this assessment report are based on data protected under the provisions of Regulation (EU) No 528/2012, such conclusions may not be used to the benefit of another applicant, unless access to these data for that purpose has been granted to that applicant.

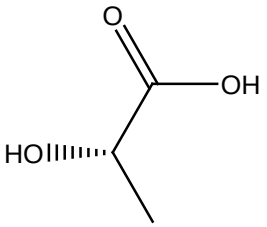
[1] COMMISSION DELEGATED REGULATION (EU) No 1062/2014 of 4 August 2014 on the work programme for the systematic examination of all existing active substances contained in biocidal products referred to in Regulation (EU) No 528/2012 of the European Parliament and of the Council. OJ L 294, 10.10.2014, p. 1

2. OVERALL SUMMARY AND CONCLUSIONS

2.1. Presentation of the Active Substance

2.1.1. Identity, Physico-Chemical Properties & Methods of Analysis

Common name	L(+) lactic acid
Chemical name (IUPAC)	(S)-2-Hydroxypropanoic acid
CAS no.	79-33-4
EINECS no.	201-196-2
Molecular formula	$C_3H_6O_3$
Molecular mass	90.08 g/mol
Structural formula	



(S)-2-hydroxypropanoic acid

The active substance L(+) lactic acid ($C_3H_6O_3$) is a carboxylic acid. L(+) lactic acid together with D(-) lactic acid are the two optical isomers of the chiral substance lactic acid.
The chemical name of the active substance L(+) lactic acid is (S)-2-Hydroxypropanoic acid (according to IUPAC nomenclature). The substance is CAS and EC listed (CAS-No. 79-33-4, EC-No. 201-196-2). The minimum purity of the active substance as manufactured is ≥ 95.5% w/w. Pure lactic acid is a crystalline solid. The active substance is marketed as an aqueous solution (88% / 93% L(+) lactic acid), which appears as a colourless to yellow light brown liquid with a characteristic odour.
The melting point of pure lactic acid was determined to be 53.0°C, the boiling point for the pure lactic acid could not be determined, but was calculated to be 204.2°C. The relative density of L(+) lactic acid is 1.213at 20°C. The calculated vapour pressure for pure L(+) lactic acid is 0.4 Pa at 20°C. Pure L(+) lactic acid is completely miscible with water and is highly soluble in methanol (78.6% w/w at 20°C). Pure L(+) lactic acid has an octanol/water partition coefficient of -0.74 (T = 20 °C), (T = 20 °C, degree of oligomerization of non-extracted aqueous L(+) Lactic acid solution n= 1). Higher degrees of oligomerization of L(+) Lactic acid solutions (because of the existence of an equilibrium system of L(+) lactic acid with several oligomers) result in higher partition coefficients (n = 1.36: log P_{OW} = 0.42; n = 1.98: log P_{OW} = - 0.05).

For the detection and identification of the active substance L(+) lactic acid a titration method is used in addition to chromatographical methods. The methods are described in Document III-A 4.1.

Relevant residues in food of plant and animal origin and in the environmental compartments arising from the application of L(+) lactic acid are not expected. Therefore, residue analytical methods for L(+) lactic acid in food of plant and animal origin, in soil, air, drinking water and surface water are not required. Since L(+) lactic acid is not classified as toxic or very toxic, analytical methods in body fluids and tissues are not required.

Identity, Physico-chemical Properties and Method of Analysis of biocidal model formulation

Only information for a dummy product is given. The dummy product is a model formulation and is identical to the active substance as marketed (aqueous solution, 88% L(+) lactic acid). No further information about the physico-chemical properties and Method of Analysis are submitted. The applicant refers to the active substance.
The physico-chemical and technical characteristics must be tested for the stage of product authorization.

2.1.2. Intended Uses and Efficacy

L(+) lactic acid is an in-can preservative in PT 6, which is used for preservation of liquid detergents such as e.g. fabric conditioners and dishwashing liquids. During production of the liquid detergents, the biocidal product, which may be identical to the active substance, is mixed into the end-products by industrial users. The treated end-products may be used by either professional or non-professional users
The active substance demonstrated basic bacteriostatic activity at concentrations of ≥3% in a simulated dishwashing fluid. Therefore, its efficacy is sufficiently supported for inclusion in the Union list of approved active substances. In the frame of biocidal product authorisation, further information on efficacy under real use conditions and other claimed target organisms will have to be provided.

L(+) lactic acid acts by entering the microbial cell, which causes a drop of the intracellular pH and subsequently inhibits diverse metabolic pathways. Although microorganisms have different innate or adaptive levels of tolerance towards lactic acid, like all other small organic acids, no specific acquired resistance mechanisms towards lactic acid are known. The likelihood of resistance development is considered limited due to the unspecific mode of action.

2.1.3. Classification and Labelling

Classification and Labelling of the active substance

Table 2-1 Classification of L(+) lactic acid based on Regulation (EC) No 1272/2008 (15th ATP[2])

	Classification	Wording
Hazard classes, Hazard categories	Skin Corr. 1C Eye Dam. 1	
Hazard statements	H314 H318	Causes severe skin burns and eye damage Causes serious eye damage

[2] Commission Delegated Regulation (EU) 2020/1182 of 19 May 2020 amending, for the purposes of its adaptation to technical and scientific progress, Part 3 of Annex VI to Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R1182

Table 2-2 Labelling of L(+) lactic acid based on Regulation (EC) No 1272/2008 (15th ATP[3])

	Labelling	Wording
Pictograms	GHS05	
Signal Word	Danger	
Hazard statements	H314 EUH071	Causes severe skin burns and eye damage Corrosive to the respiratory tract

Classification and Labelling of the biocidal model formulation

Table 2-3 Classification based on Regulation (EC) No 1272/2008 (15th ATP)

	Classification	Wording
Hazard classes, Hazard categories	Skin Corr. 1C Eye Dam. 1	
Hazard statements	H314 H318	Causes severe skin burns and eye damage Causes serious eye damage

Table 2-4 Labelling based on Regulation (EC) No 1272/2008 (15th ATP)

	Labelling	Wording
Pictograms	GHS05	
Signal Word	Danger	
Hazard statements	H314 EUH071	Causes severe skin burns and eye damage Corrosive to the respiratory tract

[3] Commission Delegated Regulation (EU) 2020/1182 of 19 May 2020 amending, for the purposes of its adaptation to technical and scientific progress, Part 3 of Annex VI to Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R1182

	Labelling	Wording
Precautionary statements	P260	Do not breathe dust/fume/gas/mist/vapours/spray.
	P264	Wash… thoroughly after handling
	P280	Wear protective gloves/protective clothing/eye protection/face protection
	P301 + P330 + P331	IF SWALLOWED: Rinse mouth. DO NOT include vomiting.
	P303 + P361 + P353	IF ON SKIN: take off immediately all contaminated clothing. Rinse skin with water.
	P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable breathing.
	P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
	P310	Immediately call a POISON CENTER or doctor/physician
	P363	Wash contaminated clothing before use.
	P321	Specific treatment (see … on this label).
	P405	Store locked up.
	P501	Dispose of contents/container to…

2.2. Summary of the Risk Assessment

2.2.1. Human Health Risk Assessment

2.2.1.1. Effects assessment

L(+) lactic acid is a naturally occurring alpha-hydroxy acid found in plants, animals, and humans. Major sources of L(+) lactic acid in the human organism are endogenous production (e. g. via anaerobic catabolism of glycogen and glucose) production by gastrointestinal microorganisms and uptake via food. The production of L(+) lactic acid as an intermediary metabolite in a 70 kg resting man is estimated to be in the range of 117-230 g/d but can be much higher during exercise. The mean daily per capita intake of L(+) lactic acid and D(-) Lactic acid from milk and milk products has been estimated to be approximately 1 g in Switzerland (Walther, 2006). The estimated overall intake via food in the EU and the USA is estimated to be 1.65-2.76 g/person/day (DocIII6.2.01).

L(+) Lactic acid has been approved in the EU as a food additive without an ADI or upper limit (*quantum satis;* Dir. 95/2/EC), is used as a cosmetics ingredient, and in veterinary medicinal products without the requirement for MRL setting (EMEA 2008).

Most of the data on the toxicological profile of L(+) lactic acid as submitted by the participant consist of published literature. Most of these data do not meet the quality standards of GLP and guideline studies, the reporting of the studies is often insufficient, in some cases only secondary literature is available. Thus, only few studies are to some extent suitable for risk assessment purposes, and it is not possible to address every endpoint necessary for a complete evaluation. Furthermore, in older publications, it is often not reported if L(+) lactic acid was used or the racemate of D and L isomers. D(-) lactic acid is considered to be more toxic than L(+) lactic acid: It is excreted less effectively by neonates and can cause lactate acidosis (Walther, 2006).

Therefore, the use of racemate-derived data seems to be justified, as the results would overestimate the toxicity of L(+) lactic acid.
In summary, the common core data set as required by Annex II of Regulation (EU) No 528/2012 was not sufficiently supported by toxicological data in the dossier submitted by the applicant. Nevertheless, based on the generally accepted low toxicity profile of L(+) lactic acid, as well as the high baseline exposure of the general population by food and endogenous metabolism, the justification that submission of further toxicity studies is not necessary owing to the nature of this naturally occurring active substance found in plants, animals, and humans was considered acceptable to the eCA

Absorption, Distribution, Excretion, and Metabolism

Lactate/lactic acid forms an integral part of normal mammalian intermediary metabolism, produced by reduction of pyruvate. Physiological plasma levels in man range between 1 mM at rest and 10 mM during exercise. Very similar levels have been reported in other mammalian species. Monocarboxylate transport proteins (MCT) facilitate the distribution of lactate between organs, cells and subcellular organelles and may be involved in gastrointestinal lactate absorption and renal lactate elimination. Cytosolic and mitochondrial lactate dehydrogenases (LDH/mLDH) convert lactate into pyruvate, consuming NAD+ and producing NADH. Via stepwise metabolism involving oxaloacetate and phosphoenolpyruvate as intermediates, pyruvate is utilised for gluconeogenesis. Alternatively, metabolites of pyruvate (oxaloacetate, acetyl-CoA) are consumed in the tricarboxylic (citric) acid cycle (TCA) generating NADH, ATP and ultimately CO_2. Finally, pyruvate may be transaminated to the amino acid L-alanine. Gluconeogenesis occurs mainly in the liver and is energy-consuming. Increased cellular levels of lactate influence pathways of cellular metabolism, leading to a decrease in the generation of pyruvate from other sources such as glucose by reduction of glycogenolysis and glycolysis, or leading to enhanced gluconeogenesis (Gladden, 2004; Sterenborg, 2007). Total normal lactate turnover at rest has been determined as 1.6 – 2 g/kg bw/d in humans and as 2.3 – 3.5 and 4.9 – 8.1 in dogs and rats, respectively, supporting applicability of allometric scaling (Connor and Woods, 1982).

Following application by gavage (oral), external L(+) lactic acid is absorbed rapidly in rats with one half being removed from the GI-tract within 2-3 hours (Cori, 1930). Of 2 g/kg administered to rats via gavage, 42 % were converted into CO_2 and presumably exhaled within 6 hours (Andersen, 1998). Complete utilization of orally administered lactate has also been reported in dogs (Andersen, 1998). In humans, a volume of distribution of approx. 0.5 L/kg was determined after intravenous application of an unknown dose. 88 % of this dose was exhaled as CO_2 and the total turnover rate was 2.3 g/kg bw/d (Andersen, 1998), and thus similar to that reported above (Connor & Woods, 1982). Lactic acid that is not metabolised to CO_2 may be utilised for the synthesis of biomacromolecules, including glycogen or proteins (Cori & Cori, 1929; Andersen, 1998). Feeding of pigs and rats with a daily dose of 1.9 and 5.8 g/kg bw/d which is roughly equivalent to the lactic turnover rate at rest resulted only in a slight increase of L(+)-lactate plasma levels by 0.03 g/L (from 0.26 g/L) and 0.04 g/L (from 0.23 g/L), respectively. At the same time, elimination in urine was minimal with increases in L(+)-lactate concentrations by 0.02 and 0.07 g/L, corresponding to < 0.01 g/kg bw/d (less than 1 % of dose) at an estimated urine volume of 100 mL/kg bw/d (Everts et al., 2000). It can therefore be concluded, that the lactate turnover rate is tightly regulated and is not saturated at total lactate load of 200 % compared to the value at rest. In contrast, Abramson & Eggleton (1927) reported between 7 and 42 % renal excretion following bolus injection of 5.4 to 30 g/kg bw in dogs. Notably, the percentage excreted with urine was correlated to urine volume, suggesting glomerular filtration as the main mechanism under these conditions.

Although a OECD guideline study regarding the toxicokinetics of L(+) lactic acid is not available, the wealth of data generated in animal and human studies can be brought in agreement and allows for adequate characterisation of the a.s.: Oral administration of lactic acid is followed by fast and practically complete absorption from the GI-tract with an absorption half-life in the order of 2-3 hours, even at high doses in the range of g/kg bw. Distribution occurs into a volume of approx. 0.5 L/kg bw and systemic L(+) lactic acid is cleared rapidly at a rate (at rest) of approx. 1.8 g/kg bw/d in humans. In dogs and rats, normal clearance rates are approx. 3 and 6 g/kg bw/d, respectively. Absorbed L(+) lactic acid adds to the plasma background level of around

1 mM at rest in humans and slightly higher values in animals. Metabolic conversion of L(+) lactic acid into CO_2 or biomacromolecules (glycogen etc.) accounts for the majority of its clearance. Significant renal elimination was observed only following bolus injection of large doses, but not after protracted application such as infusion of feeding. Minimal increases in plasma lactic acid concentrations following feeding of large doses that were in the range of the normal background turnover rate (i.e. ~ 5 g/kg in rats) suggest that the clearance capacity for lactic acid is significantly larger than this background turnover rate and that the enzymatic and transport processes involved are well regulated within this range.

Dermal absorption of various L(+) lactic acid formulations was tested on human and pig skin *ex vivo* over 6 hours (Andersen, 1998; Sah et al., 1998) and in rats *in vivo* over 3 days (Andersen, 1998). Data on the technical product was not provided. Depending on the formulation and the pH, dermal absorption *ex vivo* ranged from 10 to 30 % in human and from 7 to 32 % in pig skin. Absorption was higher at pH 3 or 3.8 (lowest pH tested) than at pH 7 and was different depending on formulation, with a decrease in the order o/w > w/o/w > w/o. Dermal penetration of L(+) lactic acid from a 5 % o/w cream formulation through rat skin was
50 % in 3 days (Andersen, 1998).
Due to skin corrosive properties of the biocidal product (identical to the active substance), a dermal absorption of 100% should be used. Considering treated articles (products which contain the respective biocidal product) a dermal absorption of 100% has to be used if classified as Skin Corr. 1, H314 i.e. for concentrations of ≥ 5% of the active substance. For non-corrosive concentrations, default dermal absorption values according to EFSA Guidance on dermal absorption (2017) should be used in the absence of data.

Acute Toxicity

L(+) lactic acid is of low toxicity in the rat after oral, dermal, and inhalative exposure. The oral LD_{50} of lactic acid in the rat is 3543 mg/kg bw, the dermal LD_{50} in the rabbit is > 2000 mg/kg bw and the inhalative LC_{50} in the rat is 7.94 mg/L air x 4 h (aerosol, nose only exposure). Main effects observed in oral studies were ataxia, lethargy, prostration, irregular breathing and local irritation of the gastrointestinal tract. In a dermal study in the rabbit signs of corrosivity were observed. Weight loss in females, rapid, shallow breathing, hunched posture, and lacrimation were the main toxicological signs observed in an acute inhalative toxicity study.

Classification and labelling for acute toxicity according to Regulation (EC) No 1272/2008:

Not required

Skin irritation/corrosivity

Skin irritation/corrosivity studies with L(+) lactic acid were performed in rabbits, guinea pigs, pigs, and humans and with a biobarrier/chemical detection system *in vitro*. In rabbits, full thickness destruction indicative of corrosivity was observed with 88 % L(+) lactic acid (pH 1.83) and 50 % L(+) lactic acid. This result was confirmed by an in vitro Corrositex assay which revealed a biobarrier break through at a time of only 31 minutes of 90 % L(+) lactic acid which would correspond to classification as corrosive 1C. No irritation or corrosivity was observed in rabbits when a 10 % aqueous dilution of L(+) lactic acid was tested (Prinsen, 1995).

In the human Patch Test the substance showed reversible irritating effects. RAC decided on the classification Skin Corrosion 1C, H314 on the basis of the rabbit study by [redacted] (1986). According to the RAC (RAC Opinion adopted 2018, Corrigendum 3 December 2019), this statement is supported by two further studies in which corrosive effects of concentrated L(+) lactic acid were shown after 4 hours ([redacted] 1983; [redacted]).

Eye irritation

Since concentrated L(+) lactic acid has a pH < 2 no eye irritation studies in rabbits were

performed due to animal welfare considerations. Instead, a chicken enucleated eye test (*in vitro*) was performed and revealed a highly damaging potential of L(+) lactic acid of the eye (severe corneal opacity, corneal swelling and fluorescein retention). Therefore, L(+) lactic acid should according to CLP criteria be assigned to category 1, H318.

Classification and labelling for skin and eye irritation according to Regulation (EC) No 1272/2008 (15th ATP)

Skin Corr. 1C with the Hazard Statement H314: Causes severe skin burns and eye damage.H318: Causes serious eye damage
EUH071: Corrosive to the respiratory tract

Skin sensitisation
In a Buehler test with 9 inductions L(+) lactic acid was non-sensitising (0/10 animals sensitised). Induction and challenge were performed with 80 % (100 % SY-83; first 2 inductions and challenge) and 24 % L(+) lactic acid (30 % SY-83). While only slightly irritating in the range-finding studies, these concentrations proved to be highly irritating after repeated exposure. Irritation reactions were pinpoint pitting and eschar formation with only slight redness and were considered not to be sensitisation reactions as the reactions observed differed from usually observed sensitisation reactions and similar reactions were observed in naive control animals.
Furthermore, considering the high endogenous exposure and exposure via food it is highly unlikely that sensitisation to L(+) lactic acid develops.

Classification and labelling for sensitisation according to Regulation (EC) No 1272/2008:
Not required

Short-term Toxicity

The results of the submitted study can only be used as a very rough approximation for a NOAEL for L(+) lactic acid because the effects observed (decrease in food consumption and body weight gain) might be due to high calcium intake, palatability, problems and/or malabsorption due to local gastrointestinal irritation (provoked by calcium or lactate). Thus, in the view of the eCA, it is inadequate for use of the obtained NOAEL for derivation of reference values.

Classification and labelling for short term toxicity according to Regulation (EC) No 1272/2008:
Not required

Genotoxicity

In vitro tests:

For the endpoint gene mutation in bacteria three Ames tests with lactic acid are available.
Two of these Ames tests were evaluated as reliable with restrictions as they suffer from poor reporting and methodological deficiencies. However, they did not reveal mutagenic potential of L(+) lactic acid (Ishidate et al. 1984 and Al-Ani & Al-Lami 1988) in the absence or presence of S9 mix. A further Ames test from 2014 (Verspeek-Rip) was conducted under GLP conditions and satisfied the requirements of the respective OECD TG 471. It was thus evaluated as key study[4]. Also, lactic acid was not mutagenic in this assay.

For the endpoint cytogenicity in mammalian cells three chromosomal aderration tests with lactic acid are available.
One of these tests (Ishidate et al. 1984) was judged as not reliable due to critical deviations from the OECD test protocol 473. Another chromosomal aberration assay with L(+) lactic acid

[4] The studies by Verspeek-Rip (2014a and b) and Verbaan (2014) were the three studies judged as most convincing by the dossier submitter and RAC to draw a conclusion on the mutagenic potential of lactic acid (table 3-8, key studies highlighted in yellow). Please note that the studies were not available to the biocide eCA. All information on these studies was taken from the CLH summary document.

in Chinese hamster ovary cells (Morita et al. 1990) showed cytotoxicity and clastogenic effects at unphysiologically low pH of 5.7-6.7. The remaining third test was conducted under GLP conditions and in accordance with the OECD TG (Verbaan 2014). Based on the quality of this cytogenicity assay the eCA judged this study as key study. Lactic acid was not clastogenic in this assay independent of metabolic activation.

For the endpoint gene mutation in mammalian cells the only available study by Verspeek-Rip (23014) was GLP-compliant and conducted in agreement with the respective OECD TG 476. Lactic acid did not induce mutations in the presence or absence of metabolic activation.

Overall, L(+) lactic acid proved to be devoid of mutagenic or clastogenic effects at non-cytotoxic concentrations and pH in *in vitro* tests. Thus, and because of the high background exposure via food and endogenous metabolism, no further studies are required.

In vivo tests:

No studies submitted- not required.

Classification and labelling for genotoxicity according to Regulation (EC) No 1272/2008:
Not required

Chronic Toxicity/ Carcinogenicity

The results of the submitted study can only be used as a very rough approximation for a NOAEL for L(+) lactic acid because the effects observed (decrease in food consumption and body weight gain) might be due to high calcium intake, low water/food intake (no data presented in the publication) and/or malabsorption due to local gastrointestinal irritation (provoked by calcium or lactate). Thus, in the view of the eCA, it is inadequate to use the obtained NOAEL for derivation of reference values. Since no statistically significant differences in the tumour rates between control animals and calcium lactate treated animals were observed it can be assumed that lactate/lactic acid has no carcinogenic potential.

Classification and labelling for chronic toxicity / carcinogenicity according to Regulation (EC) No 1272/2008:
Not required

Reproduction Toxicity

Teratogenicity
Two publications investigating potential developmental effects of lactic acid are available. Colomina et al. investigated the developmental toxicity of 570 mg/kg bw/d lactic acid in mice. They observed a slight albeit not statistically significant decrease in foetal weight and a statistically significant delayed ossification of parietal bones which might be due to the decreased foetal weight. Thus, these findings were not considered as a substance-specific developmental toxicity effect (in accordance with Carney & Kimmel, 2007).

Fertility
No studies were submitted for this endpoint. However, in the view of the RMS no further studies are required, based on the fact that L(+) lactic acid is an endogenous mammalian metabolite and a common, naturally occurring food constituent and physiological exposure and nutritional uptake is likely to exceed exposure via the biocidal product by far.

Classification and labelling for reproduction toxicity according to Regulation (EC) No 1272/2008:
Not required

Neurotoxicity

No studies on neurotoxicity of L(+) lactic acid were submitted. From the high exposure to L(+) lactic acid as natural food ingredient and food additive, there are no concerns about a possible neurotoxic potential. Thus, in the view of the eCA no further studies are required.

Classification and labelling for neurotoxicity according to Regulation (EC) No 1272/2008:

Not required

Further Studies

None

Medical Data

A case report from a fatal accidental poisoning is available from the literature. A woman received ~33 g lactic acid (100 ml of a 33 % aqueous solution) via duodenum tube in a hospital. She reported immediate pain, vomited blood and had blood in the urine. She developed dyspnoea and cyanosis and died 12 h after administration. Necropsy revealed corrosion of the stomach and the duodenum with necrosis, haemorrhages, bleeding, and thromboses of most blood vessels of the gastrointestinal tract. Tissue distribution 4 d post mortem revealed high lactic acid levels in the gastrointestinal tract.

Disruption of the Endocrine System

Based on the available evidence, no adversities as well as activities on the EATS modalities have been observed. Although lactic acid is not considered sufficiently investigated for EATS-mediated adversity and activity according to the ECHA/EFSA ED Guidance (2018), based on a comprehensive weight of evidence approach, including assessment of the lines of evidence and a gap/uncertainty analysis, lactic acid is an endogenous substance with well known, essential function in organisms (humans, mammals and other non-target organisms) not linked to EATS-related endocrine properties but to energy metabolism. It is considered that additional testing for the ED related endpoints does not appear scientifically necessary. As a whole, the substance does not meet the ED criteria for all the EATS modalities.

Summary & Conclusion

L(+) lactic acid is an endogenous alpha-hydroxy acid of generally low toxicity. Due to its acidity it is, however, considered to be corrosive to the skin and severely eye damaging.
A **dermal NOAEC** for acute, medium-term and long-term exposure of **10 % L(+) lactic acid** was derived from rabbit irritation/corrosion studies: 88 % and 50 % L(+) lactic acid were corrosive in rabbits (88 % were irritant in human patch tests); 10 % were non-irritant in rabbits and guinea pigs (range-finding Buehler test). As the rabbit is the most sensitive species it seems to be reasonable to assume that this concentration would be without effect on human skin.
At WG I 2021 it was concluded, that the 10 % dermal NOAEC value should not be considered as a general reference value and its applicability should be assessed before being used in the risk characterisation of L(+) lactic acid products, considering the differences in the formulation tested and the formulation of the product.

Because of the very low systemic toxicity of L(+) lactic acid, derivation of any systemic toxicological reference dose was regarded unnecessary. Considering the intended uses, exposure is estimated to be clearly below endogenous production (>100 g/person/day) and dietary exposure (>1 g/person/day). Therefore, neither an ADI nor an ARfD have been set. Likewise, L(+) lactic acid has been approved in the EU as a food additive without an ADI or upper limit (*quantum satis;* Dir. 95/2/EC). In addition, it is used as a cosmetics ingredient and as veterinary medicinal product without the requirement for MRL setting (EMEA 2008).
Based on the available evidence, no adversities as well as activities on the EATS modalities have been observed.

Summarising the study results and all considerations above, the a.s. L(+) lactic acid requires classification/labelling according to REGULATION (EC) NO 1272/2008 and in line with the RAC Opinion on L(+) lactic acid (CLH-O-0000001412-86-191/F adopted 9 March 2018, Corrigendum 3 December 2019):
Eye Dam. 1, H318; Skin Corr. 1, H314,EUH071

2.2.1.2. Exposure assessment and risk characterisation

Exposure of Professionals

The active substance L(+) lactic acid is produced within the EU. The biocidal product (dummy product) contains 88% L(+) lactic acid, in aqueous solution. It is intended as in-can preservative in washing-up liquids and fabric conditioners for consumer use.

The following scenario is covered by the exposure assessment in this report:

- Formulation of end-products containing L(+) lactic acid (scenario 1)
- Filling preserved products (fabric conditioner, washing-up liquids) (scenario 2)
- Application of fabric conditioner (scenario 3)
- Application of washing-up liquids (scenario 4)

Scenario 1: Formulation of end-products containing L(+) lactic acid

The biocidal product (88% w/w L(+) lactic acid) is delivered to the production plant in large containers. It is assumed that potential inhalation and dermal exposure can occur during connecting and disconnecting the containers to and from the system. During the following incorporation process, exposure to workers is not possible because a closed automated system is employed. Inhalation exposure to L(+) lactic acid during automated transfer is considered negligible, because of the low vapour pressure, the short duration of exposure and the lack of aerosol formation. Dermal exposure (hand) were expected during the automated loading process (connecting of transfer lines).

Scenario 2: Filling preserved end-products (fabric conditioner, washing-up liquids)

The exposure of workers operating a filling line for filling the preserved formulations (fabric conditioner, washing-up liquids) into closed packages that are supplied to the end user is considered. Exposure via inhalation during filling task was considered negligible because of very low potential to volatilization and the lack of aerosol formation. Dermal exposure (hand, body) is expected during the filling task.

Scenario 3: Application of fabric conditioner

L(+) lactic acid is incorporated into liquid detergents (fabric conditioner) at a maximum final concentration of up to 5%. Exposure to L(+) lactic acid may occur when individuals use liquid detergent products during hand washing laundry. Whereas professionals will more often wash cloths in machine, hand washing is a worst-case scenario for professional laundry washers. The scenario is divided in mixing & loading and application (for hand-laundry only) which are assessed separately. According to very low calculated 8h TWAs (ConsExpo Web) the inhalation exposure is considered as negligible. For dermal exposure, information from ConsExpo Cleaning product fact sheet (RIVM 2016-0179) were taken into account.

Scenario 4: Application of washing-up liquids

L(+) lactic acid incorporated into liquid detergents (hand wash-up liquids) at a maximum concentration of up to 5 %. Exposure to L(+) lactic acid may occur when individuals use liquid

detergent products during hand dishwashing. Whereas professionals will more often wash dishes in machine, hand dishwshing is a worst-case scenario for professional dish washers. The scenario is divided in mixing&loading and application (for hand dishwashing) which are assessed separately. According to very low calculated 8h TWAs (ConsExpo Web) the inhalation exposure is considerd as negligible. For dermal exposure, information from ConsExpo Cleaning product fact sheet (RIVM 2016-0179) were taken in account.

Exposure of Non-Professionals and the general public

Primary and secondary exposure

Primary exposure of non-professionals to the biocidal products is not expected since the actual application of the biocidal product is the addition to formulations, which are intended to be preserved. This is a process that is only performed by professionals during production of the formulations. Non-professional users are primarily exposed to the active substance via application of the preserved end-products (treated articles).

According to the applicant, the biocidal product can be used as in-can preservative for washing-up liquids (dish washing), fabric conditioners and household cleaners (e.g. all purpose cleaners). The following applications have been identified by the applicant as possible exposure scenarios for formulations treated with the biocidal dummy product.

Scenario 5: Washing up-liquids (dishware-liquids)

Primary dermal and inhalation exposure will occur during mixing and loading and the cleaning process. Later, secondary oral exposure is expected by using cleaned dinnerware.

Scenario 6: Fabric conditioner

Primary dermal and inhalation exposure may occur when adding the formulation to the washing machine (loading, direct pouring). Secondary dermal exposure is expected during hanging machine-washed laundry and by contact to treated textiles (e.g. clothing).

Scenario 7: Household cleaners (e.g. all purpose-cleaner, liquids)

Primary dermal and inhalation exposure may occur when the formulation is mixed and loaded and during application (cleaning process). In addition, secondary dermal exposure of toddlers by rubbing-off is considered.

The use of the representative biocidal product is described as in-can preservative for washing-up liquids (dish washing), fabric conditioners and household cleaners (e.g. all purpose cleaners). These formulations contain the active substance with a concentration of 3-5 %. The formulations with 5 % active substance represent the worst case. In accordance with the additivity approach of Regulation (EC) No. 1272/2008, these formulations may require classification and labelling as Skin Corr. 1 and Eye Dam. 1 (H314) as well as EUH071. Based on additional data (e.g. *in-vitro*- or *in-vivo*-studies with a representative formulation) or a lower active substance concentration a less severe or even no classification for these effects might be possible. In case of classification for local effects, a qualitative assessment is required.

In all cases a manual use, and that means skin and eye contact, is a possible exposure scenario for the user of the preserved formulation that requires specific consideration. Because of the potential classification of the formulation with 5 % active substance (worst case) as corrosive a possible contact to skin (and eye) has to be excluded. Hence, formulations with 5 % active substance that can be applied manually are not acceptable for use by the non-professional user unless the contact to such formulations can be excluded by appropriate risk mitigation measures. Also for other formulations, classified as Skin Irrit. 2 and or Eye Irrit. 2 appropriate risk mitigation measures are required. The use of diluted formulations or contact to these solutions showing no corrosive or irritating effects (e.g. with water, after laundry washing or after cleaning the floor)

is considered acceptable for the non-professional user and the general public.

During the discussion at WG I 2021, more information about possible treated articles containing the active substance was requested and later submitted by the applicant. Additionally information about liquid cleaning products such as wet wipes, cleaner for bathroom, toilet, floor and kitchen was presented. The new information was not considered for the quantitative exposure assessment of the general public presented in the CAR. As the focus lays on the local effects of formulations treated with the biocidal product the additionally available information was addressed, as far as possible, with the aim of proposing possible RMM that may be considered at product authorisation (please refer to risk characterisation, section 2.2.1.3).

Summary:

Total systemic long-term exposure to L(+) lactic acid from use as preservative for products during storage assuming that all formulations contain the active substance and are used daily.

	Washing up liquids [mg/kg bw/day]	Fabric conditioner [mg/kg bw/day]	Household cleaner [mg/kg bw/day]	Total [mg/kg bw/day]
Adult	0.040	0.016	0.248	0.304
Child	0.103 [1)]	0.014 [2)]	n.a.	0.117
Toddler	2.6×10^{-3} [2)]	0.014 [2)]	0.15	0.167
Infant	2.6×10^{-3}	0.014	n.a.	0.017

[1)] Post-application scenario was calculated for infants as worst case exposure.
[2)] As a worst case, exposure of infants is assumed also for toddlers and children.

Formulations containing the active substance with a concentration of 3-5 % may require classification respectively labelling as Skin Corr. 1/Skin Irrit. 2 (H314/H315) and Eye Dam. 1 (H318) as well as EUH071 in accordance with the additivity approach of Regulation (EC) No. 1272/2008, as long as no other data (e.g. *in-vitro*- or *in-vivo*-studies with a representative formulation) overrule this approach. In all cases, a manual use, and that means skin and eye contact, may occur so that local effects of formulations used by consumers require specific consideration.

Residues in food from the intended PT6 uses are expected to be low compared to naturally occurring levels in food. Therefore, residues in food from the intended uses do not significantly contribute to consumer exposure to lactic acid.

2.2.1.3. Risk Characterisation

Risk Assessment for Professionals

Systemic effects

Because of very low systemic toxicity of L(+) lactic acid, derivation of any systemic toxicological reference dose was regarded not necessary, however, the exposure estimates are compared with endogenous production of L(+) lactic acid to carry out the risk characterisation for systemic effects. If the total internal body burden is lower than the reference dose (endogenous production), health risks leading to concern are not anticipated.

For scenarios 1 (formulation of end-products containing L(+) lactic acid), 2 (Filling preserved products (fabric conditioner, washing-up liquids), 3 (Application of fabric conditioner), 4

(Application of washing-up liquids) estimated uptake/endogenous production is below 100 % and thus a safe use is identified.

At WG I 2021, it was agreed that at product authorization there was no need to compare levels of endogenous L(+)-lactic acid with systemic exposure levels as the calculations in this evaluation showed that exposure from biocidal use was well below the endogenous production in humans.

Local effects

Due to its acidity, corrosive reactions of skin and respiratory tract as well as eye damage can arise from either dermal or inhalation exposure to L(+) lactic acid.

Dermal exposure to the 5% and 88 % L(+) lactic acid might result in skin corrosion and eye damage, therefore application of risk mitigation measures and PPE is considered reasonable.

With the proposed protection measures (protective gloves and eye protection in all scenarios, additionally a protective coverall in scenario 2, see below) the reduction of dermal and eye contact minimizes the anticipated health risks to an acceptable level. Concerning corrosive properties in the respiratory tract of L(+) lactic acid, the eCA assesses inhalation exposure to be marginal so that no adverse effects are expected.

For scenario 2-4 the L(+) lactic acid concentrations is in the used products are 5% or lower.

Overall conclusion

For exposure scenarios 1 (Formulation of fabric conditioner), 2 (Filling preserved products (fabric conditioner, washing-up liquids)), 3 (Application of fabric conditioner) and 4 (Application of washing-up liquids) the risk assessment does not indicate a concern taking into account the described protection measure.

Scenario	Conclusion risk assessment Systemic effects	Conclusion risk assessment Local dermal effects (semi-quantitative and qualitative)	Overall conclusion	Included RMM
1 – formulation of fabric conditioner or washing-up liquids	Acceptable	Acceptable	Acceptable	Protective gloves, eye protection, fully automated system
2 – Filling preserved products (fabric conditioner, washing-up liquids)	Acceptable	Acceptable	acceptable	protective gloves, protective coverall, eye protection, semi and fully automated system
3 – Application of fabric	Acceptable	Acceptable	Acceptable	Protective gloves, eye

conditioner				protection
4 – Application of washing-up liquids	Acceptable	Acceptable	Acceptable	Protective gloves, eye protection

Risk Assessment for Non-Professionals and the General Public

Systemic effects

No systemic reference values have been established for the active substance due to its low toxicity. Therefore, the exposure estimates are compared to the endogenous production (100g/day) and the baseline exposure via food intake (1g/day). Risk assessment for primary exposure is not relevant.

Primary exposure to this active substance by application of formulations (washing-up liquids, fabric conditioners, household cleaner) containing the active substance as in-can preservative is considered low compared to endogenous formulation (in maximum 0.02%) or to the minimum daily food intake (1.8%). Even if it is assumed that a subject is exposed to all three formulations containing the active substance as in-can preservative simultaneously exposure is fairly low. Thus, it is concluded that exposure to L(+) lactic acid by use of formulations as washing up liquids, fabric conditioners and household cleaner containing the active substance as in-can preservative does not pose any risk to human health.

Based on these results it was agreed at WG I 2021 not to compare levels of endogenous L(+) lactic acid with systemic exposure levels at product authorisation.

Local effects

Due to the potential classification respectively labelling of formulations (washing up liquids, fabric conditioners, household cleaners) containing the active substance with a concentration of 5 % (worst case) as Skin Corr. 1 and Eye Dam 1 (H314) as well as EUH071, local effects by the formulations have to be considered, if no other data (e.g. *in-vivo*- or *in-vitro*-studies) with this or a comparable formulation are available overruling this classification. Also co-formulants may have an impact on this classification. Following the qualitative assessment, formulations with 5 % active substance may be classified as corrosive and the exposure due to manual use with direct skin (and eye) contact to these formulations has to be excluded. Hence, for classified formulations with 5 % active substance no safe use can be identified for consumers unless contact can be avoided by appropriate risk mitigation measures.

A formulation with 3 -< 5 % active substance requires the classification as Skin Irrit. 2 (H315) and Eye Dam. 1 (H318), if no other data (e.g. *in-vivo*- or *in-vitro*-studies) with this or a comparable formulation are available overruling this classification. Also co-formulants may have an impact on this classification. Hence, also local effects have to be considered regarding the use by the non-professional user. Possible skin and eye contact to the classified formulation has to be prevented. Hence, for classified formulations with 3 -< 5 % active substance, a safe use can only be identified for non-professional users with appropriate risk mitigation measures to avoid skin and eye contact.

The contact of the general public to formulations classified as corrosive and irritating has to be excluded by risk mitigation measures at product authorisation stage (e.g. Keep out of reach of children.; No access of third parties during application/treatment.; child-resistant fastenings). The contact to diluted formulations not showing corrosive or irritating effects (e.g. with water, after laundry washing or after cleaning the floor) is considered acceptable for the general public.

At product authorisation stage there may be different possibilities to ensure a safe use by the non-professional user / consumer for accordingly classified formulations:
Corrosive formulations classified as Skin Corr. 1 or Eye Dam. 1 could be safely used by the non-

professional user due to the particular use, the formulation or appropriate risk mitigation measures (e.g. corrosive toilet cleaning products or dishwashing tabs with a dissolving shell by contact with water; specific packaging of liquid corrosive toilet cleaners with child-resistant fastenings, angled necks and specific nozzle shapes, gel-kind formulation avoiding splashes, warnings, precautionary statements).
Appropriate data with a representative formulation or a lower active substance concentration may lead to a less severe or no classification.
Formulations classified as Skin Irrit. 2 and/or Eye Irrit. 2 can be handled with appropriate risk mitigation measures, which are less severe than for corrosive products. For non-classified formulation risk mitigation measures are not be necessary with respect to the active substance if they are used as intended.
Within the scope of the active substance approval it is not possible to draw a conclusion and present specific risk mitigation measures (if applicable) for all different kinds of products such as e.g. washing-up liquids, fabric conditioners and household cleaners.
Exposure-minimising/reducing formulations and packaging as well as risk mitigation measures for excluding contact to vulnerable persons such as children and infants may offer the possibility of a safe use by consumers.

For applications identified by the applicant and adopted by the eCA as possible exposure scenarios for formulations preserved with the biocidal dummy product, a list of examples of feasible risk mitigation measures was proposed at WG I 2021. Furthermore, more information about potentially treated articles was requested and later submitted by the applicant. A non-exhaustive list with additional information about liquid cleaning products such as wet wipes, cleaner for bathroom, toilet, floor and kitchen was presented. The active substance could also be used in different types of products in the same given categories. For the use conditions of the cleaning products the applicant referenced the default value of the “RIVM Report 2016-0179: Cleaning Products Fact Sheet” (updated version 2018). The new information was not considered for exposure assessment in this CAR, but used with the aim of proposing possible RMM that may be considered at product authorization.
In the following table a list of risk mitigation measures (not complete and all-encompassing) is presented that may be considered at product authorisation stage to ensure a safe use of treated articles with corrosive/irritating formulations by consumers.

No.	Treated article	Exposure scenario	Description	Potential RMM
1.	Washing-up liquid (dish washing)	Liquid for using in a dishwasher with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1)	Mixing and loading: washing-up liquid will be added to the machine	Avoid contact with skin and eyes. Only to be used in dishwashers. If skin or eye contact occurs, wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand. Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use Packaging with a self-dissolving shell (“pod”)
2.		Liquid for using in a dishwasher with 3-< 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Mixing and loading: washing-up liquid will be added to the machine	
3.		Liquid for **manual** use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1)	Mixing and loading: washing-up liquid will be added to the water (scenario 5)	Avoid contact with skin and eyes. Only use diluted in water. If skin or eye contact, occurs wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand. Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use Packaging with a self-dissolving shell (“pod”)
4.		Liquid for **manual** use with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Mixing and loading: washing-up liquid will be added to the water	
5.		Diluted liquid in water (x-fold) for **manual** use (classification: none)	Dish washing (scenario 5)	*(RMMs not required)*
6.		Post-application (classification: none)	Residues on table ware (scenario 5)	*(RMMs not required)*
7.	Fabric conditioner	Liquid for using in a machine with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1)	Mixing and loading: fabric conditioner will be added to the washing machine (scenario 6)	Avoid contact with skin and eyes. Only to be used in washing machines. If skin or eye contact, occurs wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand.
8.		Liquid for using in a machine with 3- <5 % a.s.	Mixing and loading: fabric conditioner will be added to	

No.	Treated article	Exposure scenario	Description	Potential RMM
		(classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	the washing machine	Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use Packaging with a self-dissolving shell (“pod”)
9.		Liquid after dilution in the machine (x-fold), **manual** use (classification: none)	Unloading the washing machine and hanging machine-washed laundry (scenario 6)	*(RMMs not required)*
10.		Post-application (classification: none)	Migration from fabric (scenario 6)	*(RMMs not required)*
11.	Household cleaner (e.g. all purpose cleaner)	Liquid for **manual** use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1)	Mixing and loading: household cleaner will be added to the water (scenario 7)	Avoid contact with skin and eyes. Only use diluted in water. If skin or eye contact, occurs wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand. Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use Packaging with a self-dissolving shell (“pod”)
12.		Liquid for **manual** use with 3-< 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Mixing and loading: household cleaner will be added to the water	
13.		Diluted liquid in water (x-fold) for **manual** use	Use for cleaning purposes, e.g. wiping, mobbing (scenario 7)	*(RMMs not required)*
14.		Post-application (classification: none)	Rubbing-off (scenario 7)	*(RMMs not required)*
The new information (A.-N.) presented by the applicant in 2021 that was not considered for the exposure assessment in this CAR.				
A.	All-purpose cleaning spray	Spray for **manual** use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3-	Spraying onto a surface	**Use of the biocidal product in classified formulations is not acceptable due to direct skin and eye contact and exposure via inhalation. RMMs are not applicable.**

No.	Treated article	Exposure scenario	Description	Potential RMM
		< 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)		
B.		**Manual** rinsing of spray with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Touching a wet cloth containing the sprayed cleaning product	**Use of the biocidal product in classified formulations is not acceptable due to direct skin contact.** **RMMs are not applicable.**
C.	Wet wipe	Ready-to-use cleaning product for single **manual** use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Cleaning a small surface	**Use of the biocidal product in classified formulations is not acceptable due to direct skin contact.** **RMMs are not applicable.**
D.	Bathroom cleaner	Liquid for **manual** use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Mixing and loading: bathroom cleaner will be added to the water	Avoid contact with skin and eyes. Only use diluted in water. If skin or eye contact, occurs wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand. Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use Packaging with a self-dissolving shell (“pod”)
E.		Diluted liquid in water (x-fold) for **manual** use	Use for cleaning purposes	*(RMMs not required)*
F.	Bathroom cleaner spray	Spray for **manual** use with 5 % a.s. (classification: Skin Corr.	Spraying onto a surface	**Use of the biocidal product in classified formulations is not acceptable due to direct skin and eye contact and exposure via inhalation.**

No.	Treated article	Exposure scenario	Description	Potential RMM
		1, Eye Dam. 1) or with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)		**RMMs are not applicable.**
G.		**Manual** rinsing of spray with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Touching a wet cloth containing the sprayed cleaning product	**Use of the biocidal product in classified formulations is not acceptable due to direct skin contact.** **RMMs are not applicable.**
H.	Toilet cleaner	Liquid for using in a toilet bowl	Liquid will be added into toilet for cleaning the interior of the toilet, brushing the toilet bowl after leave-on period	Avoid contact with skin and eyes. Only apply directly into the toilet. If skin or eye contact, occurs wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand. Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use
I.	Floor cleaner	Liquid for **manual** use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3- < 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Mixing and loading: floor cleaner will be added to the water	Avoid contact with skin and eyes. Only use diluted in water. If skin or eye contact, occurs wash with plenty of water. Keep out of each of children. If medical advice is needed, have product container or label at hand. Read carefully and follow all instructions. Gel-kind formulation avoiding splashes Child-resistant fastening Packaging with dosing aid that prevents contact with the concentrate during use Packaging with a self-dissolving shell (“pod”)
J.		Diluted liquid in water (x-	Use for cleaning purposes	*(RMMs not required)*

No.	Treated article	Exposure scenario	Description	Potential RMM
		fold) for **manual** use		
K.		Post-application contact (classification: none)	Rubbing-off	*(RMMs not required)*
L.	Floor cleaning wipe	Ready-to-use cleaning product for single use with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3-< 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Cleaning after mounting on a mop	**Use of the biocidal product in classified formulations is not acceptable due to direct skin contact.** **RMMs are not applicable.**
M.		Post-application contact to residues of a cleaning product with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3-< 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Rubbing-off	**Use of the biocidal product in classified formulations is not acceptable due to direct skin and eye contact.** **RMMs are not applicable.**
N.	Other cleaners (e.g. oven/stove cleaners, glass/window cleaners, heavy duty and abrasive cleaners)	Ready-to-use cleaning product with 5 % a.s. (classification: Skin Corr. 1, Eye Dam. 1) or with 3-< 5 % a.s. (classification: Skin Irrit. 2, Eye Dam. 1 or Eye Irrit. 2)	Liquid will be directly applied and used with a sponge or cloth	**Use of the biocidal product in classified formulations is not acceptable due to direct skin contact.** **RMMs are not applicable.**

At product authorisation stage special attention has to be paid to manually used cleaning products (in the case of a required classification as corrosive/irritating) such as washing-up liquids, household cleaners and cleaners for kitchen, floor, bathroom etc. that should be used as dilution (in the table above cases like No. 3., 4., 11., 12., D., I.). Only if risk mitigation measures are considered to be sufficient to prevent the use in a concentrated form, a safe use by the non-professional user can be ensured.
Based on the currently available information, the potential classification as skin-corrosive or -irritating and/or eye-damaging or -irritating and the relevant exposure pathways, use of the biocidal product to formulate end-products intended for non-professional use is considered not acceptable for many formulations.

At product authorisation stage it has to be evaluated carefully whether formulations can be safety used by non-professionals, whether secondary exposure for the general public is acceptable and which risk mitigation measures are necessary. Biocidal products should not be authorised for use in cleaning liquids used for manual work or cleaners with direct skin (and possible eye) contact or used in sprays if these cleaning products are classified for corrosive/irritating effects unless risk mitigation measures can be established avoiding skin and/or eye contact.

At product authorization stage, the applicability of the dermal NOAEC should be assessed before being used in the risk characterisation of L(+)-lactic acid products, considering the differences in the formulation tested and the formulation of the product.

Safety Measures for Non-Professionals and the General Public

The biocidal product is for industrial/professional use only.
Risks due to local effects of treated articles including the active substance with a concentration of up to 5 % (worst case) for non-professional users have been identified. Thus, risk mitigation measures to avoid or minimise exposure for non-professional users and the general public are necessary and have to be addressed at product authorisation if treated formulations require classification for the corresponding local effects.

2.2.2. Environmental Risk Assessment

The environmental risk characterisation is based on the concept of releases of the active substance (a.s.) to the environment taking into account all relevant life cycle stages. The derivation of predicted no effect concentrations (PNEC) for L(+) lactic acid (Doc II-4) as well as the estimation of predicted environmental concentrations (PEC) resulting from the use of the biocidal end-product (Doc II-8.3) in all relevant environmental compartments were performed according to Volume IV Environment, Assessment & Evaluation, Parts B+C (ECHA, 2017) and the Emission Scenario Document (ESD) for Product Type 6, Preservatives for Products during Storage (ECHA, 2019).

2.2.2.1. Fate and distribution in the environment

Biodegradation

A test on ready biodegradability was performed according to the Dutch Guidelines NEN 6633 and NEN 6634. The degradation of the a.s after 20 days was 60 and 67% at concentrations of 2 and 4 mg/l, respectively. However, the level of degradation within 10 days cannot be assessed. Therefore, L(+) lactic acid is classified as readily biodegradable but failing the 10-days window criterion. The resulting rate constant in the STP was set to k_{STP} = 0.3 / h.

During BPC WG ENV V 2016, the members of WG ENV requested a literature search regarding a.s degradation in soil. The information provided by the applicant substantiated that the current assessment of the biodegradation behaviour of the a.s in soil (default degradation half-live of 90-days) is overly conservative. During BPC-20 (April 2017) it has been concluded “that based on the literature search even the 30 days degradation is an overestimation. Based on the outcome of the additional information received and included already in the AR the additional study is not required, but the ready biodegradability test can be performed as an option if necessary”. For the environmental risk assessment, a degradation half-live of 30 days was considered.

Anaerobic biodegradation

The applicant did not submit an anaerobic biodegradation study and the eCA did not considered it necessary to request such information.

Abiotic Degradation

L(+) lactic acid possesses only one hydrolysable group the acid group. For hydrolysis of the acid group, the dissociation constant (pK) of 3.8 should be taken into account. As no further hydrolysable groups are available, no further data on hydrolysis is considered necessary. The UV-spectrum of L(+) lactic acid shows that no absorbance in the wavelength range of 290-800 nm takes place. Therefore, L(+) lactic acid cannot undergo direct photolysis in sunlight.
The vapour pressure of L(+) lactic acid is 0.4 Pa at 20°C and direct evaporation is not expected, consequently. The Henry’s constant (3.6×10^{-5} Pa $\times$ m^3/mol at 20°C) indicates low volatility from water. In air L(+) lactic acid will be degraded by indirect photodegradation. The tropospherical half-life of L(+) lactic acid was estimated to be 2.71 d with AOPWin v.4.01 assuming a 24 h-day and a corresponding OH radical concentration of $5 \cdot 10^5$ molecules cm^{-1}.

Distribution / Mobility

A HPLC-screening test according to the OECD test guideline (TG) No. 121 was performed to estimate the K_{OC} of L(+) lactic acid. The retention time of L(+) lactic acid in this test was lower than the retention time of the reference substance phenol with the known log K_{OC} of 1.32. Therefore it was concluded, that the log K_{OC} of L(+) lactic acid is < 1.32 (K_{OC} < 20.9 L/kg). The eCA decided to use a rounded K_{OC} of 20 L/kg for the environmental exposure assessment. L(+) lactic acid can be classified as substance with high mobility in soil.
The distribution in the sewage treatment plant was calculated by eCA using the SimpleTreat 4.0-model. Due to a lack of information on the fulfilment of the 10-day window criterion (rate

constant for STP concluded by eCA: 0.3 /h) the following release fractions were assessed: to air 0.0%, water 22.48%, sludge 0.20% and degraded fraction 77.32%.

Bioaccumulation

Experimentally derived data on the bioaccumulation potential of the a.s. are not available neither for the aquatic nor the terrestrial compartment, respectively. Hence, the bioconcentration factors (BCF) for the aquatic compartment (BCF_{fish} = 0.048 L/kg) and the terrestrial compartment ($BCF_{earthworm}$ = 6.78 L/kg) were assessed on the basis of the log K_{OW} of -0.74 according to the standard equations given in Vol. IV Parts B+C (Doc. II-4). Since both BCFs as well as other indicators (e.g. surface tension) indicate a low bioaccumulation potential of the a.s. in the environment, experimental studies are not required.

2.2.2.2. Effects assessment

Aquatic Compartment

For the assessment of effects on the aquatic compartment, acute data for fish, invertebrates and algae are available. These data were derived from ecotoxicological studies submitted by the applicant, from a literature survey and from QSAR estimations, both conducted by eCA. Although the experimental studies on fish and invertebrates were considered to be invalid (RI = 3), algae were identified to be the most sensitive organisms with the aid of the QSAR estimations. Thus, the $PNEC_{water}$ was derived from the E_rC_{50} (3,900 mg a.s./L) that was assessed in a valid experimental study on the inhibition of algal growth (Doc. III-A7.4.1.3; RI = 2) by applying an assessment factor of 1,000.

$PNEC_{water}$ = 3.9 mg a.s./L

Sediment

Since no tests on the toxicity of L(+) lactic acid on sediment dwelling organisms were provided, the PNEC for sediment was derived by applying the equilibrium partitioning method (EPM) according to Vol. IV Parts B+C (Doc. II-4).

$PNEC_{sed}$ = 4.8 mg a.s./kg ww

Inhibition of microbial activity (aquatic)

In a test on the respiration inhibition of activated sludge according to the OECD guideline 209, the NOEC was assessed to be ≥100 mg a.s./L (nominal), the EC_{50} >100 mg a.s./L (nominal). For the risk assessment a NOEC of 100 mg a.s./L was used as a worst case. For the derivation of the $PNEC_{microorganisms, STP}$ an assessment factor of 10 was applied in accordance with Vol. IV Parts B+C (Doc. II-4).

$PNEC_{microorganisms, STP}$ = 10 mg a.s./L

Terrestrial Compartment

Data to address the ecotoxicity of L(+) Lactic acid for terrestrial organisms were not submitted by the applicant since direct exposure as well as adsorption of the a.s. to soil is not expected to occur. Instead, a $PNEC_{soil}$ was calculated by applying the EPM according to Vol. IV Parts B+C (Doc. II-4).

$PNEC_{soil}$ of 1.9 mg a.s./kg ww

Atmosphere

L(+) lactic acid is not considered to be used as fumigant. The vapour pressure of L(+) lactic acid is 0.4 Pa at 20°C and the Henry´s law constant is 3.6 x 10^{-5} Pa m^3 mol^{-1} indicating that direct evaporation and volatility from water are expected to be insignificant. In general, emissions of

L(+) lactic acid to the atmosphere are unlikely to occur.
Due to an estimated half-life in the atmosphere of 2.71 d corresponding to 3.91 d for the chemical lifetime the potential for long-range transport of L(+) lactic acid in air is indicated (ref. to Annex D of the Stockholm Convention on Persistent Organic Pollutants (17th May 2004): "… a chemical that migrates significantly through the air, its half-life in air should be greater than two days …"). However, according to Vol. IV Parts B+C (ECHA, 2017) effects on stratospheric ozone and acidification are not expected because L(+) lactic acid does not contain halogens, nitrogen or sulphur substituents.
L(+) lactic acid shows no absorption bands in the so-called atmospheric window (range from 800 to 1200 nm). Therefore, L(+) lactic acid has no global-warming potential.

Secondary Poisoning

As indicated by the BCF_{fish} (0.048 L/kg) and the $BCF_{earthworn}$ (6.78 L/kg) as well as by the surface tension (70.7 mN/m), the bioaccumulation potential of L(+) lactic acid and thus the risk of secondary poisoning is considered to be low.

Summary of PNECs

Table 2-8 Summary of the selected PNEC values used for the risk characterisation part

Environmental compartment	PNEC
$PNEC_{water}$	3.9 mg a.s./L
$PNEC_{sed}$	4.8 mg a.s./kg ww
$PNEC_{microorganism, STP}$	10 mg a.s./L
$PNEC_{soil}$	1.9 mg a.s/kg ww

2.2.2.3. PBT and POP assessment

The PBT assessment for L(+) lactic acid was performed according to the guidance given in Vol. IV Parts B+C (ECHA, 2017) as well as following the REACH Regulation (EC) No. 1907/2006:

P criterion:	Half-life	> 40 d in freshwater or > 120 d in freshwater sediment or > 120 d in soil (according to the REACH legislation)
vP criterion:	Half-life	> 60 d in freshwater or > 180 d in freshwater sediment or > 180 d in soil (according to the REACH legislation)
B criterion:	BCF > 2000 L/kg	
vB criterion:	BCF > 5000 L/kg	
T criterion:	Long-term NOEC for freshwater organism < 0.01 mg/L or CMR or endocrine disrupting effects	

L(+) lactic acid is considered to be neither persistent (readily biodegradable but failing the 10-days window criterion) nor bioaccumulating (BCF_{fish} = 0.048 L/kg; $BCF_{earthworm}$ = 6.78 L/kg), nor does L(+) lactic acid fulfil the toxicity criterion ($NOEC_{algae}$ = 1.1 g a.s./L). Hence, the P, vP as well as the B, vB and the T criterions are not fulfilled.

Conclusion:
The active substance L(+) lactic acid is neither a PBT nor a vP/vB candidate.

2.2.2.4. Assessment of Endocrine Disrupting Properties (ED)

According to the Commission Delegated Regulation (EU) 2017/2100 and as further specified in the EFSA/ECHA Guidance for the identification of endocrine disruptors (ED) in the context of Regulations (EU) No 528/2012 and (EC) No 1107/2009 a conclusion on whether the ED criteria are met needs to be drawn separately with respect to humans and non-target organisms. It is recommended to strive for a conclusion on the ED properties with regard to humans and in parallel, using the same data base, to strive for a conclusion on mammals as non-target organisms. Only where, based on this assessment the ED criteria are met for mammals as non-target organisms, a further assessment on non-mammalian non-target organisms in the environment (e.g. fish and/or amphibians) would be required. The available data for L(+) lactic acid are not sufficient to be conclusive regarding the ED properties according to the ECHA/EFSA ED Guidance (2018) for non-mammalian non-target organisms. However, further tests are considered as scientifically not necessary and should be waived for the following reasons: L(+) lactic acid is an endogenous substance in vertebrates and invertebrates. Therefore, the internal production of lactic acid in the glucose metabolism would compromise the feasibility of testing. Furthermore, L(+) lactic acid has a well-known, essential function in mammals and non-mammalian non-target organisms as an intermediate in the glucose metabolism. Under anaerobic conditions, L(+) lactic is produced during glycolysis to maintain the requested energy level in cells. This mode of action of L(+) lactic is not linked to EATS-related endocrine properties. Thus, further test would not provide any robust data capable to identify or exclude lactic acid as an endocrine disruptor and should be avoided considering animal welfare reasons.

Overall conclusion on ED in relation to non-target organisms:

According to the ECHA/EFSA ED guidance there is not sufficient information available to conclude on the endocrine activity or ED-mediated adversity of L(+) lactic acid in non-mammalian non-target organisms in the environment. However, the German eCA is of the opinion that further tests with fish or amphibians can be waived based on a weight of evidence approach. As tests with aquatic vertebrates such as fish and amphibians are scientifically not necessary for the above mentioned reasons, additional testing would not provide any robust data capable to identify or exclude L(+) lactic acid as an endocrine disrupter.

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2.2.2.5. Exposure Assessment

The ready-to-use solution (dummy product) containing 5% w/w L(+) lactic acid, is used as detergent for dish washing as well as fabric softener. For the environmental exposure assessment of the biocidal product (b.p.) the following life cycle stages are selected to be relevant:

- Formulation of in-can preserved end-product
- Application: private use of the end-product as a “ready-to-use solution” detergent for dish washing as well as fabric softener

The environmental release estimations and the PECs for the life cycle stage “formulation of the in-can preserved end-products” can be found in the confidential annex of DOC II. The in-can preserved end-product will be used indoors and so exposure to the environment will primarily occur via the Sewage Treatment Plant (STP). The same applies to the life cycle stage “formulation of in-can preserved end-products”. The environmental exposure are assessed applying Vol. IV Parts B+C (ECHA, 2017) and the Emission Scenario Document (ESD) for Product Type 6; Preservatives for Products during Storage (ECHA, 2019). In the Emission Scenario Document for Product Type 6 two emission scenarios for the use of preservatives in detergents and cleaning fluids are presented: (1) based on tonnage and (2) based on consumption. According to the ESD PT6 both approaches shall be presented by eCA in the CA report. Based on the calculation of the break-even point the most suitable scenario should be used. For L(+) lactic acid PT6 the scenario based on consumption was used for detergents used for dish-washing

and for fabric softeners respectively.
L(+) lactic acid is a natural occurring substance in the environment: it is a metabolic intermediate in most living organisms and also occurs in sour milk, foods, fruits, vegetables and some higher plants. Furthermore, natural emissions of L(+) lactic acid to the aquatic compartment (via urine and faeces to STP) should be considered. The environmental compartments soil and groundwater may be affected by the field application of sewage sludge. According to Berkow (1981) a total excretion of L(+) lactic acid per day should be assumed for the emission calculation. To get a better understanding for the relation between the anthropogenic emission vs emission due to biocidal use, eCA decided to calculate PEC values for both emission pathways

Aggregated environmental Exposure Assessment

Article 19(2) of the BPR (528/2012/EU) states that "the evaluation […] shall take into account the following factors: […] (d) cumulative effects, (e) synergistic effects." This is further elaborated in Annex VI (common principles for the evaluation of biocidal products) where it is stated that the risks associated with the relevant individual components of the b.p. shall be assessed, taking into account any cumulative and synergistic effects. This refers to the environmental risk assessment of an a.s. which is contained in different products of the same product type (PT) or of different PTs.
L(+) lactic acid has already been approved as active substance for use in biocidal products in PT 1, 2, 3 and 4. In the respective CA reports the following uses are considered: PT 1 – hand soap, PT 2 – disinfectant bathroom cleaner for private uses; PT 3 – non-medical teat dips disinfection (only STP-pathway assessed); PT 4 – disinfection of breweries (small, average and large sized brewery); PT 6 – a) detergent for dish washing and b) fabric softener.
In the eCA`s opinion each of the above mentioned intended uses can lead to an overlap in time and space in different environmental compartments. The main entry paths into the environment are equal for all applications mentioned above (via STP), thus a combination of exposures to L(+) lactic acid for all affected environmental compartments is both possible and realistic. Consequently, an environmental evaluation considering aggregated risks according to BPR is feasible in technical terms.
According to the "Decision tree on the need for estimation of aggregated exposure" (discussed and revised at the Technical Meeting I/2012), the requirement for aggregated exposure estimations was checked for L(+) lactic acid. L(+) lactic acid is also regulated in other regulatory areas (e.g. cosmetics regulation, food legislation). The amount of L(+) lactic acid that is used annually for biocidal purposes amounts to < 10 % of the total production and import volume of L(+) lactic acid in the EU in 2012. The intended uses (hand soap, bathroom cleaner, teat dips disinfection, disinfection in breweries, detergent for dish washing and fabric softener) are widely dispersive and do not represent a specific emission pattern. Consequently, it has been concluded that no aggregated exposure assessment for a.s. L(+) lactic acid has to be performed.

2.2.2.6. Risk Characterisation

The PEC/PNEC ratios for the formulation of the preserved end-product concerning STP, surface water and sediment as well as soil and groundwater can be found in the confidential annex of DOC II. The assessment revealed that the formulation of the end-products detergent for dish-washing and fabric softeners containing L(+) lactic acid (PT6) indicates no unacceptable risk for the environment.

Risk Characterisation for the use of the end-products washing-up liquid and fabric conditioner

Aquatic Compartment including Sediment

Table 2-9 PEC/PNEC ratios for the use of the end-product in PT 6 as washing up liquid for private use concerning STP, surface water and sediment

Compartment	PEC [µg a.s./L]	PNEC [µg a.s./L]	PEC / PNEC
STP	84.3	10,000	0.008
Surface water	8.4	3,900	0.002
Compartment	**PEC [µg a.s./kg]**	**PNEC [µg a.s./kg ww]**	**PEC / PNEC**
Sediment	10.3	4,820	0.002

Table 2-10 PEC/PNEC ratios for the use of the end-product in PT 6 as fabric conditioner for private use concerning STP, surface water and sediment

Compartment	PEC [µg a.s./L]	PNEC [µg a.s./L]	PEC / PNEC
STP	330	10,000	0.033
Surface water	32.9	3,900	0.008
Compartment	**PEC [µg a.s./kg]**	**PNEC [µg a.s./kg ww]**	**PEC / PNEC**
Sediment	40.1	4,820	0.008

The estimated PEC/PNEC ratios for sewage treatment plant, surface water as well as for sediment are below the trigger value of 1 (Table 2-6; Table 2-7). Thus, the use of the end-product for both intended purposes (washing up liquid and fabric conditioner) indicates no unacceptable risk for the aquatic compartment.

Terrestrial Compartment including Groundwater

Lactic acid is a naturally occurring simple organic acid found in plants, animals and humans. It is an endogenous metabolite in many organisms, a common naturally occurring food constituent and also a growth regulator intended to increase nut and fruit set. Furthermore, the environment is exposed to Lactic acid via the excretion of faeces and urine by humans (and their subsequent release from the STPs), as well as the direct disposal of excreta by other mammals. In soils, L-(+) lactic acid naturally occurs as a fermentation by-product of anaerobic degradation of organic matter. This substance may covalent bind with organic material in sewage sludge, manure, and soils. In microorganisms, lactate formation is one of the usual pathways for NAD+ regeneration and when formed, lactate can be further metabolized through the pathway of pyruvate metabolism. As lactate is metabolized by microorganisms, its degradation in the environment is rapid. It should also be noted that biodegradation during storage of sludge as well as transformation and dilution in deeper soil layers cannot is not to be taken into account in soil concentration calculations – and thus in subsequent groundwater concentrations (tier 1). Modelling of groundwater exposure in case of lactic acid largely overestimates concentrations and is considered unrealistic (please refer to item 7.4 of WG ENV II 2020). Therefore, subsequently only PEC/PNEC ratios concerning soil are presented below:

Table 2-11 PEC/PNEC ratios for the use of the end-product in PT 6 as washing up liquid for private use concerning soil

Compartment	PEC [µg a.s./kg]	PNEC [µg a.s./kg ww]	PEC / PNEC
Soil	1.94	1,900	0.001

Table 2-12 PEC/PNEC ratios for the use of the end-product in PT 6 as fabric conditioner for private use concerning soil

Compartment	PEC [µg a.s./kg]	PNEC [µg a.s./kg ww]	PEC / PNEC
Soil	7.57	1,900	0.004

The PEC/PNEC ratio for soil is below the trigger value of 1 for both intended uses of the end-product. Hence, the eCA concludes that the use of the end-product for both intended purposes (washing up liquid and fabric conditioner) indicates no unacceptable risk for the terrestrial compartment and groundwater.

Atmosphere

Due to the intended use of the b.p. and on the basis of the available substance information, the environmental risk of L(+) lactic acid for the atmosphere is assumed to be insignificant.

Aggregated Risk Assessment

Since the amount of L(+) lactic acid that is used annually in biocidal products accounts for less than 10% compared to the annual production and import volume of L(+) lactic acid in the EU, no aggregated risk assessment was performed.

Overall Conclusion to the Environment

The assessment revealed that the formulation of the end-products detergent for dish-washing and fabric softener containing L(+) lactic acid (PT6) indicates no unacceptable risk for the environment.

Considering the intended use of the biocidal end-product (which is identical to the a.s. L(+) lactic acid as in-can preservative in the end-products washing up liquid and fabric softener (Product Type 6: Preservatives for products during storage), no unacceptable risk for the environment is indicated.

In addition, no potential for bioaccumulation and consequently no concern for secondary poisoning was identified. Moreover, L(+) lactic acid is no PBT candidate.

2.3. Overall conclusion.

The outcome of the assessment for L(+) lactic acid in product-type 6 specified in the BPC opinion following discussions at the 39th BPC meeting of the Biocidal Products Committee (BPC). The BPC opinion is available from the ECHA website.

2.4. List of endpoints

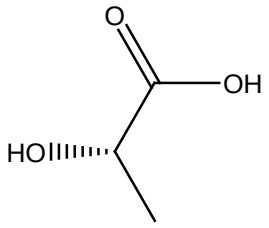
The most important endpoints, as identified during the evaluation process, are listed in Appendix I.

Appendix I: List of endpoints

Chapter 1: Identity, Physical and Chemical Properties, Classification and Labelling

Active substance (ISO Name)	L(+) lactic acid
Product-type	6

Identity

Chemical name (IUPAC)	(S)-2-Hydroxypropanoic acid
Chemical name (CA)	Propanoic acid, 2-hydroxy-, (2S)-
CAS No	79-33-4
EC No	201-196-2
Other substance No.	
Minimum purity of the active substance as manufactured (g/kg or g/l)	≥ 95.5% w/w Existence of an equilibrium system of L(+) lactic acid with several oligomers
Identity of relevant impurities and additives (substances of concern) in the active substance as manufactured (g/kg)	not applicable
Molecular formula	$C_3H_6O_3$
Molecular mass	90.08 g/mol
Structural formula	 (S)-2-hydroxypropanoic acid

Physical and chemical properties

Melting point (state purity)	53°C (pure, crystalline solid L(+) lactic acid) Supercooled viscous: no melting until – 80°C (93% L(+) lactic acid, equilibrium system)
Boiling point (state purity)	204.2°C (calculated) (100% L(+) lactic acid) Not determinable (88% L(+) lactic acid, equilibrium system)
Thermal stability / Temperature of decomposition	Not applicable

Appearance (state purity)	Liquid (aqueous solution, 88 % / 93 % L(+) lactic acid), colour ≤100 Apha, colourless to yellow light brown odour: characteristic
Relative density (state purity)	1.213 (T = 20 °C, 93 % L(+) lactic acid, equilibrium system)
Surface tension (state temperature and concentration of the test solution)	70.7 mN/m (1 g/l 93 % L(+) lactic acid, equilibrium system)
Vapour pressure (in Pa, state temperature)	0.4 Pa (T = 20 °C, 100 % L(+) lactic acid, calculated) no scientific value of the vapour pressure result of a 93 % L(+) lactic acid solution
Henry's law constant (Pa m^3 mol^{-1})	because of the equilibrium system only hypothetical
Solubility in water (g/l or mg/l, state temperature)	completely miscible with water (100% L(+) lactic acid)
Solubility in organic solvents (in g/l or mg/l, state temperature)	78.6 % wt in Methanol 29 % wt in 2-Ethylhexanol 0.005 % wt in Hexane 39.9 % wt in Ethylacetate 0.11 % wt in Toluene 38.7 % wt in Diethylether 52.9 % wt in 2-Butanone (T = 20 °C, only the monomeric L(+) lactic acid (free acid) is determined, oligomers are not considered, only rough estimation values)
Stability in organic solvents used in biocidal products including relevant breakdown products	Not applicable
Partition coefficient (log P_{OW}) (state temperature)	-0.74 (T = 20 °C, 100 % L(+) lactic acid, degree of oligomerisation n = 1)

	-0.42 (T = 20 °C, degree of oligomerisation n = 1.36) -0.05 (T = 20 °C, degree of oligomerisation n = 1.98)0.74 (T = 20 °C, 100 % L(+) lactic acid) The determination of the partition coefficient n-octanol/water of a 93 % L(+) lactic acid solution is not scientific, because of the existence of an equilibrium system of L(+) lactic acid with several oligomers (higher partition coefficients)
Dissociation constant	pKa = 3.86, T = 22.5 °C (crystalline L(+) lactic acid)
UV/VIS absorption (max.) (if absorption > 290 nm state ε at wavelength)	Maximum absorption at 210 nm No absorption > 290 nm
Flammability or flash point	88 % solution in water: > 74 °C pure, crystalline solid lactic acid: > 150 °C 93 % L(+) Lactic acid: The steam-volatility of lactic acid is very low, therefore the solution vapour is more than 99 % water vapour, and as such the vapour is not ignitable.
Explosive properties	From structural reasons and composition of the substance it can be concluded that the substance has no explosive properties
Oxidising properties	From structural reasons and composition of the substance it can be concluded that the substance has no oxidising properties
Auto-ignition or relative self-ignition temperature	The auto-ignition temperature of a 93% aqueous solution of lactic acid was determined to be ≥ 400°C
Additional: Corrosive to metals	88.2 % L(+) Lactic acid: Uniform corrosion: negative corrosion result on steel and aluminium Localised corrosion: negative corrosion result on steel and aluminium Conclusion: L-(+)-Lactic acid has no corrosive properties to metals

Classification and proposed labelling

with regard to physical hazards	-	
with regard to human health hazards	Skin Corr. 1C Eye Dam .1	H314 H318 EUH071
with regard to environmental hazards		

Chapter 2: Methods of Analysis

Analytical methods for the active substance

Technical active substance (principle of method)	The determination of L(+) lactic acid could be done with several titration methods. The validated titration with sodium hydroxide respectively back titration with sulfuric acid is capable to determine free and, or total lactic acid. After derivatization the Methyl esters of S- and R-lactic acid are separated on a chiral GC column, and the ratio determined from FID-generated peak surfaces areas. L(+) lactic acid oligomers and cyclic dimers are determined by a UV/HPLC method.
Impurities in technical active substance (principle of method)	Organic acid impurities are determined and quantified by a GC/MS method based on derivatization of acids to methyl esters. Methyl esters of organic acids are separated on two different GC columns for a positive identification, and quantified from the FID-generated peak surfaces areas.

Analytical methods for residues

Soil (principle of method and LOQ)	Not required, no relevant residues expected
Air (principle of method and LOQ)	Not required, no relevant residues expected
Water (principle of method and LOQ)	Not required, no relevant residues expected
Body fluids and tissues (principle of method and LOQ)	Not required, not classified as T /T+
Food/feed of plant origin (principle of method and LOQ for methods for monitoring purposes)	Not required, no relevant residues expected
Food/feed of animal origin (principle of method and LOQ for methods for monitoring purposes)	Not required, no relevant residues expected

Chapter 3: Impact on Human Health

Absorption, distribution, metabolism and excretion in mammals

Rate and extent of oral absorption:	100 %, rapid

Rate and extent of dermal absorption*:	Default values in the absence of data for the biocidal product (identical to the a.s.): 100% for products containing ≥ 5% a.s.; default values (EFSA Guidance on dermal absorption, 2017) for products containing non-corrosive concentrations Values from studies with other formulations (rate dependent on pH and formulation): • 30-32 % at pH 3/3.8 (human (PEG-100 stearate, laureth-4) and pig (o/w emulsion) skin *ex vivo*); • 11 % at pH 3.8 (pig skin *ex vivo*, w/o emulsion) • 7-10 % at pH 7 (human (PEG-100 stearate, laureth-4) and pig (o/w emulsion) skin *ex vivo*) 50 % within 3 days (rat *in vivo*, o/w; pH not stated)
Distribution:	V_d ~ 0.5 L/kg bw, widely distributed
Potential for accumulation:	No evidence for accumulation
Metabolism	Lactate/lactic acid form an integral part of normal mammalian intermediary metabolism. It is converted into pyruvate by cytosolic and mitochondrial lactate dehydrogenase. Pyruvate is utilised for gluconeogenesis, for tricarboxylic (citric) acid cycle or transaminated to the amino acid L-alanine
Rate and extent of excretion:	Predominantly metabolic elimination via CO_2 or synthesis of biomolecules (glucose, glycogen, amino acids, polypeptides); ~ 1.8 g/kg bw/d endogenous turnover rate at rest in humans; turnover capacity: > 200 % turnover rate at rest
Toxicologically significant metabolite(s)	None

* the dermal absorption value is applicable for the active substance and might not be usable in product authorization

Acute toxicity

Rat LD_{50} oral	3543 mg/kg bw
Rat LD_{50} dermal	> 2000 mg/kg bw
Rat LC_{50} inhalation	> 7.94 mg/L air x 4 h* (aerosol, nose only)

Skin corrosion / irritation	Corrosive (rabbit study) **H314**
Eye irritation	Irritant (Chicken enucleated Eye test), Risk of serious damage to eyes **H318**

Respiratory tract irritation	EUH071 Corrosive to the respiratory tract
Skin sensitisation (test method used and result)	No sensitising (Buehler)*

*80% L(+) lactic acid

Respiratory sensitisation (test method used and result)	No data – not applicable

Repeated dose toxicity

Short term

Species / target / critical effect	Oral: no valid data, justification accepted Dermal (Buehler, guinea pig): local irritation effects: pinpoint pitting, eschar formation H315
Relevant oral NOAEL / LOAEL	No valid data, justification accepted
Relevant dermal NOAEL / LOAEL	Systemic effects: no data, justification accepted Local effects: < 24 % L(+) lactic acid
Relevant inhalation NOAEL / LOAEL	No data, justification accepted

Subchronic

Species / target / critical effect	Not applicable since no reference values were derived
Relevant oral NOAEL / LOAEL	
Relevant dermal NOAEL / LOAEL	
Relevant inhalation NOAEL / LOAEL	

Short term

Species/ target / critical effect	No data
Relevant oral NOAEL / LOAEL	
Relevant dermal NOAEL / LOAEL	
Relevant inhalation NOAEL / LOAEL	

Long term

Species/ target / critical effect	Not applicable since no reference values were derived
Relevant oral NOAEL / LOAEL	
Relevant dermal NOAEL / LOAEL	
Relevant inhalation NOAEL / LOAEL	

Genotoxicity	Not mutagenic

Carcinogenicity

Species/type of tumour	Rat: no tumours observed
Relevant NOAEL/LOAEL	Rat: ~880 mg/kg bw/d (highest dose tested)

Reproductive toxicity

Developmental toxicity

Species/ Developmental target / critical effect	Mouse: no specific effects observed
Relevant maternal NOAEL	570 mg/kg bw/d (highest dose tested)
Relevant developmental NOAEL	570 mg/kg bw/d (highest dose tested)

Fertility

Species/critical effect	No data
Relevant parental NOAEL	
Relevant offspring NOAEL	
Relevant fertility NOAEL	

Neurotoxicity

Species/ target/critical effect	No data, not required

Developmental Neurotoxicity

Species/ target/critical effect	No data - not required

Immunotoxicity

Species/ target/critical effect	No data – not required

Developmental Immunotoxicity

Species/ target/critical effect	No data – not required

Other toxicological studies

No data, not required

Medical data

Case report, fatal accidental intoxication: Administration of ca. 30 g lactic acid by duodenal tube resulted in pain, vomiting, gastrointestinal haemorrhages, corrosion, bleeding and necrosis of the duodenum; death within 12 h

Summary

	Value	**Study**	**Safety factor**
$AEL_{long\text{-}term}$	Not allocated – not necessary		
$AEL_{medium\text{-}term}$	Not allocated – not necessary		

$AEL_{short-term}$	Not allocated – not necessary
ADI[5]	Not allocated – not necessary
ARfD	Not allocated – not necessary
Dermal $NOAEC_{acute}$, medium-term, long-term	10 % *The 10 % dermal NOAEC value should not be considered as a general reference value and its applicability should be assessed before being used in the risk characterisation of L(+) lactic acid products, considering the differences in the formulation tested and the formulation of the product*

MRLs

Relevant commodities	Additional uses as food additive E270 and as VMP (under Regulation (EEC) No. 2377/90) No MRLs required

Reference value for groundwater

According to BPR Annex VI, point 68	

Dermal absorption

Study (*in vitro/vivo*), species tested	
Formulation (formulation type and including concentration(s) tested, vehicle)	
Dermal absorption values used in risk assessment	Default values in the absence of data for the biocidal product (identical to the a.s.): 100 % for products containing ≥ 5% a.s.; default values (EFSA Guidance on dermal absorption, 2017) for products containing non-corrosive concentrations

Chapter 4: Fate and Behaviour in the Environment

Route and rate of degradation in water

Hydrolysis of active substance and relevant metabolites (DT_{50}) (state pH and temperature)	No hydrolysis
pH 5	
pH 9	
Other pH: *[indicate the value]*	
Photolytic / photo-oxidative degradation of active substance and resulting relevant metabolites	Not applicable, no absorption maximum > 290 nm

[5] If residues in food or feed.

Readily biodegradable (yes/no)	Yes, but 10-day windows cannot be assessed; At BPC-20 (April 2017) it was concluded: DT_{50} soil of 30 days should be used for risk assessment representing a worst-case value
Inherent biodegradable (yes/no)	-
Biodegradation in freshwater	-
Biodegradation in seawater	-
Non-extractable residues	-
Distribution in water / sediment systems (active substance)	-
Distribution in water / sediment systems (metabolites)	-

Route and rate of degradation in soil

Mineralization (aerobic)	-
Laboratory studies (range or median, with number of measurements, with regression coefficient)	-
DT_{50lab} (20°C, aerobic):	
DT_{90lab} (20°C, aerobic):	
DT_{50lab} (10°C, aerobic):	
DT_{50lab} (20°C, anaerobic):	
degradation in the saturated zone:	-
Field studies (state location, range or median with number of measurements)	-
DT_{50f}:	
DT_{90f}:	
Anaerobic degradation	-
Soil photolysis	-
Non-extractable residues	-
Relevant metabolites - name and/or code, % of applied a.i. (range and maximum)	-
Soil accumulation and plateau concentration	-

Adsorption / desorption

Ka , Kd Ka_{oc} , Kd_{oc} pH dependence (yes / no) (if yes type of dependence)	K_{OC} was estimated by HPLC-screening test according to the OECD test guideline (TG) No. 121: K_{OC} < 20.9 L/kg → RMS used the rounded value of 20 L/kg for K_{OC} for environmental exposures calculations Not stated in the HPLC-screening test

Fate and behaviour in air

Direct photolysis in air	-
Quantum yield of direct photolysis	-
Photo-oxidative degradation in air	Tropospherical half-life of lactic acid: 2.71 d (reaction with OH radicals; OH radical concentration = 5 x 10^5 OH radicals/cm^3, global 24-hours-mean)
Volatilization	Henry's law constant indicates low volatility

Reference value for groundwater

According to BPR Annex VI, point 68	-

Monitoring data, if available

Soil (indicate location and type of study)	-
Surface water (indicate location and type of study)	-
Ground water (indicate location and type of study)	-
Air (indicate location and type of study)	-

Chapter 5: Effects on Non-target Species

Toxicity data for aquatic species (most sensitive species of each group)

Species	Time-scale	Endpoint	Toxicity
Fish			
Salmo gairdneri *Lepomis macrochirus*	96 h	Mortality	(LC_{50} = 130 mg a.s./L)[1] (LC_{50} =130 mg a.s./L)[1]
QSAR		Mortality	LC_{50} = 177 g a.s./L
Invertebrates			
Daphnia magna	48 h	Mortality	LC_{50} = 177 g a.s./L
QSAR		Mortality	EC_{50} = 78.8 g a.s./L

Algae			
Selenastrum capricornutum	70.5 h	Growth inhibition	(E_rC_{50} = 3.9 g a.s./L)[1] (NOE_rC = 1.1 g a.s./L)
QSAR		Growth inhibition	21.3 g a.s./L
Microorganisms			
Activated sludge from municipal sewage treatment plant (treating predominantly domestic sewage)	3 h, static	Respiration inhibition	EC_{50} > 100 mg a.s./L (nominal) NOEC ≥ 100 mg a.s./L (nominal)

Effects on earthworms or other soil non-target organisms

Acute toxicity to earthworm (*Eisenia foetida*)	-
Reproductive toxicity to earthworm (*Eisenia fetida andrei*)	-
Acute toxicity to plants (*Avena sativa* and *Lactuca sativa*)	-

Effects on soil micro-organisms

Nitrogen mineralization	-
Carbon mineralization	-

Effects on terrestrial vertebrates

Acute toxicity to mammals	-
Acute toxicity to birds	-
Dietary toxicity to birds	-
Reproductive toxicity to birds	-

Effects on honeybees

Acute oral toxicity	-
Acute contact toxicity	-

Effects on other beneficial arthropods

Acute oral toxicity	-
Acute contact toxicity	-

Acute toxicity to ……..	-

Bioconcentration

Bioconcentration factor (BCF)	BCF_{Fish} = 0.048 L/kg (calculated) $BCF_{Earthworm}$ = 6.78 L/kg (calculated)
Depration time (DT_{50})	-
Depration time (DT_{90})	-
Level of metabolites (%) in organisms accounting for > 10 % of residues	-

Chapter 6: Other End Points

Residues in food and feed from the intended use of L(+) lactic acid in PT 6 biocidal products are not expected. Lactic acid is used as a food additive (E270) and a VMP (under Regulation (EWG) 2377/90). No MRLs exist for these uses.

Appendix II: List of Intended Uses

Object and/or situation	Product Name	Organisms controlled	Formulation		Application	Applied amount per treatment					Re-marks:
			Type (d-f)	Conc. of a.s. (i)	method kind (f-h)	number min max	interval between applications (min)	g a.s./L min max	water L/m^2 min max	g a.s./m^2 min max	
MG 2 / PT 6 Preservation of dishwashing liquid	Model formulation	Bacteria	liquid concentrate	100% (88% L(+) lactic acid)	The biocidal product containing 100% technical lactic acid is added to the products to be preserved in an automated process.	The concentration of L(+) lactic acid in products to be preserved (dishwashing liquids, fabric softeners) is 5%.					The treatment of the end-use products with the biocidal product is done by professionals in industrial settings. The L(+) lactic acid treated end-products are used by professional or non-professional users.

(a) e.g. biting and suckling insects, fungi, molds; (b) e.g. wettable powder (WP), emulsifiable concentrate (EC), granule (GR)

(c) GCPF Codes - GIFAP Technical Monograph No 2, 1989 ISBN 3-8263-3152-4); (d) All abbreviations used must be explained

(e) g/kg or g/l;(f) Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench;

(g) Kind, e.g. overall, broadcast, aerial spraying, row, bait, crack and crevice equipment used must be indicated;

(h) Indicate the minimum and maximum number of application possible under practical conditions of use;

(i) Remarks may include: Extent of use/economic importance/

Appendix III: List of studies

Data protection is claimed by the applicant in accordance with Article 60 of Regulation (EU) No 528/2012.

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II A3	Abramson, H.A., Eggleton, P.	1927	The utilization of intravenous sodium r-lactate. I. Excretion by kidneys and intestines. J. Biol. Chem. 75: 745-752.	No	Published
Doc II A3	Andersen, F.A.	1998	Safety assessment of glycolic acid, ammonium, calcium, potassium, and sodium glycolate, methyl, ethyl, ptopyl, and butyl glycolate, and lactic acid, ammonium calcium, potassium, sodium, and TEA-lactate, methyl, ethyl, isopropyl, and butyl lactate, and lauryl, myristyl, and cetyl lactate Cosmetic Ingredients Review, final report. International Journal of Toxicology, Vol.17, Suppl.1 Not GLP, Published	No	Published
Doc II A3	Carney, E.W, Kimmel, C.A	2007	Interpretation of skeletal variations for human risk assessment: delayed ossification and wavy ribs. Birth Defect Research (Part B) 80:473-496.	No	Published
Doc II A3	CLH Report	2019	Background document to the Opinion proposing harmonised classification and labelling at EU level of L-(+)-lactic acid; (2S)-2-hydroxypropanoic acid (Corrigendum 3 December 2019); https://echa.europa.eu/documents/10162/2b0274f0-7ca1-59fc-5967-c33839b91446	No	Published
Doc II A3	Conner H. Woods, H.F.	1982	Metabolic acidosis. Pitman Books Ltd London (Ciba Foundation symposium 87) p. 214-234 Not GLP, Published	No	Published
Doc II A3	Cori, C.F., Cori, G.T.	1929	Glycogen formation in the liver from d- and l-lactic acid. J. Biol. Chem. 81: 389-403.	No	Published
Doc II A3	Cori, G.T.	1930	Study on intestinal absorption. I. The absorption of lactic acid. J. Biol. Chem. 87: 13-18.	No	Published

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II A3	[redacted]	1986	Lactic acid Q88: a skin corrosivity test in guinea pigs Inveresk Research International Report nr. 3625 GLP, Unpublished	Yes	Purac
Doc II A3	D'Amour, F.E.	1934	Effects of feeding sodium bicarbonate or lactic acid upon the sex ratio in rats. Science 79(2038):61-62.	No	Published
Doc II A3	Demerec, M., Bertani, G., Flint, J.	1951	A survey of chemicals for mutagenic action on E.coli The American Naturalist, Vol. 85, no. 821: pp 119-136 Not GLP, Published	No	Published
Doc II A3	EFSA	2012	Guidance on Dermal Absorption, EFSA Panel on Plant Protection Products and their Residues (PPR), EFSA Journal 2012;10(4):2665	No	Published
Doc II A3	EMEA	2008	Status on MRL procedures. MRL assessments in the context of Council Regulation (EEC) No. 2377/90. http://www.emea.europa.eu/pdfs/vet/mrls/076599en.pdf	No	Published
Doc II A3	EC	1995	European Parliament and Council Directive No. 95/2/EC of 20 February 1995 on food additives other than colours and sweeteners. http://ec.europa.eu/food/fs/sfp/addit_flavor/flav11_en.pdf	No	Published
Doc II A3	Everts, H et al.	2000	High intakes of L + and D –lactic acid are efficiently metabolized by pigs and rats J. Anim. Physiol. a. Anim. Nutr. 83, 224–230	No	Published
Doc II A3	Ferguson,B. et al.	2017	Lactate metabolism: historical context, prior misinterpretations, and current understanding. European Journal of Applied Physiology, Vol.118, p.691-728	No	Published
Doc II A3	Fühner, H.	1932	Milchsäure-Vergiftung, tödliche, medizinale. Arch Toxicol 3(1):71-74	No	Published
Doc II A3	Gladden, L.B.	2004	Lactate metabolism: a new paradigm for the third millennium. J Physiol. 558:5-30.	No	Published
Doc II A3	Harbell, J.W.	1994	Corrositex Continuous Time Monitor Assay Microbiological Associates Inc. Report nr. A000449 Not GLP, Unpublished	Yes	Purac

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
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Doc II A3	Miller, B.F., Fattor, J.A., Jacobs, K.A., Horning, M.A., Navazio, F., Lindinger, M., I., and Brooks, G.A.	2002	Lactate and glucose interactions during rest and exercise in men: effect of exogenous lactate infusion. Journal of Physiology, Vol.544, Nr.3, p.963-975 Not GLP, Published	No	Published
Doc II A3	Morita, T., Takeda, K., Okumura, K.	1990	Evaluation of clastogenicity of formic acid, acetic acid and lactic acid on cultured mammalian cells. Mutation Research, Vol. 240, p. 195-202. Not GLP, Published	No	Published
Doc II A3	Philp, A., Macdonald, A.L., Watt, P.W.	2005	Lactate – a signal coordinating cell and systemic function. The Journal of Experimental Biology, Vol.208, p.4561-4575 Not GLP, Published	No	Published
Doc II A3	Sims, C.J., Fujito, D.T., Burholt, D.R., Dadok, J., Giles, H.R., Wilkinson, A.	1993	Quantification of human aminiotic fluid constituents by high resolution proton nuclear magnetic resonance (NMR) spectroscopy. Prenatal Diagnosis 13:473-480.	No	Published
Doc II A3	Smyth et al.	1941	The single dose toxicity of some glycols and derivatives. Journal of industrial hygiene and toxicology (vol. 25, no. 6)	No	Published
Doc II A3	[redacted]	1986	Acute dermal irritation/corrosion test with lactic acid (50%) in albino rabbits TNO Report nr. V86.015/250067 GLP, Unpublished	Yes	Purac
Doc II A3	[redacted]	1987b	Acute dermal irritation/corrosion study with lactic acid (50%) in pigs TNO Report nr. V87.406/270419 GLP, Unpublished	Yes	Purac
Doc II A3	[redacted]	1996	In vitro skin irritation study in rabbit and human skin organ cultures after 30 minutes exposure to lactic acid and lactic acid esters TNO Report nr. V96.636 GLP, Unpublished	Yes	Purac

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II A3	Walther, B.	2006	Milchsäure in Lebensmitteln und ihre Bedeutung für die menschliche Ernährung. Technisch-wissenschaftliche Information, ALP Science 2006, Nr. 505.	No	Published
Doc II A3	[redacted]	1983a	Acute oral toxicity study in rats using SY-83 at a dose level of 5 grams per kilogram of body weight Toxicogenics Inc. Report nr. 410-1353 GLP, Unpublished	Yes	Purac
Doc II A3	[redacted]	1983c	Primary dermal irritation study in rabbits using SY-83 Toxicogenics Inc. Report nr. 410-1355 GLP, Unpublished	Yes	Purac
Doc II A4	ECHA	2018	Guidance on the Biocidal Products Regulation: Volume IV: Environment, Version 1.2 (Part A: Information Requirements)	No	Published
Doc II A4	ECHA	2017	Guidance on the Biocidal Products Regulation: Volume IV: Environment, Assessment & Evaluation, Version 2.0 (Parts B + C)	No	Published
Doc II A4	EU	2007	Regulation (EC) No 1272/2008 of the European Parliament and on the Council of 16 December 2008 on classification, labelling and packing of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006	No	Published
Doc II A4	Hooftman, R.N.	1992	Evaluation of the toxicity of lactic acid and lactates to aquatic organisms; TNO Report nr. IMW-R 92/256	Yes	Purac
Doc II A4	Lyman et al.	1983	Handbook of chemical property estimation methods, McGraw-Hill Inc.; New York	No	Published
Doc II A4	McCall, P.J. et al	1981	Measurement of Sorption Coefficients of organic Chemicals and their use in Environmental Fate Analysis; Test protocols for Environmental Fate & Movement of Toxicants (1981); Proceedings of Symposium AOAC, 21.-22.10.1980, Washington, DC	No	Published

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II A4	OECD	2000	OECD 106 “Adsorption -- Desorption Using a Batch Equilibrium Method”	No	Published
Doc II A4	OECD	2001	OECD 121 “Estimation of the Adsorption Coefficient (Koc) on Soil and on Sewage Sludge using High Performance Liquid Chromatography (HPLC)”	No	Published
Doc II A4	OECD	1984	OECD 202 “Daphnia sp., Acute Immobilisation Testand Reproduction Test"	No	Published
Doc II A4	OECD	1992	OECD 301D “Ready Biodegradability”	No	Published
Doc II A4	Saha, N.C. et al.	2006	Comparative toxicity of three organic acids to freshwater organisms and their impact on aquatic ecosystems; Human and Ecological Risk Assessment, Vol. 12, No. 1: pp 192-202	No	Published
Doc II A4	Sansone, F.J. et al.	1987	Adsorption of short-chain organic acids onto nearshore marine sediments; Geochim Cosmochim Acta, Vol. 51, pp. 1889-96	No	Published
Doc II A4	The Netherlands	1987	NEN 6633 “Water-Determination of Oxygen Demand (COD)” Dutch Guideline	No	Published
Doc II A4	The Netherlands	1991	NEN 6634 “Water-Determination of Biochemical Oxygen Demand after n days (BOD)” Dutch Guideline	No	Published
Doc II A4	UNEP	2004	Stockholm Convention on Persistent Organic Pollutants (POP), entered into force 17 May 2004	No	Published
Doc II A4	US EPA	1997	US EPA standard 660/3-75-009 “Methods of acute toxicity test with fish, macroinvertebrates and amphibians”	No	Published
Doc II B6.5	EC	1999	Directive 1999/45/EC - classification, packaging and labelling of dangerous preparations	No	Published
Doc II B6.5	EC	2008	REGULATION (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006	No	Published

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II B8	ECHA	2017	Guidance on the Biocidal Products Regulation: Volume IV: Environment, Assessment & Evaluation, Version 2.0 (Parts B + C)	No	Published
Doc II B8	EC	2004	Supplement to the methodology for risk evaluation of biocides Environmental Emission Scenarios for biocides used as human hygiene biocidal products (Product type 1)	No	Published
Doc II B8	UBA, ECHA	2019	ESD for PT 6: Revised Emission Scenario Document – Preservatives for Products during Storage	No	Published
Doc II B8	RIVM	2001	Supplement to the methodology for risk evaluation of biocides. Emission Scenarios Document for Product Type 2: Private and public health area disinfectants and other biocidal products (sanitary and medical sector)	No	Published
Doc II B8	Holten, C.H.	1971	Lactic acid; properties and chemistry of lactic acid and derivates, Verlag Chemie; Weinheim/Bergstr., Germany	No	Published
Doc II B8	Berkow, R.	1982	The Merck Manual of Diagnosis and Therapy, Merck Sharp & Dohme Research Laboratiories, Merck & Co., Inc. Rahway, N.J., 14. Edition	No	Published
Doc II B8	CA Meeting	2008	EU Workshop PT 1-6 Report, document: “CA-Nov08-Doc[1].6.3 - Workshop Report PT1-6_CA_31_final_track_ changes”	No	No owner
Doc II B8	Lyman et al.	1983	Handbook of chemical property estimation methods, McGraw-Hill Inc.; New York	No	Published
Doc II B8	McCall, P.J. et al	1981	Measurement of Sorption Coefficients of organic Chemicals and their use in Environmental Fate Analysis; Test protocols for Environmental Fate & Movement of Toxicants (1981); Proceedings of Symposium AOAC, 21.-22.10.1980, Washington, DC	No	Published
Doc II B8	EC	2003	FOCUS Surface water scenarios in the EU evaluation process under 91/414/EEC; SANCO/4802/2001-rev.2 final	No	Published

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II B8	EC	2000	FOCUS groundwater scenarios in the EU review of active substances ". Report of the FOCUS Groundwater Scenarios Workgroup, EC Document Reference SANCO/321/2000 Rev.2	No	Published
Doc II B8	EU	2012	Biocidal Products Regulation (BPR), 528/2012/EU concerning the making available on the market and use of biocidal products	No	Published
Doc II B8	Human Exposure Expert Group (HEEG)	2015	Biocides Human health Methodology (first ed., October 2015)	No	Published
Doc II B8	RIVM	2018	RIVM – Cleaning Products Factsheet – Default parameters for estimating consumer exposure – Update version 2018 – RIVM report 2016-0179	No	Published
Doc II 8	Human Exposure Expert Group (HEEG)	2008	HEEG opinion 1 - Mixing loading model 7 alternatives	No	Published
Doc II 8	Human Exposure Expert Group (HEEG)	2010	HEEG opinion 9 - Default protection factors for protective clothing and gloves	No	Published
Doc II 8	Human Exposure Expert Group (HEEG)	2011	HEEG opinion 13 - Assessment of inhalation exposure of volatilised biocide active substance	No	Published
Doc II B9	Andersen, F.A.	1998	Safety assessment of glycolic acid, ammonium, calcium, potassium, and sodium glycolate, methyl, ethyl, ptopyl, and butyl glycolate, and lactic acid, ammonium calcium, potassium, sodium, and TEA-lactate, methyl, ethyl, isopropyl, and butyl lactate, and lauryl, myristyl, and cetyl lactate Cosmetic Ingredients Review, final report. International Journal of Toxicology, Vol.17, Suppl.1 Not GLP, Published	No	Published
Doc II C13	EC	2006	Groundwater Directive (GWD), Council Directive 2006/118/EG on the protection of groundwater against pollution and deterioration	No	Published

Section No / Reference No	Author(s)	Year	Title. Source (where different from company) Company, Report No. GLP (where relevant) / (Un)Published	Data Protection Claimed (Yes/No)	Owner
Doc II C13	EC	2006	REACH-VO Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the registration, authorisation and restriction of chemicals (REACH) establishing a European Chemicals Agency amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC, Commission Directives 91/155/EEC, 93/105/EC and 2000/21/EC	No	Published
Doc II C13	EC	2003	Technical Guidance Document in support of Commission Directive 93/67/EEC on Risk Assessment for new notified substances, Part II; Commission Regulation (EC) No 1488/94 on Risk Assessment for existing substances and Directive 98/8/EC of the European Parliament and of the Council concerning the placing of biocidal products on the market. EUR 20418 EN/2	No	Published
Doc II C13	EC	2000	FOCUS groundwater scenarios in the EU review of active substances ". Report of the FOCUS Groundwater Scenarios Workgroup, EC Document Reference SANCO/321/2000 Rev.2	No	Published