File No: STD/1422

October 2012

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Xylitylglucoside

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of Sustainability, Environment, Water, Population and Communities.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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Director
NICNAS

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SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
STD/1422	Bronson & Jacobs Pty Ltd	Xylitylglucoside	No	50 tonnes per annum	Conditioning agent and humectant for use in cosmetic products, paper and textiles

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
Based on the available information, the notified chemical is not recommended for classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment
Under the conditions of the occupational settings described, the notified chemical is not considered to pose an unreasonable risk to the health of workers.

When used at up to 2.5% concentration in cosmetic products, paper and textiles, the notified chemical is not considered to pose an unreasonable risk to public health.

Environmental risk assessment
On the basis of the PEC/PNEC ratio and the reported use pattern, the notified chemical is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS
Hazard Classification and Labelling

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical as introduced:
  - Avoid contact with eyes

  Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.

- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified chemical should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification
This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(1) of the Act; if
- the concentration of the chemical exceeds or is intended to exceed 2.5% in cosmetic products, paper and textiles;

or

(2) Under Section 64(2) of the Act; if
- the function or use of the chemical has changed from conditioning agent and humectant for use in cosmetic products, paper and textiles or is likely to change significantly;
- the chemical has begun to be manufactured in Australia;
- additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

No additional secondary notification conditions are stipulated.

(Material) Safety Data Sheet
The (M)SDS of the product AQUAXYL containing the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

The notifier has submitted with the application an assessment of the chemical by a notification and assessment scheme in an OECD country (Canada). The health and environmental hazard assessment of the Canadian reports were provided to NICNAS and where appropriate used in this assessment report. The other elements of the risk assessment and recommendations on safe use of the notified chemical were carried out by NICNAS.

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Bronson and Jacobs Pty Ltd (ABN 81 000 063 249)
70 Marple Avenue
VILLAWOOD NSW 2163

NOTIFICATION CATEGORY
Standard: Chemical other than polymer (more than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: spectral data, degree of purity, impurities and composition details of AQUAXYL as imported and as used in studies.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: dissociation constant, particle size, flammability, explosive properties and reactivity.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
Europe (2003)
Canada (2008)

2. IDENTITY OF CHEMICAL

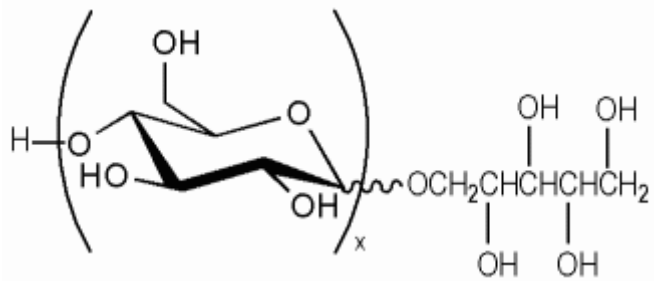
MARKETING NAME(S)
Xylitylglucoside (INCI name)
AQUAXYL (contains up to 50% notified chemical in aqueous solution)

CAS NUMBER
101469-75-4

CHEMICAL NAME
D-Glucose, polymer with xylitol

MOLECULAR FORMULA
$C_5H_{12}O_5.(C_6H_{12}O_6)x$

STRUCTURAL FORMULA



MOLECULAR WEIGHT
< 500 Da

3. COMPOSITION

DEGREE OF PURITY
Part of an inseparable mixture.

4. PHYSICAL AND CHEMICAL PROPERTIES

The notifier has stated that it is difficult to separate the notified chemical from the product AQUAXYL. Hence, the notifier has submitted physicochemical property data for a dried extract of AQUAXYL containing ~55% notified chemical (Batch 4359MP).

APPEARANCE AT 20°C AND 101.3 kPa: Clear, light yellow liquid (for AQUAXYL as imported in aqueous solution).

Property	Value	Data Source/Justification
Melting Point	<50°C	Measured
Boiling Point	315°C at 101.3 kPa	Measured
Density	1435 kg/m^3 at 20°C	Measured
Vapour Pressure	3.6 x 10^{-7} kPa at 25°C	Measured
Water Solubility	674 g/L at 20°C	Measured
Hydrolysis as a Function of pH	$t_{1/2}$ >1 yr at 25°C	Measured
Partition Coefficient (n-octanol/water)	log P_{OW} = -2	Measured
Surface Tension	72.0 mN/m at 22.0 ± 0.5°C	Measured. Not surface active

Adsorption/Desorption	log K_{OC} = <1.25 at 22°C	Measured
Dissociation Constant	Not determined	Not expected to be ionised at environmental pH (4-9)
Flash Point	244°C at 101.3 kPa	Measured
Flammability	Not expected to be flammable	Based on the flash point, not classified as flammable (NTC, 2007)
Autoignition Temperature	> 423°C	Measured
Explosive Properties	Not expected to be explosive	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not expected to oxidise	Contains no functional groups that would imply oxidative properties

DISCUSSION OF PROPERTIES
For full details of tests on physical and chemical properties not assessed by Canada, refer to Appendix A.

Reactivity
The notified chemical is expected to be stable under normal conditions of use.

Physical hazard classification
Based on the submitted physico-chemical data depicted in the above table, the product AQUAXYL containing the notified chemical at up to 50% is not recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified chemical is an inseparable component of the product AQUAXYL, present at up to 50% concentration. The notified chemical will be imported in Australia as a component of AQUAXYL, and also in finished cosmetic products. AQUAXYL is present in finished cosmetic products at up to 5% concentration (up to 2.5% concentration notified chemical). In the future, the notified chemical may also be imported in neat form.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	50	50	50	50	50

PORT OF ENTRY
Sydney and Melbourne.

IDENTITY OF MANUFACTURER
Seppic S.A., France.

TRANSPORTATION AND PACKAGING
Finished cosmetic products containing the notified chemical at concentration up to 2.5% as imported will be packaged in various pack sizes up to 500 mL bottles or tubes. The product AQUAXYL containing the notified chemical at concentrations up to 50% as imported will be packaged in 5 kg and 30 kg plastic drums, and 5 kg plastic jerry cans.

USE
Conditioning agent and humectant for use in cosmetic products, paper and textiles at concentrations up to 2.5%.

OPERATION DESCRIPTION
Formulation of cosmetic products
Formulation of the finished cosmetic products from the commercial mixture AQUAXYL containing the notified chemical at concentrations up to 50% will occur in a highly automated and fully enclosed environment, followed by automated filling of the reformulated products into containers of various sizes.

End-use
The finished cosmetic products containing the notified chemical at concentrations up to 2.5% may be used by consumers and professionals such as hairdressers. Depending on the nature of the product, these could be applied in a number of ways, such as by hand, using an applicator or sprayed.

Use of notified chemical in textiles and papermaking applications
As these are potential applications, an operation description was not provided for these applications.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment
The notifier did not provide exposure information for use of the notified chemical in paper and textiles. Therefore, the use of the notified chemical in cosmetics is being used as a worst case exposure estimate.

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Number*	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport and Storage	10	4	12
Professional compounder	1	8	12
Chemist	1	3	12
Packers	2	8	12
Store persons	2	4	12
End users	3×10^5	8	365

EXPOSURE DETAILS

Transport and storage
Transport and storage workers may come into contact with the notified chemical at concentrations up to 50% only in the event of accidental rupture of containers containing the imported AQUAXYL product.

Formulation of cosmetic products
During formulation of cosmetic products, dermal, ocular and perhaps inhalation exposure of workers to the notified chemical (≤ 50% concentration) may occur during transfer of the imported AQUAXYL product to the mixing vessels and during blending, quality control analysis and cleaning and maintenance of equipment. Exposure is expected to be minimised through the use of mechanical ventilation and/or enclosed systems and through the use of personal protective equipment (PPE) such as coveralls, safety glasses and impervious gloves.

End-use
Exposure to the notified chemical at concentrations up to 2.5% in cosmetic products may occur in professions where the services provided involve the application of personal care products to clients (e.g. hair dressers). Such professionals may use some personal protective equipment to minimise repeated exposure, and good hygiene practices are expected to be in place. If PPE is used, exposure of such workers is expected to be of a similar or lesser extent than that experienced by consumers using products containing the notified chemical.

6.1.2. Public Exposure
There will be widespread and repeated exposure of the public to the notified chemical through the use of cosmetic products. The principal route of exposure will be dermal, while ocular and inhalation exposure is also possible, particularly if products are applied by spray.

Data on typical use patterns of cosmetic product categories in which the notified chemical may be used is shown in the following table (SCCS, 2010). Systemic exposure is based on the product AQUAXYL at 5% concentration (equivalent to 2.5% notified chemical). For the purposes of the exposure assessment, Australian use patterns for the various cosmetic product categories are assumed to be similar to those in Europe. In the absence of dermal absorption data, the default dermal absorption (DA) of 100% was assumed for calculation purposes (European Commission, 2003). An adult bodyweight (BW) of 60 kg has been assumed for calculation purposes.

Product type	**Amount (A)** (mg/day)	**C** (%)	**RF**	**Daily systemic exposure** (mg/kg bw/day)
Body lotion	7820	5	1	6.517
Face cream	1540	5	1	1.283
Eyeliner	5	5	1	0.004
Lipstick	57	5	1	0.048
Makeup remover	5000	5	0.1	0.417
Shower gel	18670	5	0.01	0.156
Shampoo	10460	5	0.01	0.087
Hair conditioner	3920	5	0.01	0.033
Total				**8.550**

C = concentration; RF = retention factor.
Daily systemic exposure = A x C x RF x DA/BW

The worst case scenario estimation using these assumptions is for a person who is a simultaneous user of all products listed in the above table that contain the product AQUAXYL at 5% concentration (equivalent to 2.5% notified chemical). This would result in a combined internal dose of 8.550 mg/kg bw/day of the product AQUAXYL.

The notifier did not provide exposure information for use of the notified chemical in paper and textiles. However, such exposure would only, at most, be occasional and negligible in magnitude compared to the exposure of consumers through the use of cosmetic products. The conservative assumption of 100% dermal absorption assumed in the calculation of the combined internal dose offers significant safety margin to account for the use of the notified chemical in paper and textiles, in the future.

6.2. Human Health Effects Assessment

The notifier has stated that it is difficult to separate the notified chemical from the product AQUAXYL. Hence, the notifier has submitted toxicological data for dried extracts of AQUAXYL containing ~55% notified chemical, the results of which are summarised in the table below. For full details of the studies that were not assessed in the Canadian report, refer to Appendix B.

Endpoint	*Result and Assessment Conclusion*	*Test Method*
Rat, acute oral toxicity	LD50 > 2000 mg/kg bw; low toxicity	OECD 401
Rat, acute dermal toxicity	LD50 > 2000 mg/kg bw; low toxicity	OECD 402
Rabbit, skin irritation	non-irritating	OECD 404
Rabbit, eye irritation	slightly irritating	OECD 405
Guinea pig, skin sensitisation – adjuvant test	no evidence of sensitisation	OECD 406
Rat, repeat dose oral toxicity – 28 days	NOAEL 1000 mg/kg bw/day*	OECD 407
Mutagenicity – bacterial reverse mutation	non-mutagenic	OECD 471
Genotoxicity – *in vitro* chromosome aberration	non-genotoxic	OECD 473
Genotoxicity – *in vivo* micronucleus	non-genotoxic	OECD 474

*The NOAEL is based on xylitol as the results of the study were unequivocal (see repeated dose toxicity below for details).

Toxicokinetics

Based on the low molecular weight (< 500 Da) of the notified chemical, there is potential for dermal absorption and passage across the gastrointestinal tract. However this may be limited by its high water solubility (674 g/L) and low partition coefficient (log P_{OW} = -2).

Acute toxicity

The product AQUAXYL containing ~55% notified chemical was determined to be of low acute oral and dermal toxicity (LD50 > 2000 mg/kg bw) in rats. No mortality, abnormal clinical signs, body weight changes, or gross pathological findings were observed for any of the treated rats.

No acute inhalation toxicity data were provided.

Irritation and sensitisation

In studies conducted in rabbits, the product AQUAXYL containing the notified chemical at ~ 55% concentration was not irritating to the skin but was slightly irritating to the eyes. In the eye irritation study, slight conjunctival

effects (redness and chemosis) were observed from 1-hour after instillation that were resolved in all animals at the 72 hour observation period.

The product AQUAXYL containing the notified chemical at ~55% concentration was non-sensitising to guinea pigs in a maximisation study (100% topical induction concentration; 100% and 50% challenge concentration).

Repeated Dose Toxicity
In a 28-day repeat dose toxicity study, rats were administered the product AQUAXYL containing the notified chemical at ~55% concentration via oral gavage at doses of 0, 15, 150 and 1000 mg/kg bw/day. The study results indicated no treatment-related changes in mortality, clinical observations, behavioural assessment, functional performance, sensory reactivity, bodyweight, food consumption, haematology, blood chemistry, organ weights or necropsy. However, minimal focal myocarditis was noted for two high dose males and one high dose female. Histopathological examination was not conducted on the mid- and low-dose groups, hence it is not known if myocarditis also occurred in these groups.

The study authors state that the lesions found in the study are typical of findings expected in animals of this type, strain and age, and that the incidence is typical of that seen in rats in this type of study. However, no historical data was provided to support this statement.

Myocarditis is inflammation of the heart muscle. It is most often caused by viral infections and immune disease conditions, rather than be chemically-induced. Given the uncertainty in the cause of the observed myocarditis in the high dose group and limited histopathology data, the study does not allow a NOAEL to be clearly established.

Based on the chemistry and proposed metabolism of the components of AQUAXYL, systemic exposure to AQUAXYL is virtually equivalent to exposure to an equivalent exposure to xylitol. Based on the number of toxicological studies available on xylitol, no reported adverse effects other than potential laxative effects at high dose levels as a result of slow absorption and consequent osmotic effects in the gut have been reported.

WHO established an ADI for xylitol of 'not specified' (total daily intake of the substance arising from its use at the levels necessary to achieve the desired effect does not represent a hazard to health). The studies on xylitol were considered by the Joint Expert Committee on Food Additives (JECFA) and published by WHO in the Food Additive Series in 1977, 1978 and 1983.

Two-year dietary studies in rats at levels of 20% xylitol in the diet were conducted. In these studies, the high levels caused gross dietary imbalance which led to some adverse effects but these were not considered to be of toxicological significance. Specifically, there were no adverse effects on the heart. The NOAEL established by the study authors was therefore the highest dose tested, namely 20,000ppm, equivalent to 1000 mg/kg bw/day.

Therefore, based on the long-term toxicological studies on xylitol, the NOAEL for AQUAXYL is considered to be 1000 mg/kg bw/day.

Mutagenicity
Bacterial reverse mutation, *in vitro* chromosomal aberration (human peripheral blood lymphocytes) and *in vivo* micronucleus (mice; ≤ 2000 mg/kg bw/day for 2 days) studies that were conducted on the product AQUAXYL containing ~55% notified chemical were all negative. However, it is not clear that the test substance was systemically absorbed (and reached the bone marrow) in the *in vivo* micronucleus study.

Health hazard classification
Based on the available information, the notified chemical is not recommended for classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety
Based on available studies, the product AQUAXYL containing the notified chemical at up to 50% concentration is not irritating to the skin but is slightly irritating to the eyes. It is expected to have low acute oral and dermal toxicity and low toxicity after repeated exposure. It is not a skin sensitiser and is not expected to be genotoxic.

Reformulation
Reformulation workers may be exposed to the notified chemical when handling the product AQUAXYL containing the notified chemical at up to 50% concentration. However, given the low hazardous nature of the product AQUAXYL and the control measures in place to limit exposure, the risk to the health of workers from use of the notified chemical is not considered to be unreasonable.

End-use
Beauty care professionals will handle cosmetic products containing up to 2.5% notified chemical similar to public use. Therefore, the risk to workers who regularly use products containing the notified chemical is expected to be of a similar or lesser extent than that experienced by members of the public who use such products on a regular basis. For details of the public health risk assessment see section 6.3.2.

Based on the information available, the risk to workers associated with the use of the notified chemical at up to 2.5% in cosmetic products is not considered to be unreasonable.

Assuming use in cosmetics as the worst case scenario, the risk to workers associated with the use of the notified chemical at up to 2.5% in paper and textiles is not considered to be unreasonable.

6.3.2. Public Health
Members of the public may experience repeated dermal exposure to the notified chemical at concentrations up to 2.5% (equivalent to up to 5% AQUAXYL) through the use of cosmetic products, paper and textiles.

Use in cosmetic products
The repeat dose toxicity potential was estimated by calculation of the margin of exposure (MoE) of the product AQUAXYL at 5% concentration using the worst case exposure scenario from use of multiple products of 8.550 mg/kg bw/day (see Section 6.1.2) and the NOAEL of 1000 mg/kg bw/day for xylitol. A MoE value greater ≥ 100 is considered acceptable to account for intra- and inter-species differences. Using the abovementioned NOAEL, a MoE of 117 was estimated for cosmetic products containing up to 5% AQUAXYL (equivalent to 2.5% notified chemical).

Therefore, based on the information available, the risk to the public associated with the use of the notified chemical up to 2.5% concentration in cosmetic products is not considered to be unreasonable.

Use in paper and textiles
Assuming use in cosmetics as the worst case scenario, the risk to the public associated with the use of the notified chemical at up to 2.5% in paper and textiles is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE
The notified chemical will be imported as a component of the product, AQUAXYL, and reformulated into finished cosmetics products. It may also be used in paper products and textiles. It is estimated that approximately 1% (500kg) of the notified chemical will remain as residues in the import containers and the empty containers and residues are expected to be disposed of to landfill. Any spills during reformulation activities will be contained using an absorbent material and, along with wastes, are expected to be transported to an offsite industrial disposal facility and disposed of according to local regulations. The notified chemical used in reformulation of paper products and textiles is expected to be either absorbed to the substrate or the solution containing the notified chemical is expected to be reused and recycled. This is expected to result in minimal release into aqueous waste streams. It is estimated that approximately 1% (500 kg) of the annual import volume of the notified chemical will be released to sewer as industrial effluent as a result of transfer and cleaning activities during reformulation of cosmetic products and, potentially, paper and textile products.

RELEASE OF CHEMICAL FROM USE
The majority of the notified chemical in cosmetic products is expected to be released to sewer when washed off the skin and hair.

RELEASE OF CHEMICAL FROM DISPOSAL

Unused cosmetic products and residues of the notified chemical remaining in empty end-use containers are expected to be disposed of to landfill. This is estimated to account for approximately 3% of the total annual import of the notified chemical. The notified chemical in personal care paper products is expected to be disposed of to landfill or released to sewer. For any of the notified chemical in textiles, it is expected that the articles containing the notified chemical will be disposed of to landfill at the end of their useful life.

7.1.2. Environmental Fate

The majority of the notified chemical is expected to be released to sewer during reformulation use of cosmetic products. Upon release to the aquatic environment in effluent from sewage treatment plants (STPs), the notified chemical is expected to remain in the water column due to the very high water solubility, low vapour pressure and low n-octanol/water partition coefficient (log K_{OW}). Consequently it is available to aquatic organisms. The notified chemical is expected to leach through soil and sediments given its low adsorption/desorption coefficient (log K_{OC}). Given the notified chemical's low log K_{OW}, it is not expected to penetrate cell membranes and bioaccumulate.

The product, AQUAXYL, containing the notified chemical at concentrations up to 50% was experimentally determined not to be readily biodegradable (OECD 301D; 35% degradation after 28 days) and is not expected to hydrolyse under environmental conditions. Therefore the notified chemical has the potential to persist in the aquatic compartment. However, in surface waters the notified chemical is expected to disperse and degrade into water and oxides of carbon.

7.1.3. Predicted Environmental Concentration (PEC)

The imported product, AQUAXYL, containing the notified chemical at up to 50% may be used in the reformulation of cosmetic, paper and textile products. Up to 1% of the imported notified chemical is estimated to be released in aqueous waste streams due to reformulation activities. The predicted environmental concentration (PEC) is calculated assuming 1% of the annual import quantity of the notified chemical (500 kg) will be released through a STP over 10% of the population in one geographic location (452 ML/day). It is further assumed that none of the chemical is removed by STP processes and that releases occur on 50 days each year. Based on this scenario, the maximum daily discharge rate of notified chemical is 10.0 kg/day which could result in concentrations of up to 22.1 µg/L notified chemical (= 10.0 kg day^{-1} / 452 ML) in the STP effluent.

Based on the reported use in cosmetic products, it is assumed that 100% of the notified chemical in end-use products (50,000 kg) will be released to sewer on a nationwide basis over 365 days per year. Since most of the notified chemical will be washed into the sewer, under a worst-case scenario, with no removal of the notified chemical in the sewage treatment plant, the resultant predicted environmental concentration (PEC) in sewage effluent on a nationwide basis is estimated as follows:

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	50,000	kg/year
Proportion expected to be released to sewer	100%	
Annual quantity of chemical released to sewer	50,000	kg/year
Days per year where release occurs	365	days/year
Daily chemical release:	137.0	kg/day
Water use	200.0	L/person/day
Population of Australia (Millions)	22.613	million
Removal within STP	0%	
Daily effluent production:	4,523	ML
Dilution Factor - River	1	
Dilution Factor - Ocean	10	
PEC - River:	30.3	µg/L
PEC - Ocean:	3.03	µg/L

Based on the above calculations, the maximum PEC for the notified chemical in surface water receiving combined effluents from reformulation and use is 52.4 µg/L (= 22.1 + 30.3) for river water and 5.24 µg/L (= 22.1/10 + 3.03) for ocean waters.

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1000 L/m^2/year (10 ML/ha/year). The notified chemical in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1500 kg/m^3). Using these assumptions, irrigation with a concentration of 52.4 µg/L may potentially result in a soil concentration of approximately 0.347 mg/kg. Assuming accumulation of the notified chemical in soil for 5 and 10 years under repeated irrigation, the concentration of notified chemical in the applied soil in 5 and 10 years may be approximately 1.74 mg/kg and 3.47 mg/kg, respectively.

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations for the notified chemical are summarised in the table below. Tests were conducted on the product, AQUAXYL, containing the notified chemical at ~ 55% concentration. Reported test results have been corrected for the notified chemical concentration in the test substance. For full details of ecotoxicological tests not assessed by Canada, refer to Appendix C.

Study	Duration	Endpoint	Value	Test Method	Assessment Conclusion
Fish Toxicity (*Oncorhynchus mykiss* – Rainbow trout)	96h	LC50 NOEC	> 54.5 mg/L = 54.5 mg/L	OECD 203	Not expected to be harmful
Daphnia Toxicity (*Daphnia magna*)	48h	EC50 NOEC	> 54.5 mg/L = 54.5 mg/L	OECD 202	Not expected to be harmful
Algal Toxicity (*Scenedesmus subspicatus*)	72h	E_bC50 E_rC50 NOEC	> 41.9 mg/L* > 41.9 mg/L* = 41.9 mg/L*	OECD 201	Not expected to be harmful
Activated Sludge Respiration Inhibition	3h	EC50 NOEC	> 545 mg/L = 545 mg/L	OECD 209	Not expected to be inhibitory to microbial respiration

*Based on geometric mean measured test concentrations

The available measured data indicates that the notified chemical is not expected to be harmful to fish, aquatic invertebrates and algae on an acute basis. Therefore, the notified chemical is not formally classified for acute aquatic hazard under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations, 2009).

7.2.1. Predicted No-Effect Concentration

The most sensitive observed ecotoxicological endpoint for the notified chemical was the 72-hour median effect concentration (growth rate, E_rC50) for algae. This endpoint was used to calculate the predicted no-effect concentration (PNEC). An assessment factor of 100 was used as acute endpoints are available for three trophic levels.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
E_rC50 (Algae)	> 41.9	mg/L
Assessment Factor	100	
PNEC:	> 419	µg/L

7.3. Environmental Risk Assessment

Risk□□ssessment	PEC µg/L	PNEC µg/L	Q
Q - River	52.4	> 419	< 0.125
Q - Ocean	5.24	> 419	< 0.013

The Risk Quotients (Q = PEC/PNEC) for the worst-case discharge scenario have been calculated to be less than 1 for the river and ocean waters, indicating that the risk to aquatic organisms is not unreasonable. The notified chemical has the potential to persist in the aquatic compartment however it is not expected to bioaccumulate. On the basis of the value for Q, the notified chemical is not expected to pose an unreasonable risk to the environment for the assessed use pattern.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

The following physicochemical data was obtained using dried extracts of AQUAXYL containing ~55% notified chemical.

Surface Tension 72.0 mN/m at 22.0 ± 0.5°C

Method	EC Council Regulation No 440/2008 A.5 Surface Tension.
Remarks	Concentration: 1.0 g/L
Test Facility	Confidential (6)

Flash Point 244°C at 101.3 kPa

Method	EC Commission Directive 92/69/EEC A.9 method (1992) ISO Standard 3679 (1983).
Remarks	No self-ignition temperature of the test item was observed up to 244°C.
Test Facility	Confidential (2)

Autoignition Temperature > 423°C

Method	EC Commission Directive 92/69/EEC A.16 method (1992) Auto-Ignition Temperature (Liquids and Gases).
Remarks	No deviations from the study protocol was observed.
Test Facility	Confidential (3)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Irritation – skin

TEST SUBSTANCE	Dried extract of the product AQUAXYL containing ~ 55% notified chemical
METHOD	OECD TG 404 Acute Dermal Irritation/Corrosion. EEC Council Regulation No 92/69/EEC B.4 Acute Toxicity (Skin Irritation).
Species/Strain	Rabbit/New Zealand White albino
Number of Animals	3
Observation Period	72 hours
Type of Dressing	Semi-occlusive
Remarks - Method	No significant protocol deviations
RESULTS	No cutaneous reactions (erythema and oedema) were observed in any animal during the observation period.
CONCLUSION	The product AQUAXYL containing the notified chemical at ~ 55% concentration is non-irritating to the skin.
TEST FACILITY	Confidential (4)

B.2. Irritation – eye

TEST SUBSTANCE	Dried extract of the product AQUAXYL containing ~ 55% notified chemical
METHOD	OECD TG 405 Acute Eye Irritation/Corrosion. EEC Council Regulation No 92/69/EEC B.4 Acute Toxicity (Skin Irritation).
Species/Strain	Rabbit/New Zealand White albino
Number of Animals	3
Observation Period	72 hours
Remarks - Method	There were no protocol deviations

RESULTS

Lesion	*Mean Score* Animal No.*			*Maximum Value*	*Maximum Duration of Any Effect*	*Maximum Value at End of Observation Period*
	1	2	3			
Conjunctiva: redness	0.7	0.3	0.7	1	< 72 hrs	0
Conjunctiva: chemosis	0	0	0	1 (1hr)	-	0
Corneal opacity	0	0	0	0	-	0
Iridial inflammation	0	0	0	0	-	0

*Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal.

Remarks - Results	Only slight conjunctival irritation (redness and chemosis) was observed that was fully resolved in all animals at the 72 hour observation period.
CONCLUSION	The product AQUAXYL containing the notified chemical at ~55% concentration is slightly irritating to the eye.
TEST FACILITY	Confidential (5)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1 Ecotoxicological Investigation

C 1.1 Inhibition of microbial activity

TEST SUBSTANCE	Dried extract of the product AQUAXYL containing ~55% notified chemical
METHOD	OECD TG 209 Activated Sludge, Respiration Inhibition Test.
Inoculum	Activated sludge of a primarily domestic origin
Exposure Period	3 hours
Concentration Range	Nominal: 5.5, 17.2, 54.5, 172, 545 mg/L Actual: Not measured
Remarks – Method	The method was conducted according to test guidelines using good laboratory practice (GLP) with no significant deviations.
RESULTS	
EC50	> 545 mg/L
NOEC	545 mg/L
Remarks – Results	All relevant test validity criteria were met.
CONCLUSION	The product AQUAXYL containing the notified chemical at ~55% concentration is not inhibitory to microbial respiration.
TEST FACILITY	Confidential (1)

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