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April 2016

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

D-Glucitol, 1-deoxy-1-(methylamino)-, *N*-(C_{16-18} and C_{18}-unsatd. acyl) derivs.

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment.

This Public Report is 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/1567	Clariant (Australia) Pty Ltd	D-Glucitol, 1-deoxy-1-(methylamino)-, *N*-(C_{16-18} and C_{18}-unsatd. acyl) derivs.	ND*	< 5 tonnes per annum	Component of rinse-off cosmetic and household cleaning products

* ND = not determined

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 of Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

The environmental hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS) is presented below. Environmental classification under the GHS is not mandated in Australia and carries no legal status but is presented for information purposes.

Hazard classification	*Hazard statement*
Acute Category 1	H400 – Very toxic to aquatic life
Chronic Category 3	H412 – Harmful to aquatic life with long lasting effects

Human health risk assessment
Provided that the recommended controls are being adhered to, 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 in the proposed manner, 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

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following engineering controls to minimise occupational exposure to the notified chemical during reformulation processes:
  - Enclosed, automated processes, where possible
  - Adequate general ventilation and local exhaust ventilation

- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure to the notified chemical during reformulation processes:
  - Avoid contact with eyes
  - Avoid formation of mists/aerosols

- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical during reformulation processes:
  - Respiratory protection if mist/aerosol formation is expected

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

- A copy of the (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Public Health

- Product formulators should exercise due care when using the notified chemical in cosmetic products given its potential ability to enhance the dermal penetration of other chemicals in the formulation.

Disposal

- Where reuse or recycling are not appropriate, dispose of the notified chemical in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by containment, physical 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 is intended to exceed 7% in rinse-off cosmetic and household cleaning products;
  - the chemical is intended to be used in products involving spray applications;

or

(2) Under Section 64(2) of the Act; if
  - the function or use of the chemical has changed from a component of rinse-off cosmetic and household cleaning products, or is likely to change significantly;
  - the amount of chemical being introduced has increased, or is likely to increase, 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.

(Material) Safety Data Sheet

The (M)SDS of the product 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

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT
Clariant (Australia) Pty Ltd (ABN: 30 069 435 552)
Level 3, 3 Acacia Place
296 - 324 Ferntree Gully Road
NOTTING HILL VIC 3168

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: other names, analytical data, degree of purity, impurities, additives/adjuvants and import volume

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: hydrolysis as a function of pH, adsorption/desorption, particle size, flash point, explosive properties, and oxidising properties

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

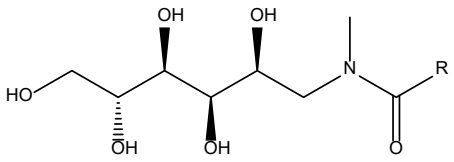
MARKETING NAME(S)
GlucoTain Flex (product containing the notified chemical at ~35% concentration)

CAS NUMBER
1591782-99-8

CHEMICAL NAME
D-glucitol, 1-deoxy-1-(methylamino)-, *N*-(C_{16-18} and C_{18}-unsatd. acyl) derivs.

MOLECULAR FORMULA
Unspecified

STRUCTURAL FORMULA



Where R = C15-C17 alkyl group or C17 alkenyl group

MOLECULAR WEIGHT
433.6 – 461.7 Da

ANALYTICAL DATA
Reference NMR, IR and UV-Vis spectra were provided

3. COMPOSITION

DEGREE OF PURITY
> 75%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Off-white wax-like solid

Property	Value	Data Source/Justification
Melting Point	50 °C	Measured
Boiling Point	Decomposes without boiling	Measured
Density	1,100 kg/m^3 at 22.8 °C	Measured
Vapour Pressure	7.1 × 10^{-6} kPa at 25 °C	Measured
Water Solubility	0.0071 ± 0.0032 g/L at pH 5.76 at 20 °C 0.0057 ± 0.0026 g/L at pH 5.76 at 20 °C (active content)	Measured
Fat (or n-octanol) Solubility	36 g/L at 20 °C	Measured
Hydrolysis as a Function of pH	Not determined	Contains no hydrolysable functionalities
Partition Coefficient (n-octanol/water)	log Pow = 3.80 at pH 5.76 at 20 °C	Calculated from measured solubilities in n-octanol and water; expected to partition to phase boundaries based on surfactant properties
Surface Tension	31.32 nM/m at 20 °C	Measured. The notified chemical is surface active
Adsorption/Desorption	Not determined	Expected to adsorb strongly to soil and sediment based on surfactant properties
Dissociation Constant	pKa$_1$ = -1.31 to 0.12; pKa$_2$ = 13.24 to 13.64	Calculated for all homologues in the C8 to C18 range using I-Lab v2.0
Particle Size	Not determined	Introduced as a paste
Flash Point	Not determined	Estimated to be high based on flammability
Flammability	Not highly flammable	Measured
Autoignition Temperature	> 400 °C	Measured
Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidative properties

DISCUSSION OF PROPERTIES
For full details of tests on physical and chemical properties, 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 notified chemical is not recommended for hazard classification according to the *Globally Harmonised System of 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 will not be manufactured within Australia. It will be imported into Australia as a component of a product, GlucoTain Flex, at ~35% concentration as a paste.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 2.5	< 5	< 5	< 5	< 5

PORT OF ENTRY
Sydney and Melbourne

TRANSPORTATION AND PACKAGING
The product GlucoTain Flex containing the notified chemical at ~35% concentration will be imported in 200 L PE drums. The imported containers will be transported from the wharf to the warehouses for storage and distribution.

USE
The notified chemical will be used in rinse-off cosmetic and household cleaning products (such as dishwashing liquids and hard surface cleaners) at ≤ 7% concentration. The finished products containing the notified chemical will not be applied by spray.

OPERATION DESCRIPTION
The imported product containing the notified chemical, GlucoTain Flex, will be distributed to formulators for reformulation of rinse-off cosmetic and household cleaning products.

At the reformulation sites, metering pumps will be used to transfer GlucoTain Flex from the original containers into vats where it will be blended with other raw materials. Blending will be carried out in enclosed and automated systems. Once blending is complete, quality assurance (QA) workers will take aliquots of samples for laboratory analysis. An automated and metered process will be applied to dispense the finished products into individual consumer size packaging.

The finished rinse-off cosmetic and household cleaning products containing the notified chemical at ≤ 7% concentration will be distributed nationwide for retail and consumer use.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Stevedores	2-3	10-15
Transport workers	6	260
Warehousing workers	6	260
Reformulation process workers	4	260
Quality assurance workers	4	260
Maintenance workers and cleaners	1	260

EXPOSURE DETAILS
Transportation and storage
Stevedores, transport and warehouse workers may come into contact with the notified chemical at up to 35% concentration, only in the unlikely event of an accidental rupture of containers.

Reformulation
During reformulation into cosmetic and household cleaning products, dermal, ocular and inhalation exposure of workers to the notified chemical at ≤ 35% concentration may occur. Exposure is expected to be minimised through the use of exhaust ventilation and/or automated/enclosed systems as well as through the use of personal protective equipment (PPE) such as coveralls, eye protection, impervious gloves and respiratory protection (as appropriate).

End-use
Exposure to the notified chemical in end-use products at ≤ 7% concentration where the services provided involve the applications of cosmetic products to clients (e.g. hair dressers and workers in beauty salons) or in the cleaning industry. Spray applications involving the use of the notified chemical are not expected as indicated by the notifier. The main route of exposure is therefore expected to be dermal, while ocular exposure is also

possible. Such professionals may use some PPE 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 less extent than that experienced by consumers using the same products containing the notified chemical.

6.1.2. Public Exposure

There will be widespread and repeated exposure of the public to the notified chemical at ≤ 7% concentration through the use of rinse-off cosmetic or household cleaning products. The main route of exposure will be dermal, while ocular is also possible.

For the purposes of the exposure assessment via the dermal route, data on typical use patterns of product categories in which the notified chemical may be used are shown in the following tables (SCCS, 2012; Cadby et al., 2002; ACI, 2010). Australian use patterns for the various product categories are assumed to be similar to those in Europe. A lifetime average female body weight (BW) of 64 kg (enHealth, 2012) was used for the calculations. In the absence of dermal absorption data, a dermal absorption (DA) of 100% was assumed for the notified chemical (ECHA, 2014).

Direct dermal exposure

Cosmetic products

Product type	*Use Amount (mg/day)*	*C (%)*	*RF*	*DA (%)*	*Daily Systemic Exposure (mg/kg bw/day)*
Facial cleanser	800	7	0.01	100	0.0088
Shampoo	10,460	7	0.01	100	0.1144
Conditioner	3,920	7	0.01	100	0.0429
Shower gel	18,670	7	0.01	100	0.2042
Hand wash soap	20,000	7	0.01	100	0.2188
Total					**0.5890**

Daily systemic exposure = (Use amount × C × RF × DA)/BW, where C = Use concentration, RF = Retention factor, DA = Dermal absorption rate, BW = Average bodyweight

Household cleaning products

Product type	*Frequency (use/day)*	*C (%)*	*Contact Area (cm^2)*	*Product Use C (g/cm^3)*	*Film Thickness (cm)*	*Time Scale Factor*	*DA (%)*	*Daily systemic exposure (mg/kg bw/day)*
Laundry liquid	1.43	7	1980	0.01	0.01	0.007	100	0.0022
Dishwashing liquid	3	7	1980	0.009	0.01	0.03	100	0.0175
All-purpose cleaner	1	7	1980	1	0.01	0.007	100	0.1516
Total								**0.1713**

Daily systemic exposure = (Frequency × C × Contact area × Product Use C × Film thickness × Time scale factor × DA)/BW, where C = concentration, DA = Dermal absorption rate, BW = Average bodyweight

Indirect dermal exposure (from wearing clothes)

Household cleaning products

Product type	*Amount (g/use)*	*C (%)*	*PR (%)*	*PT (%)*	*DA (%)*	*Daily systemic exposure (mg/kg bw/day)*
Laundry liquid	230	7	0.95	10	100	0.2390
Fabric softener	90	7	0.95	10	100	0.0935
Total						**0.3325**

Daily systemic exposure = (Amount × C × PR × PT × DA)/BW, where C = Use concentration, PR = Retained product rate, PT = Percentage transfer, DA = Dermal absorption rate

The worst case scenario estimation using these assumptions is for a person who is a simultaneous user of all products listed in the above tables that contain the notified chemical. This would result in a combined internal dose of 1.093 mg/kg bw/day.

6.2. Human Health Effects Assessment

The results from toxicological investigations conducted on the notified chemical are summarised in the following table. For full details of the studies, refer to Appendix B.

Endpoint	*Result and Assessment Conclusion*
Rat, acute oral toxicity	LD50 > 2,000 mg/kg bw; low toxicity
Rat, acute dermal toxicity	LD50 > 2,000 mg/kg bw; low toxicity
Skin irritation (*in vitro*)	non-irritating
Eye irritation (*in vitro*)	not severely irritating
Rabbit, eye irritation	slightly irritating
Guinea pig, skin sensitisation – adjuvant test	no evidence of sensitisation
Rat, repeat dose oral toxicity – 28 days	NOAEL = 650 mg/kg bw/day
Mutagenicity – bacterial reverse mutation	non mutagenic
Genotoxicity – *in vitro* mammalian cell gene mutation	non genotoxic
Genotoxicity – *in vivo* mammalian erythrocyte micronucleus test	non genotoxic
Rat, reproductive and developmental toxicity screening	NOAEL = 650 mg/kg bw/day

Toxicokinetics
No toxicokinetic data was provided for the notified chemical. The notified chemical has a molecular weight of 433.6 to 461.7 Da and a log Pow of 3.80 at 20 °C, indicating potential for absorption. The notified chemical is to be used a surfactant and therefore may have the ability to enhance dermal penetration of other chemicals in the formulations.

Acute toxicity
Based on studies conducted in rats, the notified chemical is of low acute oral and dermal toxicity. No acute inhalation toxicity information on the notified chemical was provided. However, a similar chemical (D-glucitol, 1-deoxy-1-(methylamino)-, *N*-C_{8-10} acyl derivs., CAS No. 1591782-62-5; STD/1565) has been found to be harmful if inhaled. Therefore the potential for the notified chemical to cause toxicity effects through inhalation cannot be ruled out.

Irritation and sensitisation
An *in vitro* study on skin irritation using a reconstituted three-dimensional human epidermis model showed that the notified chemical is not expected to be irritating to the skin.

An *in vitro* study on eye irritation using bovine corneal opacity and permeability test method indicated that the notified chemical was not severely irritating. An *in vivo* eye irritation study in rabbits showed that the notified chemical is slightly irritating to the eye but not classified under the GHS.

A guinea pig maximisation test on the notified chemical up to 20% concentration did not reveal any evidence of skin sensitisation properties for the chemical.

Repeated dose toxicity
In a 28 day repeated dose oral toxicity study on the notified chemical, no treatment-related adverse effects were observed in the test animals at any dose tested. The No Observed Adverse Effect Level (NOAEL) was therefore established at 650 mg/kg bw/day based on the highest dose level tested.

Mutagenicity/Genotoxicity
The notified chemical tested negative in a bacterial reverse mutation assay and an *in vitro* mammalian cell gene mutation test using Chinese Hamster V79 cells. The notified chemical also tested negative in an *in vivo* mouse bone marrow micronucleus test via the oral route.

Reproductive/developmental toxicity
Based on a reproductive/developmental toxicity screening test in rats, no adverse effects of the notified chemical on adult male and female animals and reproductive parameters were noted up to the dose level of 650 mg/kg bw/day. The NOAEL for reproductive toxicity was therefore established as 650 mg/ kg bw/day.

There was an increase of percent pre implantation loss in all the treatment groups, achieving statistical significance in the low (125 mg/kg bw/day) and medium dose (300 mg/kg bw/day) levels. In the absence of obvious dose response and statistical significance in the high dose (650 mg/kg bw/day) group, as well as with the finding within the range of historical control data, it was not considered by the study authors to be an adverse effect of the treatment. Therefore, the NOAEL for the developmental toxicity was also established as 650 mg/kg bw/day.

Health hazard classification
Based on the available information, the notified chemical is not recommended for classification according to the *Globally Harmonised System of 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 the available information, the notified chemical is a slight eye irritant. The potential for acute inhalation toxicity cannot be ruled out.

Reformulation
Dermal, ocular and potentially inhalation exposure to the notified chemical at up to 35% concentration may occur during reformulation. The stated use by the notifier of PPE such as coveralls, eye protection, impervious gloves and respiratory protection (as appropriate) and engineering controls including automated/enclosed processes and local exhaust ventilation should minimise the risk for workers.

Provided that control measures stated by the notifier are in place to minimise worker exposure, including the use of automated processes and PPE, the risk to the health of workers from use of the notified chemical is not considered to be unreasonable.

End-use
Cleaners and beauty care professionals may come into contact with products containing the notified chemical at ≤ 7% concentration. These products will also be available to the public. The risk to workers who regularly use these products is expected to be of a similar or lesser extent than that experienced by consumers using products containing the notified chemical (for details of the public health risk assessment, see Section 6.3.2).

6.3.2. Public Health
Cosmetic and household cleaning products containing the notified chemical at ≤ 7% concentration will be available to the public. The main route of exposure is expected to be dermal with some potential for accidental ocular or oral exposure.

Irritation
The notified chemical is slightly irritating to the eyes. At the proposed use concentration in cosmetic and household cleaning products irritation effects are not expected.

Risk of repeated exposure
Members of the public may experience repeated exposure to the notified chemical up to 7% concentration through the use of a range of rinse-off cosmetic and household cleaning products.

Estimation of repeated dose toxicity potential of the notified chemical using the worst case exposure scenario from the use of multiple products would result in a combined internal dose of 1.093 mg/kg bw/day (see Section 6.1.2). Using a NOAEL of 650 mg/kg bw/day established in a 28 day oral repeat dose toxicity study and a reproductive/development toxicity screening test on the chemical, the margin of exposure (MoE) was calculated to be 595. A MoE value greater than or equal to 100 is considered acceptable to account for intra- and inter-species differences.

Therefore, based on the available information, the risk to the public from use of the notified chemical at ≤ 7% in rinse-off cosmetic and household cleaning products 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 raw material for reformulation into finished cosmetic products and household cleaning products. There is unlikely to be any significant release to the environment from transport and storage, except in the case of accidental spills and leaks. In the event of spills, the product

containing the notified chemical is expected to be collected with inert material, and disposed of to landfill in accordance with local government regulations.

The reformulation process will involve transfer of the raw material containing the notified chemical into blending vessels using metering pumps, followed by blending operations that will be highly automated that is expected to occur within a fully enclosed environment. Therefore, significant release of the notified chemical from this process to the environment is not expected. The process will be followed by automated filling of the formulated products into end-use containers of various sizes. Wastes containing the notified chemical generated during reformulation include equipment wash water, spilt materials, and empty import containers. Wastes are not expected to be released to sewer and are expected to be collected and disposed of to landfill in accordance with local government regulations.

RELEASE OF CHEMICAL FROM USE

The majority of the notified chemical is expected to be released to sewer across Australia as a result of its use in various cosmetic formulations, which will be washed off the hair and skin of consumers, or disposed of following cleaning activities to the sewer. A small proportion of the notified chemical is expected to be disposed of to landfill as residue in empty end-use containers.

RELEASE OF CHEMICAL FROM DISPOSAL

A small proportion of the notified chemical may remain in end-use containers once the consumer products are used up. Wastes and residues of the notified chemical in empty containers are likely either to share the fate of the container and be disposed of to landfill, or to be released to sewer when containers are rinsed before recycling through an approved waste management facility.

7.1.2. Environmental Fate

Following its use in cosmetics and household cleaning formulations, the majority of the notified chemical is expected to enter the sewer system, before potential release to surface waters nationwide. Based on the results of a biodegradability study, the notified chemical is considered to be readily biodegradable (60-65% in 28 days). For details of the environmental fate studies, please refer to Appendix C. Based on its low water solubility and surfactant properties, the notified chemical is expected to bind strongly to sludge and sediment. The notified chemical is expected to partition to phase boundaries based on its surfactant properties, and along with its ready biodegradability, is therefore not expected to be bioaccumulative. In surface waters, the notified chemical is expected to adsorb to soil and sediment, and eventually degrade through biotic and abiotic processes to form water and oxides of carbon and nitrogen.

The majority of the notified chemical will be released to sewer after use. A proportion of the notified chemical may be applied to land when effluent is used for irrigation, or when sewage sludge is used for soil remediation, or disposed of to landfill as collected spills and empty container residue. The notified chemical residues in landfill, soil and sludge are expected to eventually degrade to form water and oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) has been calculated to assume a worst case scenario, with 100% release of the notified chemical into sewer systems nationwide and no removal within sewage treatment plants (STPs).

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	5,000	kg/year
Proportion expected to be released to sewer	100%	
Annual quantity of chemical released to sewer	5,000	kg/year
Days per year where release occurs	365	days/year
Daily chemical release:	13.70	kg/day
Water use	200.0	L/person/day
Population of Australia (Millions)	22.613	million
Removal within STP	**73%**	**mitigation**
Daily effluent production:	4,523	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.818	µg/L

PEC - Ocean:	0.082	µg/L

The PEC of the notified chemical in sewage treatment plants (STPs) before mitigation was calculated to be 3.029 µg/L and 0.303 µg/L for the river and marine compartments respectively. Following mitigation (73% removal in STP), the PEC was calculated to be 0.818 µg/L and 0.082 µg/L for the river and marine compartments respectively.

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 1,500 kg/m^3). Using these assumptions, irrigation with a concentration of 0.818 µg/L may potentially result in a soil concentration of approximately 5.452 µg/kg. Assuming accumulation of the notified chemical in soil for 5 and 10 years under repeated irrigation, the concentration of the notified chemical in the applied soil in 5 and 10 years may be approximately 27.26 µg/kg and 54.52 µg/kg, respectively.

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations conducted on the notified chemical are summarised in the table below. Details of these studies can be found in Appendix C.

Endpoint	*Result*	*Assessment Conclusion*
Acute toxicity		
Fish	96 h LC50 = 2.02 mg/L*	Toxic to fish
Daphnia	48 h EC50 = 0.8 mg/L*	Very toxic to *Daphnia*
Algae	72 h E_rC50 > 64.3 mg/L*	Not harmful to algae up to the water solubility limit
Inhibition of Bacterial Respiration	3 h IC50 > 4023 mg/L*	Not inhibitory to bacterial respiration
Chronic toxicity		
Fish	9 d NOEC = 0.355 mg/L*	Harmful to fish
Daphnia	21 d NOEC = 0.201 mg/L*	Harmful to *Daphnia*
Algae	72 h E_rC10 > 64.3 mg/L*	Not harmful to algae

* Concentration based on the active components

Based on the above acute ecotoxicological endpoints for the notified chemical, it is expected to be very toxic to aquatic invertebrates and toxic to fish; it is not expected to be harmful to algae up to the limit of its water solubility. Therefore, under the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS) (United Nations, 2009), the notified chemical is formally classified as "Acute Category 1; Very toxic to aquatic life". Based on the above chronic ecotoxicological endpoint for the notified chemical and its ready biodegradability, the notified chemical is formally classified as "Chronic Category 3; Harmful to aquatic life with long lasting effects".

7.2.1. Predicted No-Effect Concentration

The predicted no-effects concentration (PNEC) has been calculated from the most sensitive chronic ecotoxicological endpoint for daphnids. A safety factor of 10 was used given chronic endpoints for three trophic levels are available.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
NOEC (*Daphnia*, 21 d)	0.201	mg/L
Assessment Factor	10	
Mitigation Factor	1.00	
PNEC:	20.10	µg/L

7.3. Environmental Risk Assessment

The Risk Quotient (Q = PEC/PNEC) has been calculated based on the predicted PEC and PNEC.

Risk Assessment	PEC µg/L	PNEC µg/L	Q
Q - River	0.818	20.10	**0.041**
Q - Ocean	0.082	20.10	**0.004**

The risk quotient for discharge of treated effluents containing the notified chemical to the aquatic environment indicates that the notified chemical is unlikely to reach ecotoxicologically significant concentrations in surface waters, based on its maximum annual importation quantity. The notified chemical is readily biodegradable, and is expected to have a low potential for bioaccumulation. On the basis of the PEC/PNEC ratio, maximum annual importation volume and assessed use pattern in cosmetics and household cleaning formulations, the notified chemical is not expected to pose an unreasonable risk to the environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Melting Point 50 °C

Method	OECD TG 102 Melting Point/Melting Range. EC Council Regulation No 440/2008 A.1 Melting/Freezing Temperature.
Remarks	Differential scanning calorimetry (DSC) and capillary method
Test Facility	Siemens AG (2013a)

Boiling Point Decomposes without boiling

Method	OECD TG 103 Boiling Point. EC Council Regulation No 440/2008 A.2 Boiling Temperature.
Remarks	DSC and capillary method. The test substance decomposed before boiling
Test Facility	Siemens AG (2013a)

Relative Density 1,100 kg/m^3 at 22.8 °C

Method	OECD TG 109 Density of Liquids and Solids. EC Council Regulation No 440/2008 A.3 Relative Density.
Remarks	Gas comparison pycnometer method
Test Facility	Siemens AG (2013b)

Vapour Pressure 6.5×10^{-6} kPa at 20 °C
7.1×10^{-6} kPa at 25 °C
1.0×10^{-5} kPa at 50 °C

Method	OECD TG 104 Vapour Pressure. EC Council Regulation No 440/2008 A.4 Vapour Pressure.
Remarks	Vapour pressure balance (Effusion method)
Test Facility	Siemens AG (2013c)

Water Solubility 0.0071 ± 0.0032 g/L at pH 5.76 at 20 °C
0.0057 ± 0.0026 g/L at pH 5.76at 20 °C (active content)

Method	ISO 4311
Remarks	Water solubility as the determination of critical micelle concentration via surface tension by the plate method
Test Facility	Clariant (2013a)

Fat (or n-octanol) Solubility 47 g/L at 20 °C

Method	OECD TG 105 Flask Method
Remarks	Flask method adapted for n-octanol
Test Facility	Clariant (2013b)

Partition Coefficient (n-octanol/water) log Pow = 3.80 at pH 5.76 at 20 °C

Method	OECD TG 105 and ISO 4311
Remarks	Calculated from the individual solubilities of the notified chemical in n-octanol and water
Test Facility	Clariant (2013c)

Surface Tension 38.32 mN/m at 20 °C

Method	OECD TG 115 Surface Tension of Aqueous Solutions. EC Council Regulation No 440/2008 A.5 Surface Tension.
Remarks	Concentration: 6.39 mg/L
Test Facility	Siemens AG (2013d)

Flammability Not highly flammable

Method EC Council Regulation No 440/2008 A.10 Flammability (Solids)
Test Facility Siemens AG (2013e)

Autoignition Temperature > 400 °C

Method EC Council Regulation No 440/2008 A.16 Relative Self-Ignition Temperature for Solids.
Remarks The test substance showed an endothermic effect in the range of 50 – 140 °C. No autoignition temperature was observed up to the maximum test temperature of 402 °C.
Test Facility Siemens AG (2013f)

APPENDIX B: TOXICOLOGICAL INVESTIGATIONS

B.1. Acute toxicity – oral

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 423 Acute Oral Toxicity – Acute Toxic Class Method EC Council Regulation No 440/2008 B.1 tris Acute Oral Toxicity – Acute Toxic Class Method
Species/Strain	Rat/WISTAR Crl: WI(Han)
Vehicle	Corn oil
Remarks - Method	No significant deviation of protocol was noted. The purity of the test substance was report as 80.4%.

RESULTS

Group	*Number and Sex of Animals*	*Dose (mg/kg bw)*	*Mortality*
Step 1	3 F	2,000	0/3
Step 2	3 F	2,000	0/3

LD50	LD50 > 2,000 mg/kg bw
Signs of Toxicity	No mortality was noted during the study. The relevant clinical findings in the animals treated with the test substance at a dose of 2,000 mg/kg bw were reduced spontaneous activity, wasp waist, piloerection and kyphosis. The test animals recovered from all symptoms by day 3. Throughout the 14-day observation period, the body weight gain of the test animals was within the normal range of variation.
Effects in Organs	At necropsy, no treatment-related macroscopic findings were observed in test animals.
Remarks - Results	Under the conditions of the study, a single oral application of the test substance to rats at a dose of 2,000 mg/kg bw was associated with signs of toxicity but with no mortality.

CONCLUSION	The notified chemical is of low toxicity via the oral route.
TEST FACILITY	BSL (2014a)

B.2. Acute toxicity – dermal

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 402 Acute Dermal Toxicity – Limit Test EC Council Regulation No 440/2008 B.3 Acute Toxicity (Dermal) – Limit Test
Species/Strain	Rat/WISTAR Crl: WI(Han)
Vehicle	Corn oil (for moistening only)
Type of dressing	Semi-occlusive
Remarks - Method	No significant deviation of protocol was noted. The purity of the notified chemical was reported as 80.4%.

RESULTS

Group	*Number and Sex of Animals*	*Dose (mg/kg bw)*	*Mortality*
1	5 M	2,000	0/5
2	5 F	2,000	0/5

LD50	> 2,000 mg/kg bw

Signs of Toxicity - Local	Erythema was observed in 6 of 10 test animals. Eschar was observed in 9 of 10 test animals. Scratches were observed in 4 of 10 test animals. No oedema was observed. All signs of irritation were reversible within the observation period.
Signs of Toxicity - Systemic	No treatment-related effects were observed. The male test animals showed weight gain during the observation.
Effects in Organs	No treatment-related effects were observed.
Remarks - Results	Under the conditions of the test, the notified chemical was not associated with mortality and signs of toxicity, although local irritation effects were recorded.
CONCLUSION	The notified chemical is of low toxicity via the dermal route.
TEST FACILITY	BSL (2014b)

B.3. Irritation – skin (*in vitro*)

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 439 *In Vitro* Skin Irritation: Reconstructed Human Epidermis Test Method EC Commission Regulation No 640/2012 B.46. *In Vitro* Skin Irritation: - Reconstructed Human Epidermis Test Method
Vehicle	None. The test substance was applied undiluted.
Remarks - Method	No significant deviation of the protocol was noted. The EPISKIN-Standard Model™ (EPISKIN-SM™), a reconstituted three-dimensional human epidermis model, was used in the test. Phosphate buffered saline was used as a negative control. The purity of the test substance was reported as 80.4%.

RESULTS

Test material	*Mean OD_{550} of triplicate tissues*	*Relative mean Viability (%)*	*SD of relative mean viability*
Negative control	0.962	100	1.2
Test substance	0.861	89.5	17.4
Positive control	0.059	6.2	4.0

OD = optical density; SD = standard deviation

Remarks - Results	The relative mean tissue viability after 15 minutes of exposure and 42 hours post incubation was > 50%.
CONCLUSION	The notified chemical was a non-irritant under the conditions of the test.
TEST FACILITY	BSL (2013a)

B.4. Irritation – eye (*in vitro*)

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 437 Bovine Corneal Opacity and Permeability Test Method for Identifying Ocular Corrosives and Severe Irritants
Vehicle	Physiological saline (0.9% sodium chloride in water)
Remarks - Method	No significant deviation of the protocol was noted. The purity of the test substance was reported at 80.4%.

RESULTS

Test material	*Mean opacity of triplicate tissues*	*Mean permeability of triplicate tissues (OD490)*	*IVIS*
Vehicle control	1.00	0.013	1.20
*Test substance**	3.00	0.031	3.47
*Positive control**	195.33	2.057	226.18

IVIS (in vitro irritancy score) = mean opacity value + (15 × mean permeability OD490 value)
*Corrected for background values

Remarks - Results: The IVIS of the test substance is < 55 and is therefore not a severe eye irritant. However the notified chemical may present as a mild irritant.

CONCLUSION: The notified chemical was not a severe eye irritant under the conditions of the test.

TEST FACILITY: BSL (2013b)

B.5. Irritation – eye

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 405 Acute Eye Irritation/Corrosion
EC Council Regulation No 440/2008 B.5 Acute Toxicity (Eye Irritation)

Species/Strain: Rabbit/New Zealand White Crl: KBL (NZW)
Number of Animals: 3
Observation Period: extended up to 7 days for reversibility
Remarks - Method: No significant deviation of the protocol was noted. The purity of the test substance was reported as 80.4%.

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	1.3	1.00	0.00	2	< 7 d	0
Conjunctiva: chemosis	0.3	0.00	0.00	1	< 48 h	0
Conjunctiva: discharge	0.3	0.00	0.00	1	< 48 h	0
Corneal opacity	0.00	0.00	0.00	0	-	0
Iridial inflammation	0.00	0.00	0.00	0	-	0

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

Remarks - Results: All irritation effects were reversed in 7 days.

CONCLUSION: The notified chemical is slightly irritating to the eye.

TEST FACILITY: BSL (2014c)

B.6. Skin sensitisation

TEST SUBSTANCE: Notified chemical

METHOD: OECD TG 406 Skin Sensitisation – Guinea Pig Maximisation Test
EC Commission Regulation 440/2008 B.6 Skin Sensitisation – Guinea Pig Maximisation Test

Species/Strain: Guinea pig/Albino, Dunkin Hartley
PRELIMINARY STUDY: Maximum Non-irritating Concentration:
Intradermal 20%
Topical 2%

MAIN STUDY

Number of Animals	Test Group: 10 Control Group: 5
Vehicle	Propylene glycol
Positive control	Not conducted in parallel with the test substance, but provided as a separate reliability check previously conducted in the test laboratory using α-hexylcinnamaldehyde
INDUCTION PHASE	Induction Concentration: Intradermal 20% Topical 2%
Signs of Irritation	Signs of necrosis on intradermal injection were observed in all test animals. Erythema was noted in test animals after topical induction.
CHALLENGE PHASE	Topical 2%
Remarks - Method	The purity of the test substance was reported as 67.3%.

RESULTS

Animal	*Challenge Concentration (%)*	*Number of Animals Showing Skin Reactions after Challenge* *24 h*	*48 h*
Test Group	2	0	0
Control Group	2	0	0

Remarks - Results	Only scaliness was noted at challenge with the test substance at 2% concentration. Scaliness was also found in one control animal.

CONCLUSION There was no evidence of reactions indicative of skin sensitisation to the notified chemical under the conditions of the test.

TEST FACILITY WIL (2013)

B.7. Repeat dose oral toxicity

TEST SUBSTANCE Notified chemical

METHOD OECD TG 407 Repeated Dose 28-day Oral Toxicity Study in Rodents
EC Council Regulation No 440/2008 B.7 Repeated Dose (28 Days) Toxicity (Oral)

Species/Strain	Rat/Wistar Crl: WI(Han)
Route of Administration	Oral – gavage
Exposure Information	Total exposure days: 28 days Dose regimen: 7 days per week Post-exposure observation period: 14 days
Vehicle	Corn oil
Remarks - Method	No significant deviation of the protocol was noted. The purity of the substance was reported at 80.4%.

RESULTS

Group	*Number and Sex of Animals*	*Dose (mg/kg bw/day)*	*Mortality*
Control	5 M/5 F	0	0/10
Low Dose	5 M/5 F	125	0/10
Mid Dose	5 M/5 F	300	0/10
High Dose	5 M/5 F	650	0/10
Control Recovery	5 M/5 F	0	0/10
High Dose Recovery	5 M/5 F	650	0/10

Mortality and Time to Death
No mortality occurred in the control and dose groups during treatment and recovery.

Clinical Observations
All test animals of the mid and high dose groups showed signs of salivation and moving the bedding, which

were considered to be treatment relevant. These clinical signs were observed immediately after the treatment and were therefore not considered by the study authors to be a systemic effect but more likely a local effect.

There were isolated signs of diarrhoea, nasal discharge, piloerection, eschar and alopecia in various groups. These clinical signs were transient in appearance and were considered by the study authors to have no toxicological relevance.

There was transient increase or decrease in body weight gain without statistical significance in all dose groups during the treatment and recovery. These changes were not considered by the study authors to have biological relevance.

In female test animals, the food consumption was increased during the treatment when compared to corresponding control. This difference was transient and was not considered by the study authors to be test substance-related.

Laboratory Findings – Clinical Chemistry, Haematology, Urinalysis

Clinical Biochemistry

In both male and female test animals, there were no adverse changes of toxicological relevance noted for the measured clinical biochemistry parameters.

However, following effects were reported in the study:

- statistically significant increase of mean alkaline phosphatase value in the males of the low dose group
- statistically significant decrease of mean aspartate-aminotransferase in the females of the mid dose and high dose groups
- statistically significant decrease of mean total protein in the females of the high dose group correlated to slightly decrease in mean albumin
- marginal increase of mean alkaline phosphatase in males of the mid dose and high dose groups
- marginal increase of total bile acids in the males of all treatment groups
- marginal increase of total bile acids and decrease of sodium content in females of the high dose group

These were not considered by the study authors to have adverse toxicological relevance due to the absence of associated macroscopic or microscopic findings in liver and kidney.

Haematology and Blood Coagulation

In both male and female test animals, there were no statistically or biologically significant changes of toxicological relevance noted for the measured haematological and blood coagulation parameters.

Following changes were noted in the study:

- moderate increase of mean eosinophil values in the treatment groups in males at the end of treatment with no dose response
- marginal increase of mean white blood cell count in females of the treatment groups

These changes were considered by the study authors to have no biological relevance.

Urinalysis

All urinary parameters were in the normal range of variation and no noticeable differences between the treatment groups and the control groups were observed.

However, at the end of treatment, there were increased erythrocyte level in 1 female of the mid dose group and marginally increased ketamine, erythrocyte and leucocyte value in 1 female of the high dose group. At the end of recovery, increased erythrocyte level were found in 2 males of the recovery high dose group. There were also marginally increased leukocyte level in 2 males and marginally increased bilirubin, ketamine and protein levels in 1 male of the recovery high dose group. In the absence of associated pathological changes, these differences were not considered by the study authors to be treatment related.

Effects in Organs

It was concluded by the study authors that there were no gross lesions and microscopic lesions that could be attributed to treatment with the test substance, and all microscopic findings recorded were within the range of

normal background lesions.

There were slightly decreased and increased mean pituitary gland weights (absolute and relative) in males and females, respectively in all dose groups. In males, the absolute pituitary weights of all dose and control groups were within the historical control range and in females the mean and most individual absolute pituitary weights were slightly higher than the historical control range. In the absence of macroscopical and histopathological findings, no relevance to the treatment was considered by the study authors.

Remarks – Results
The study authors concluded that there were no adverse effects of the test substance found up to a dose level of 650 mg/kg bw/day.

CONCLUSION
The No Observed Adverse Effect Level (NOAEL) was established as 650 mg/kg bw/day in this study, based on the highest dose tested with no obvious adverse effects observed.

TEST FACILITY BSL (2014d)

B.8. Genotoxicity – bacteria

TEST SUBSTANCE Notified chemical

METHOD OECD TG 471 Bacterial Reverse Mutation Test.
EC Council Regulation No 440/2008 B.13/14 Mutagenicity – Reverse Mutation Test using Bacteria.
Plate incorporation procedure and pre incubation procedure

Species/Strain	*S. typhimurium*: TA1535, TA1537, TA98, TA100 and TA102	
Metabolic Activation System	S9 microsomal fraction of male rat liver induced with phenobarbital and β-naphthoflavone	
Concentration Range in Main Test	a) With metabolic activation:	3.16 – 5,000 µg/plate
	b) Without metabolic activation:	1.00 – 5,000 µg/plate
Vehicle	DMSO	
Remarks - Method	No significant deviation of the protocol was recorded. The purity of the test substance was reported as 67.3%. Preliminary test for cytotoxicity was conducted on strains TA98 and TA100. Sterile water was used as a negative control in parallel with the solvent (DMSO) control.	

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/plate) Resulting in:* *Cytotoxicity in Preliminary Test*	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	≥ 316	≥ 31.6	≥ 5,000	Negative
Test 2		≥ 31.6	> 5,000	Negative
Present				
Test 1	≥ 1,000	≥ 100	≥ 5,000	Negative
Test 2		≥ 316	> 5,000	Negative

Remarks - Results

No biologically relevant increases in revertant colony numbers of any of the five tester strains were observed during the test in either the presence or absence of metabolic activation.

In TA 98, the higher spontaneous reversion frequency with metabolic activation in Test 1 and the lower spontaneous reversion frequency without metabolic activation in Test 2 were regarded by the study authors as not biologically relevant and did not influence the validity of the results.

The positive controls induced a distinct increase of revertant colonies during the study indicating the validity of the test system.

CONCLUSION The notified chemical was not mutagenic to bacteria under the conditions of the test.

TEST FACILITY BSL (2012)

B.9. Genotoxicity – *in vitro*

TEST SUBSTANCE Notified chemical

METHOD OECD TG 476 *In vitro* Mammalian Cell Gene Mutation Test.
EC Commission Regulation No 440/2008 B.17 Mutagenicity - *In vitro* Mammalian Cell Gene Mutation Test.

Species	Chinese Hamster
Cell Type/Cell Line	V79
Metabolic Activation System	S9 microsomal fraction of male rat liver induced with phenobarbital and β-naphthoflavone
Vehicle	DMSO (diluted with MEM for 4 hour treatment and MEM with 10% FBS for 20 hour treatment)
Remarks - Method	No significant deviation of the protocol was noted. The purity of the test substance was reported as 67.3%. The V79 cells were tested with the test substance for potential to induce mutations at the HPRT locus. Treatment medium and DMSO were taken negative and solvent controls respectively. Extra solvent control at 1% v/v was added.

Metabolic Activation	*Test Substance Concentration (μM)*	*Exposure Period*	*Expression Time*	*Selection Time*
Absent				
Test 1	0.10, 0.25, 0.5, 1, 4, 6, 8, 10, 12, 14	4 h	48-72 h	1 week
Test 2	15, 20, 27.5, 35, 42.5, 50, 90, 100, 140	20 h	48-72 h	1 week
Present				
Test 1	1.1, 2.8, 5.6, 11, 28, 56, 111, 167, 222	4 h	48-72 h	1 week
Test 2	0.75, 1.5, 4, 7.5, 15, 40, 100, 150, 210	4 h	48-72 h	1 week

All cultures were selected for metaphase analysis

RESULTS

Metabolic Activation	*Test Substance Concentration (μM) Resulting in:* *Cytotoxicity in Preliminary Test*	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	≥ 10	≥ 10	> 14	Equivocal
Test 2	> 35	≥ 90	> 140	Negative
Present				
Test 1	≥ 316	≥ 167	> 222	Negative
Test 2	-	≥ 150	> 210	Negative

Remarks - Results No biologically relevant increase of mutants was found after treatment with the test substance, except in Test 1 at the highest concentration of 14 μM without metabolic activation where increased mutants with a mutation factor of 3.31 were observed. This increase of mutants was accompanied by a strong cytotoxicity effect and could not be confirmed in the second experiment and therefore was not considered by the study authors to be biologically relevant.

CONCLUSION The notified chemical was not clastogenic to Chinese hamster V79 cells treated *in vitro* under the conditions of the test.

TEST FACILITY BSL (2013e)

B.10. Genotoxicity – *in vivo*

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 474 Mammalian Erythrocyte Micronucleus Test EC Council Regulation No 440/2008 B.12 Mutagenicity - Mammalian Erythrocyte Micronucleus Test
Species/Strain	Mouse/NMRI
Route of Administration	Oral – gavage
Vehicle	Sterile water
Remarks - Method	No significant deviation of the protocol was noted. The purity of the test substance was reported as 67.3%.

Group	*Number and Sex of Animals*	*Dose (mg/kg bw)*	*Sacrifice Time (hours)*
I (vehicle control)	5 M/5 F	0	44
II (low dose)	5 M/5 F	400	44
III (mid dose)	5 M/5 F	1,000	44
IV (high dose)	5 M/5 F	2,000	44
V (positive control, CP)	5 M/5 F	40	44
VI (vehicle control)	5 M/5 F	0	68
VII (high dose)	5 M/5 F	2,000	68

CP = cyclophosphamide

RESULTS	
Doses Producing Toxicity	The animals treated with doses of 400 and 1,000 mg/kg bw showed no signs of systemic toxicity. The animals treated with a dose of 2,000 mg/kg bw showed mild signs of systemic toxicity including reduction of spontaneous activity, piloerection and half eyelid closure.
Genotoxic Effects	No biologically relevant increase of micronuclei was found after treatment with the test substance in any of the dose groups evaluated.
Remarks - Results	Cyclophosphamide at 40 mg/kg bw administered through intraperitoneal injection induced a significant increase in micronucleus frequency, demonstrating the validity of the test system.
CONCLUSION	The notified chemical was not clastogenic under the conditions of this *in vivo* mammalian erythrocyte micronucleus test.
TEST FACILITY	BSL (2013d)

B.11. Reproductive/developmental toxicity screening

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 421 Reproduction/Developmental Toxicity Screening Test
Species/Strain	Rat/Wistar Crl: WI(Han)
Route of Administration	Oral – gavage
Exposure Information	Exposure days: 28 days for male and 54 days for female. Post-exposure observation period: None
Vehicle	Corn oil
Remarks - Method	No significant deviation of protocol was noted. After 14 days of treatment to both male and female, animals were mated (1:1) for a maximum of 14 days. After the confirmation of the mating, females were separated and housed individually. Each litter was examined as soon as possible after delivery of the dam. Live pups were checked for number, sex and litter weight within 24 hours of parturition and on day 4 post-partum.

The purity of the test substance was reported as 80.4%.

RESULTS

Group	*Number of Animals*	*Dose (mg/kg bw/day)*	*Mortality*
Control	10 M/10 F	0	0/20
Low dose	10 M/10 F	125	0/20
Medium dose	10 M/10 F	300	1/20
High dose	10 M/10 F	650	0/20

Mortality and Time to Death

There was no mortality due to the treatment. However, one female of medium dose group was sacrificed prematurely for animal welfare reasons due to the presence of tumour mass found in the region of the left flank, which was considered by the study authors to be of a spontaneous nature.

Effects on Parental animals:

Clinical toxicity signs

There were cases of salivation and moving the bedding in most males and females of the treatment groups immediately after the administration and were assumed by the study authors to be due to discomfort and not to be an adverse effect. There were also transient incidences of reddish nasal discharge, slight to moderate abnormal breathing, moderate to severe piloerection and aggressive behaviour in a few isolated males and females of the medium and high dose groups. These clinical signs, being transient and limited to isolated incidences, were not considered by the study authors to be an adverse effect.

In males there was statistically significantly decrease of body weight gain in the medium and high dose groups, correlated to a decrease of food consumption. However, no toxicological relevance was attributed to these findings. In females, there were no effects of the treatment on body weight and body weight gain observed during the treatment.

Reproductive effects in females

There were no treatment-related effect observed for the duration of precoital and the duration of gestation. All pregnancies resulted in normal births.

There was increased percent pre- implantation loss in all treatments with statistical significance in the low and medium dose groups. In the absence of obvious dose response, this finding was not considered by the study authors to be an adverse effect.

No effects of the treatment were observed for the pre- and post-natal data including number of corpora lutea, number of implantation loss, number of live pups and percent post implantation loss.

There were no effects of the treatment observed for copulation, fertility, delivery and viability indices. Successful mating resulted in 100% pregnancies in the control, medium and high dose groups, and 90% pregnancy in the low dose group. A reduced fertility index in the low dose group (90%) was considered by the study authors to be incidental due to the absence of dose response. The viability index was slightly reduced in the low and medium dose groups. However, it was within the normal range of biological variation.

In the necropsy, there was a marginal decrease of absolute and relative uterus (with cervix) weight in the high dose group with no statistical significance.

Reproductive effects in males

There was a statistically significant increase (26.5%) of relative prostate weight (including the weight of seminal vesicle and coagulating glands) in the medium dose group. In the absence of histopathological changes, these findings were not considered by the study authors to be adverse.

There were no treatment-related effects on the completeness of stages or cell populations of the testes. Spermatid retention and/or Sertoli cell vacuolation were recorded at a minimal severity in some animals from both of the control and the high dose groups and in two animals of the medium dose group. All the findings were considered by the study authors to be of spontaneous nature and not related to the treatment.

Effects on Litter Size

There were no effects of the treatment observed for litter data including total number of pups born, number of still births and sex ratio. There were no statistically significant differences in litter data observed between the treatment and the control groups. However, there was a very slight decrease in the number of male and female pups in all the treatment groups with no statistical significance and dose response.

There was a statistically significant increase of group mean pup weight in the low dose group. In the absence of dose response, this was not considered by the study authors to be of biological relevance.

There was a marginally decrease of female litter weight in all the treatment groups. This decrease was not statistically significant and therefore was not considered by the study authors to be an effect of the treatment.

Effects on Foetus

There was no test substance-related effect on the survival of the pups in the treatment groups. However, one pup each from two dams was missing on post natal days 2 and 3, respectively. These missing pups were attributed to the cannibalism by the dams. This finding was considered by the study authors to be incidental.

There were no significant treatment-related gross external findings observed in the treatment groups, apart from a few isolated incidences of dark spots and small wounds.

Remarks - Results

There were no adverse effects of the test substance on adult male and female animals and reproductive parameters. The NOAEL for the reproductive toxicity was established at 650 mg/ kg bw/day.

There was an increase in percent pre implantation loss in the low, medium and high dose groups, achieving statistical significance in the low and medium dose groups. In the absence of obvious dose response and statistical significance in the high dose group, and with the finding within the range of historical controls, it was not considered by the study authors to be an adverse effect. The NOAEL for the developmental toxicity was established as 650 mg/ kg bw/day.

CONCLUSION

The No Observed Adverse Effect Level (NOAEL) was established as 650 mg/kg bw/day for both the reproductive and developmental toxicity in this study, based on the highest dose tested with no adverse effects observed.

TEST FACILITY BSL (2014e)

APPENDIX C: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

C.1. Environmental Fate

C.1.1. Ready biodegradability

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 301 B Ready Biodegradability: CO2 Evolution Test
Inoculum	Activated sludge
Exposure Period	28 days
Auxiliary Solvent	None
Analytical Monitoring	Theoretical Carbon Dioxide ($ThCO_2$)
Remarks - Method	No significant deviations to the test protocol were reported.

RESULTS

Test substance		*Sodium benzoate*	
Day	*% Degradation*	*Day*	*% Degradation*
6	18-23	6	57
14	44-52	14	85
21	54-60	21	94
29*	60-65	29*	100

* Corrected for the last gas wash

Remarks - Results	All validity criteria for the test were satisfied. The percentage degradation of the reference compound, surpassed the threshold level of 60% by 8 days (68%). Therefore, the tests indicate the suitability of the inoculums. The percentage degradation of the toxicity control surpassed the threshold level of 25% by 6 days (31%; 75% in 28 days), showing that toxicity was not a factor inhibiting the biodegradability of the test substance. The degree of degradation of the test substance after 28 days was 60-65%, and a degradation plateau was not achieved. As the test substance is surface active, the 10-day window is not applicable. Therefore, the test substance is considered to be readily biodegradable according to the OECD (301 B) guideline.
CONCLUSION	The notified chemical is readily biodegradable.
TEST FACILITY	Dr U Noack-Laboratorien (2013)

C.2. Ecotoxicological Investigations

C.2.1. Acute toxicity to fish

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 203 Fish, Acute Toxicity Test – Semi-Static
Species	*Danio rerio* (zebrafish)
Exposure Period	96 hours
Auxiliary Solvent	None
Water Hardness	10-250 mg $CaCO_3$/L
Analytical Monitoring	LC-MS/MS
Remarks – Method	No significant deviations to the test protocol were reported.

RESULTS

Concentration mg/L		Number of Fish	Cumulative Mortality (%)			
Nominal	*Actual**		*24 h*	*48 h*	*72 h*	*96 h*
Control	Control	7	0	0	0	0
0.444	0.0684	7	0	0	0	0
0.888	0.411	7	0	0	0	0
1.78	1.12	7	0	0	0	0
3.55	Not determined	7	57	100	100	100
7.10	Not determined	7	100	100	100	100

* Measured values for the C18-unsaturated fraction at 96 h

LC50	2.02 mg/L at 96 hours
NOEC	1.43 mg/L at 96 hours
Remarks – Results	All validity criteria for the test were satisfied. The test solutions were not renewed during the 96 h test period. The actual concentrations of the test substance were measured at 0 and 96 h during the 96 h test period. The 96 h LC50 and NOEC for fish were determined to be 2.02 mg/L and 1.43 mg/L of the active component, respectively, based on the nominal concentration.

CONCLUSION Under the study conditions, the notified chemical is considered to be toxic to fish.

TEST FACILITY Dr U Noack-Laboratorien (2014a)

C.2.2. Chronic toxicity to fish

TEST SUBSTANCE Notified chemical

METHOD OECD TG 212 Fish, Short-term Toxicity Test on Embryo and Sac-Fry Stages – Semi-Static

Species	*Danio rerio* (zebrafish)
Exposure Period	9 days (5 days post-hatch)
Auxiliary Solvent	None
Water Hardness	50-53 mg $CaCO_3$/L
Analytical Monitoring	LC-MS/MS
Remarks – Method	The definitive test was conducted at the nominal concentrations of 0.0444, 0.0888, 0.178, 0.355, and 0.710 mg/L of the test substance. No significant deviations to the test protocol were reported.

RESULTS

Concentration mg/L		Number of Eggs	Mortality post-hatch day 5 (%)
Nominal	*Actual**		
Control	Control	30	0
0.0444	0.0101	30	0
0.0888	0.0250	30	3
0.178	0.0694	30	3
0.355	0.157	30	3
0.710	0.335	30	60

* Measured values for the C18-unsaturated fraction at the end of first exposure interval of day 2

NOEC	0.355 mg/L at 9 days.
Remarks – Results	All validity criteria for the test were satisfied. The test solutions were renewed every 48-72 h during the 9 d test period. Some larvae showed morphological and behavioural effects at the highest test concentration after Days 5 and 6 of the study. The 9 d NOEC for fish was determined to be 0.355 mg/L, based on nominal concentrations.

CONCLUSION	Under the study conditions, the notified chemical is considered to be harmful to fish on a chronic basis.
TEST FACILITY	Dr U Noack-Laboratorien (2014b)

C.2.3. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 202 *Daphnia sp*. Acute Immobilisation Test and Reproduction Test – Semi-Static
Species	*Daphnia magna*
Exposure Period	48 hours
Auxiliary Solvent	None
Water Hardness	160-180 mg $CaCO_3$/L
Analytical Monitoring	LC-MS/MS
Remarks - Method	The definitive test was conducted at the nominal concentrations of 0.71, 1.26, 2.25, 3.99, and 7.1 mg/L of the test substance, which corresponds to 0.528, 0.936, 1.67, 2.96, and 5.28 mg/L of the active components. A total of 20 daphnids (5 daphnids/replicate across 4 replicates) were used. No significant deviations to the test protocol were reported.

RESULTS

Concentration mg/L		*Number of D. magna*	*Cumulative Immobilised (%)*	
Nominal	*Actual*[*]		*24 h*	*48 h*
Control	Control	20	0	0
0.71	0.344	20	0	10
1.26	0.686	20	20	90
2.25	1.19	20	50	100
3.99	2.11	20	45	100
7.1	3.74	20	55	100

[*] Measured values for the C18-unsaturated fraction at 48 h

EC50	0.8 mg/L at 48 hours
NOEC	0.6 mg/L at 48 hours
Remarks - Results	All validity criteria for the test were satisfied. The test solutions were renewed every 24 h during the 48 h test period. The actual concentrations of the test substance were measured at 0 and 48 hours during the 48 h test period. The 48 h EC50 and NOEC for daphnids were determined to be 0.8 mg/L and 0.6 mg/L respectively based on the nominal concentrations of the active components.
CONCLUSION	Under the study condition, the notified chemical is considered to be very toxic to aquatic invertebrates.
TEST FACILITY	Dr U Noack-Laboratorien (2014c)

C.2.4. Chronic toxicity to aquatic invertebrates

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 211 *Daphnia magna* Reproduction Test – Semi-Static
Species	*Daphnia magna*
Exposure Period	21 days
Auxiliary Solvent	None
Water Hardness	160-180 mg $CaCO_3$/L
Analytical Monitoring	LC-MS/MS
Remarks - Method	The definitive test was conducted at the nominal concentrations of 0.0625, 0.125, 0.25, 0.5, and 1 mg/L of the test substance, which corresponds to

0.0503, 0.101, 0.201, 0.402, and 0.804 mg/L of the active components. A total of 20 daphnids (5 daphnids/replicate across 4 replicates) were used. No significant deviations to the test protocol were reported.

RESULTS

	Nominal Test Concentration (mg/L)					
	Control	*0.0503*	*0.101*	*0.201*	*0.402*	*0.804*
Total No. of Offspring Released by Survived *Daphnia*	94 ± 4	84 ± 10	86 ± 10	85 ± 10	74 ± 12	11 ± 6
Body Lengths of Surviving Adults (mm)	5.08	5.05	4.95	4.97	4.97	4.53
Survival (%)	100	100	100	90	90	80

NOEC 0.201 mg/L at 21 days

Remarks - Results All validity criteria for the test were satisfied. The test solutions were renewed every 24 hours during the 21 d test period. The actual concentrations of the test substance were measured at 0 and 21 days during the 21 d test period. The reproductive output was significantly reduced at the two highest concentrations of the test substance as compared to the control. The 21 d EC50 and NOEC were determined to be 0.474 mg/L and 0.201 mg/L respectively based on nominal concentrations of the active components.

CONCLUSION Under the conditions of the study, the notified chemical is considered to be harmful to aquatic invertebrates on a chronic basis.

TEST FACILITY Dr U Noack-Laboratorien (2014d)

C.2.5. Algal growth inhibition test

TEST SUBSTANCE Notified chemical

METHOD OECD TG 201 Freshwater Alga and Cyanobacteria, Growth Inhibition Test.

Species *Desmodesmus subspicatus* (green alga)

Exposure Period 72 hours

Concentration Range Nominal: 5-80 mg/L (up to 64.3 mg/L of the active components)
Actual: 2.68-61.4 mg/L of the active components

Auxiliary Solvent None

Water Hardness 0.24 mmol Ca + Mg/L

Analytical Monitoring LC-MS/MS

Remarks - Method No significant deviations to the test protocol were reported.

RESULTS

Biomass		*Growth*	
E_bC50 mg/L at 72 h	*E_bC10 mg/L*	*E_rC50 mg/L at 72 h*	*E_rC10 mg/L*
> 64.3	> 64.3	> 64.3	> 64.3

Remarks - Results All validity criteria for the test were satisfied. The test solutions were not renewed during the 72 h test period. The actual concentrations of the test substance were measured at 0 and 72 hours during the 72 h test period. The 72 h E_bC50 and E_rC50 were both determined to be > 64.3 mg/L of the active components, based on the nominal concentration. The 72 h E_bC10 and E_rC10 were both determined to be > 64.3 mg/L of the active components.

CONCLUSION Under the study conditions, the notified chemical is not considered to be harmful to algae up to the limit of its solubility in water.

TEST FACILITY	Dr U Noack-Laboratorien (2014e)

C.2.6. Inhibition of microbial activity

TEST SUBSTANCE	Notified chemical
METHOD	OECD TG 209 Activated Sludge, Respiration Inhibition Test.
Inoculum	Activated sludge
Exposure Period	3 hours
Concentration Range	Nominal: 10-5000 mg/L Actual: Not determined
Remarks – Method	No significant deviation in protocol. Copper (II) sulphate pentahydrate was used as the reference control. The respiration rate was determined by measurement of Biochemical Oxygen Demand during the test after 3 hours of exposure.
RESULTS	
IC50	> 4023 mg/L of the active components
NOEC	8.04 mg/L of the active components
Remarks – Results	All validity criteria for the test were satisfied. No significant inhibition of respiration rates was observed. The 3 h EC50 was determined to be > 4,023 mg/L based on the nominal concentration.
CONCLUSION	The notified chemical is not inhibitory to microbial activity.
TEST FACILITY	Dr U Noack-Laboratorien (2014f)

BIBLIOGRAPHY

ACI (2010) Consumer Product Ingredient Safety, Exposure and Risk Screening Methods for Consumer Product Ingredients, 2nd Edition, American Cleaning Institute, Washington DC.

BSL (2012) Reverse Mutation Assay using Bacteria (*Salmonella typhimurium*) with [Notified Chemical] (Study No. 124399, November, 2012). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2013a) *In Vitro* Skin Irritation: Human Skin Model Test with C18/18 unsatd.-Glucamide (Study No. 136160, December, 2013). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2013b) Screening for the Eye Irritancy Potential Using the Bovine Corneal Opacity and Permeability Assay with C18/18 unsatd.-Glucamide (Study No. 136161, December, 2013). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2013c) *In vitro* Mammalian Cell Gene Mutation Test (HPRT-Locus) in Chinese Hamster V79 Cells with [Notified Chemical] (Study No. 124405, March, 2013). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2013d) Mammalian Micronucleus Test of Murine Peripheral Blood Cells with [Notified Chemical] (Study No. 124408, August, 2013). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2014a) Acute Oral Toxicity (Acute Toxic Class Method) with C18/18 unsatd.-Glucamide (Study No. 136156, January, 2014). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2014b) Acute Dermal Toxicity (Limit Test) with C18/18 unsatd.-Glucamide (Study No. 136157, January, 2014). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2014c) Acute Eye Irritation/Corrosion with C18/18 unsatd.-Glucamide (Study No. 136159, May, 2014). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2014d) 28-Day Repeated Dose Oral Toxicity Study in Wistar Rats with C18/18 unsatd.-Glucamide including a 14-Day Recovery Period (Study No.: 136162, November, 2014). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

BSL (2014e) Reproduction / Developmental Toxicity Screening Test after Oral Administration in Wistar Rats with C18/18 unsatd.-Glucamide (Study No.: 136163, November, 2014). Germany, BSL BIOSERVICE Scientific Laboratories GmbH (Unpublished study report submitted by the notifier).

Cadby, PA, Troy, WR and Vey, MGH (2002) Consumer Exposure to Fragrance Ingredients: Providing Estimates for Safety Evaluation. Regulatory Toxicology and Pharmacology, 36: 246-252.

Clariant (2013a) [Notified chemical]: Solubility in water – Critical micelle concentration (Study no. 13-152215; 28 October 2013). Frankfurt am Main, Germany, Clariant Produkte (Deustchland) GmbH (Unpublished report submitted by the notifier).

Clariant (2013b) [Notified chemical]: Solubility in n-Octanol (Study no. 13-153878; 15 November 2013). Frankfurt am Main, Germany, Clariant Produkte (Deustchland) GmbH (Unpublished report submitted by the notifier).

Clariant (2013c) [Notified chemical]: Partition Coefficient (n-octanol/water) via solubility in water and in n-octanol (Study no. 13-158672; 19 November 2013). Frankfurt am Main, Germany, Clariant Produkte (Deustchland) GmbH (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2013) C18/C18 unsatd.-Glucamide Ready Biodegradability – Modified Sturm Test (Study No. AST15740; 26 November 2013). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2014a) C18/C18 unsatd.-Glucamide Fish (Zebrafish), Acute Toxicity Test, Semi-Static, 96 hours (Study No. FAZ15740; 21 January 2014). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2014b) C18/C18 unsatd.-Glucamide Zebrafish (*Danio rerio*), Short-term Toxicity Test on Embryo and Sac-fry Stages, Semi-Static (Study No. FFZ15740; 26 February 2014). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2014c) C18/C18 Unsatd.-Glucamide Acute Immobilisation Test to *Daphnia magna*, Semi-Static, 48 h (Study No. DAI15740; 13 February 2014). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2014d) C18/C18 unsatd.-Glucamide *Daphnia magna* Reproduction Test, Semi-static, 21 days (Study No. DRE15740; 06 March 2014). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2014e) C18/C18 unsatd.-Glucamide Alga, Growth Inhibition Test with *Desmodesmus subspicatus*, 72 hours (Study No. SSO15740; 13 February 2014). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

Dr U Noack-Laboratorien (2014f) C18/C18 unsatd.-Glucamide Respiration Inhibition Test with Activated Sludge (Study No. BBR15740; 24 January 2014). Sarstedt, Germany, Dr U Noack-Laboratorien (Unpublished report submitted by the notifier).

ECHA (2014) Guidance on Information Requirements and Chemical Safety Assessment Chapter R.7c: Endpoint specific guidance Version 2.0, European Chemicals Agency, Helsinki.

enHealth (2012) Australian Exposure Factor Guidance. Guideline for Determining Human Health Risks from Environmental Hazards, Commonwealth of Australia.

NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.

NTC (National Transport Commission) 2007 Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code), 7th Edition, Commonwealth of Australia

SCCS (2012) Notes of Guidance for testing of Cosmetic Ingredients and Their Safety Evaluation (8th revision). European Commission - Scientific Committee on Consumer Safety.

Siemens AG (2013a) Melting Point A.1. (OECD 102) Boiling Point A.2. (OECD 103) (Project No.: 20130344.01, December, 2013) Frankfurt am Main, Germany, Siemens AG (Unpublished report submitted by the notifier)

Siemens AG (2013b) Relative Density A.3. (OECD 109) (Project No.: 20130344.02, December, 2013) Frankfurt am Main, Germany, Siemens AG (Unpublished report submitted by the notifier)

Siemens AG (2013c) Vapour Pressure A.4. (OECD 104) (Project No.: 20130344.03, December, 2013) Frankfurt am Main, Germany, Siemens AG (Unpublished report submitted by the notifier)

Siemens AG (2013d) Surface Tension A.5. (OECD 115) (Project No.: 20130344.04, December, 2013). Frankfurt am Main, Germany, Siemens AG (Unpublished report submitted by the notifier).

Siemens AG (2013e) Flammability (Solids) A.10. (Project No.: 20130344.05, December, 2013) Frankfurt am Main, Germany, Siemens AG (Unpublished report submitted by the notifier)

Siemens AG (2013f) Auto-Flammability (Solids – Determination of Relative Self-Ignition Temperature) A.16. (Project No.: 20130344.06, December, 2013) Frankfurt am Main, Germany, Siemens AG (Unpublished report submitted by the notifier)

United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE), <http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html >.

WIL (2013) Assessment of Contact Hypersensitivity to [notified chemical] in the Albino Guinea Pig (Maximisation-Test) (Project 502103, April, 2013). The Netherlands, WIL Research Europe B.V. (Unpublished report submitted by the notifier).