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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in PPG4615-002A

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 the Environment, Water, Heritage and the Arts.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full 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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FULL PUBLIC REPORT

Polymer in PPG4615-002A

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
PPG Industries Australia Pty Ltd (ABN: 82 055 500 939)
McNaughton Road
Clayton VIC 3168

AND

Bayer Australia Ltd (ABN: 22 000 138 714)
391-393 Tooronga Road
East Hawthorn VIC 3123

NOTIFICATION CATEGORY
Limited: Synthetic polymer with Mn ≥ 1000 Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Chemical Name; Other Names; Marketing Names; CAS Number; Molecular Formula; Structural Formula; Molecular Weight; Identity of Impurities/Residual Monomers; Additives/Adjuvants; Polymer Constituents; Import Volume; Use Details

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows:
Melting Point; Boiling Point; Density; Vapour Pressure; Water Solubility; Flash Point; Flammability Limits; Autoignition Temperature

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
US EPA (year unknown)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
PPG4615-002A (containing <10% notified polymer)

MOLECULAR WEIGHT
Mn >1000 Da

ANALYTICAL DATA
Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY > 98%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: Clear, slightly yellow liquid

[A] Value is for a solution containing ~70% notified polymer.

Property	Value	Data Source/Justification
Glass Transition Temperature	23°C	No test report.
Boiling Point [A]	~165°C at 101.3 kPa	MSDS
Pour Point [A]	~-20 °C	MSDS
Density [A]	1080 kg/m^3 at 20°C	MSDS
Vapour Pressure	Estimated to be < 1.3x10^{-9} kPa	Based on the molecular weight of > 1000 Da (USEPA, 2007).
Water Solubility	Not measured	Not considered to be water soluble as it contains only hydrophobic functionalities.
Hydrolysis as a Function of pH	Not conducted due to low water solubility.	Not expected to hydrolyse under normal conditions of use in the environment pH range of 4-9 despite the presence of hydrolysable functionalities.
Partition Coefficient (n-octanol/water)	log Pow >4 (test not conducted)	Estimated using EPI v3.20 (2007), USEPA. Expected to partition into the octanol phase rather than the water phase based on low water solubility.
Adsorption/Desorption	Not conducted due to low water solubility.	Expected to be immobile in soil due to its low water solubility and to become associated with soil and sediment.
Dissociation Constant	Not measured	Not conducted due to low water solubility and lack of dissociable functionality.
Particle Size	N/A	Liquid at room temperature.
Flash Point [A]	49°C	MSDS
Flammability	Upper: 10.8% Lower: 1.5%	MSDS Values are for the solvent present in the imported product
Autoignition Temperature [A]	~360°C	MSDS
Explosive Properties [A]	Not expected to be explosive	Contains no explosophores

DISCUSSION OF PROPERTIES

Loss of Monomers, Other Reactants, Additives, Impurities

Not expected to occur under normal conditions of use.

Degradation Products

At temperatures of 110-130 °C, release of some monomeric components may occur.

Reactivity

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

5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported as a component (<10% concentration) in a range of ready-to-use wet paint products.

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

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

PORT OF ENTRY

Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS

Bayer Australia Ltd
PPG Industries Australia Pty Ltd

TRANSPORTATION AND PACKAGING
Products containing the notified polymer will be imported by sea freight in 35kg steel pails. It will then be transported by road from the docks to PPG Australia in Clayton and then to sites around Melbourne and Sydney as required.

USE
The notified polymer will be used as a component of an isocyanate crosslinker resin used in ready-to-use wet paint formulations for coating rigid metal cans. The metal cans may be used in industrial settings or by members of the public.

OPERATION DESCRIPTION
The product containing the notified polymer will be transferred under exhaust ventilation to a reservoir via a mechanical decanting pump. The reservoir will feed onto transfer rollers, which will then apply the coating formulation to the exterior of the article (can or tube) as it is fed through the coating machine, which is enclosed. During the application process, any residual coating formulation remaining on the application roller will be removed by a scraper and returned into the reservoir via a drip tray for reuse. After application the article will be fed into a multi–zone oven, where heat will dry and cure the coating.

6. HUMAN HEALTH IMPLICATIONS

6.1 Exposure assessment

6.1.1 Occupational exposure

NUMBER AND CATEGORY OF WORKERS

Category of Worker	*Number*	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport and Storage	10	1	200
Roller Coating Operators	30	4	220
Cleaning and Maintenance Workers	10	1	200

EXPOSURE DETAILS
Dermal and ocular exposure of workers to the notified polymer (<10% concentration) may occur during application of the coating to the exterior of articles, mainly during the connection and disconnection of pumps, cleaning and maintenance of equipment, and when handling open drums of the product. Exposure is expected to be reduced by the automated processes and fume extraction system used for the roller coating application, and the wearing of personal protective equipment (PPE) by workers during handling operations (such as filter masks, safety glasses, gloves, and protective clothing). Inhalation exposure is not expected to be significant, given the low vapour pressure of the notified polymer.

6.1.2. Public exposure
The public may become exposed to substrates coated with the notified polymer. At this stage the coating will be cured and cross linked to form an inert rigid coating that is unlikely to be available for exposure. Therefore, public exposure is expected to be negligible.

6.2. Human health effects assessment

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

Endpoint	*Result and Assessment Conclusion*
Rat, acute oral toxicity	Low oral toxicity LD50 >2000 mg/kg bw
Rabbit, skin irritation	slightly irritating
Rabbit, eye irritation	slightly irritating

Mouse, skin sensitisation – Local lymph node assay (Assay 1)	evidence of sensitisation
Mouse, skin sensitisation – Local lymph node assay (Assay 2)	evidence of sensitisation
Mutagenicity – bacterial reverse mutation	non mutagenic

No information is available on the toxicokinetics of the notified polymer. However, the notified polymer is not expected to be absorbed to a significant extent from the gastrointestinal tract given its high molecular weight. On the basis of the high molecular weight, expected low water solubility, and the relatively high partition coefficient of the notified polymer, dermal absorption is not likely, although the results of the skin sensitisation assays suggest that at least some dermal uptake occurs upon skin contact.

No information is available on the acute dermal or inhalation toxicity of the notified polymer, or on its effects following repeated exposure. It was found to be of low toxicity in an acute oral toxicity study.

The notified polymer was not mutagenic in a bacterial reverse mutation assay.

The notified polymer was found to be slightly irritating to the skin (very slight erythema observed). The test for eye irritation indicated that the solution containing ~70% notified polymer was slightly irritating to the eyes (minor conjunctival redness observed). It is noted that such an effect may have been due to the presence of a solvent within the notified polymer solution that is classified as an eye irritant (R36).

Two modified local lymph node assays were performed on the product containing ~70% of the notified polymer. This procedure has undergone interlaboratory validation in Europe (Ehling et al 2005a and 2005b) and involves the use of lymph node weights and cell counts rather than radioactive labelling. In addition, measurements of ear swelling and ear weight are taken to indicate the irritating potential of a test substance. In Assay 1, there were effects that may be consistent with skin sensitisation in animals treated with the test substance, including statistically significant increases in stimulation indices for cell counts (but not dose related). Increases in ear swelling and ear weights at the highest tested dose (50%) were also observed. The cell count indices and the level of ear swelling were reported to slightly exceed the "positive" levels determined for such studies in this strain of mice (without challenge application). Assay 2 included induction and challenge applications of the test substance at 50% in order to examine the secondary response of the animals. Effects indicative of skin sensitisation were observed including statistically significant increases in the stimulation indices for cell counts and increases in the weights of the draining lymph nodes, although a significant difference was not observed between the primary response and challenge group. Statistically significant increases were also observed for the level of ear swelling and ear weights. Both the cell count indices and level of ear swelling significantly exceeded the appropriate positive levels. The authors note that increases in ear swelling in this type of test are a measure for skin sensitisation rather than for irritation. The results of these studies therefore indicate possible sensitisation and irritation potential of the notified polymer. However, in previous studies, the notified polymer was shown to not be a significant skin irritant (only very slight erythema, no oedema after single application to rabbit skin). In addition, the notified polymer contains a small percentage of low molecular weight species that may have unreacted functional groups capable of inducing skin sensitisation. Therefore, the results obtained in the modified LLNA studies are considered to indicate that the notified polymer has the potential to induce skin sensitisation.

Classification
Based on the potential to induce skin sensitisation, the notified chemical is classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* (NOHSC 2004).

The following risk phrase should be applied:
R43: May cause sensitisation by skin contact.

6.3. Human health risk characterisation

6.3.1. Occupational health and safety
Dermal and ocular exposure are the main routes of worker exposure to the notified polymer (up to 10% concentration) expected to occur during application of the coating to the exterior of articles. However, as a result of the mainly automated processes that will be used, as well as the fume extraction systems, exposure is expected to be low, occurring infrequently and for relatively short periods of time. As such, the risk of irritancy effects resulting from dermal exposure to the notified polymer are unlikely.

At the concentrations of notified polymer present in products that will be handled by workers (<10%), the risk of skin sensitisation cannot be ruled out. However, as outlined above, exposure is expected to be low assuming that the proposed automated processes, engineering controls and personal protective equipment are implemented during handling of the notified polymer. As such, the risk of skin sensitisation is considered to be low.

In conclusion, the occupational health and safety risk of the notified polymer is considered to be low.

6.3.2. Public health

Members of the public will only occasionally come into contact with substrates coated with the notified polymer on which the notified polymer has been cured and cross linked into the rigid coating. As such, the risk to public health is considered to be negligible.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1 Environmental Exposure

RELEASE OF CHEMICAL AT SITE

As the notified polymer is imported as a component of a wet-paint formulation and will not be repackaged or reformulated in Australia, releases to the environment are not expected during manufacture or reformulation.

If a spill occurred during storage or transportation, products containing the notified polymer are expected to be prevented from entering drains, sewers or waterways and contained with absorbent materials like soil, sand or sawdust and collected into suitable containers for disposal to landfill.

RELEASE OF CHEMICAL FROM USE

Roller coating to the exterior of cans or tubes is carried out using automated processes. Roller application is efficient (approximately 90%) with any coating not applied (i.e. excess material) being retained and recycled or going through a solvent recovery plant. The solids from the process will be incinerated or sent to landfill. Equipment cleaning and container residues will be handled in the same manner as the application excess. It is estimated that up to 300 kg (10%) per annum will be disposed of during coating application and equipment cleaning and up 30 kg (1%) per annum of the notified polymer will be disposed of during drum cleaning.

Ultimately, the final substrate to which the coating has been applied will either be recycled or go to landfill. At this time the polymer will be an inert matrix and will not leach out if placed in landfill. If the containers are recycled the coating will be removed and collected in sludge/solid and will go to landfill or be incinerated. Water and oxides of carbon will be generated when the polymer is incinerated.

The notified polymer will be present in the waste resulting from the application processes and in empty import drums and such waste will be disposed to landfill. Incineration of the wastes may also occur. Any solvents that are used to clean the application equipment will be recycled and solid waste disposed to landfill or incinerated.

RELEASE OF CHEMICAL FROM DISPOSAL

Minor quantities of the notified polymer will be disposed to landfill across Australia. Due to its expected low water solubility, high molecular weight and solid nature, any polymer released is likely to adhere to organic material, sediment and soil. Over time the notified polymer is expected to undergo biotic and abiotic degradation.

7.1.2 Environmental fate

The majority of the notified polymer will share the fate of the cans to which the coating will be applied and will either be recycled or go to landfill.

Due to the low water solubility and high molecular weight of the notified polymer, its potential for bioaccumulation is low.

For the details of the environmental fate studies please refer to Appendix B.

7.1.3 Predicted Environmental Concentration (PEC)

No significant release of the notified polymer to the aquatic compartment is expected based on the reported use pattern, therefore, the PEC cannot be calculated.

7.2. Environmental effects assessment

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

Endpoint	*Result*	*Assessment Conclusion*
Algal Toxicity	EC50 >193 mg/L(WAF)	Not toxic to alga up to the water solubility
Inhibition of Bacterial Respiration	EC50 >10,000 mg/L	Not inhibitory to activated sludge

The ecotoxicology tests indicate that at concentrations below the solubility, the notified polymer has no observable effect on the aquatic environment.

7.2.1 Predicted No-Effect Concentration

PNEC cannot be calculated based on the WAF endpoint, which would not reflect the real EC50. The notified polymer will be an inert matrix after application and will not be released to aquatic environment in any significant quantity. On this basis, the calculation was not considered necessary.

7.3. Environmental risk assessment

The notified polymer is not considered to pose an unacceptable risk to the aquatic environment due to the expected low release to the aquatic compartment.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
Based on the available data the notified polymer is classified as hazardous under the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)]. The classification and labelling details are:

R43 May cause sensitisation by skin contact

and

As a comparison only, the classification of the notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations 2003) is presented below. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

	Hazard category	***Hazard statement***
Skin sensitiser	1	May cause allergic skin reaction

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

When used in the proposed manner, the notified polymer is not considered to pose an unacceptable risk to public health.

Environmental risk assessment
On the basis of the reported use pattern, the notified polymer is not considered to pose a risk to the environment.

Recommendations

REGULATORY CONTROLS
Hazard Classification and Labelling

- The Office of the ASCC, Department of Employment and Workplace Relations (DEWR), should consider the following health hazard classification for the notified polymer:
  - R43: May cause sensitisation by skin contact.

- Use the following risk phrases for products/mixtures containing the notified polymer:
  - Concentration ≥ 1%: R43 May cause sensitisation by skin contact.

Health Surveillance

- As the notified polymer is a skin sensitiser, employers should carry out health surveillance for any worker who has been identified in the workplace risk assessment as having a significant risk of skin sensitisation.

CONTROL MEASURES
Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer:
  - Prevent leaks and spills.
  - Automated processes.

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
  - Avoid contact with eyes and skin.

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
  - Gloves, safety glasses, protective clothing.

  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 polymer 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 polymer should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified polymer 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 polymer has a number-average molecular weight of less than 1000; or
- additional information related to the skin sensitisation of the notified polymer becomes available.

or

(2) Under Section 64(2) of the Act; if
- the function or use of the chemical has changed from a component of a paint formulation for coating rigid metal cans, or is likely to change significantly;
- the amount of chemical being introduced has increased from 3 tonnes per annum, or is likely to increase, significantly;
- if 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 MSDS of the products containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

APPENDIX A: TOXICOLOGICAL INVESTIGATIONS

A.1. Acute toxicity – oral

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	OECD TG 423 Acute Oral Toxicity – Acute Toxic Class Method.
Species/Strain	Rat/Wistar
Vehicle	Corn oil with 10% acetone
Remarks - Method	No significant protocol deviations
RESULTS	
LD50	> 2000 mg/kg bw
Remarks - Results	No mortality, signs of toxicity, or adverse effects in organs were observed at the dose level of 2000 mg/kg bw.
CONCLUSION	The notified polymer is of low toxicity via the oral route.
TEST FACILITY	Bayer (2007a)

A.2. Irritation – skin

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	OECD TG 404 Acute Dermal Irritation/Corrosion. EC Directive 92/69/EEC B.4 Acute Toxicity (Skin Irritation).
Species/Strain	Rabbit/Himalayan
Number of Animals	3 males
Vehicle	None
Observation Period	7 days
Type of Dressing	Semi-occlusive.
Remarks - Method	No significant protocol deviations
RESULTS	
Remarks - Results	Very slight erythema was observed in all animals 24 hours to 6 days, and in one animal this was observed from the 1 hour time point onwards. No oedema was observed.
CONCLUSION	The notified polymer is slightly irritating to the skin.
TEST FACILITY	LPT (2002a)

A.3. Irritation – eye

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	OECD TG 405 Acute Eye Irritation/Corrosion. EC Directive 92/69/EEC B.5 Acute Toxicity (Eye Irritation).
Species/Strain	Rabbit/Himalayan
Number of Animals	3 males
Observation Period	72 hr
Remarks - Method	No significant protocol deviations.
RESULTS	

Remarks - Results	Minor conjunctival redness was observed in all animals at the 1 and 24 hour observation. No other effects were observed.
CONCLUSION	The test substance is slightly irritating to the eye.
TEST FACILITY	LPT (2002b)

A.4. Skin sensitisation – mouse local lymph node assay (LLNA) Assay 1

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	Adaptation of OECD TG 429: Skin Sensitisation: Local Lymph Node Assay. The modified assay is known as an Integrated Model for the Differentiation of Skin Reactions (IMDS).
Species/Strain	Mouse/SPF Hsd Win:NMRI
Vehicle	Methyl ethyl ketone
Remarks - Method	The assay was modified by measuring lymph node weights and cell counts instead of using radioactive labelling. Ear swelling and ear weight were also measured after treatment to indicate the irritating potential of the test substance. The IMDS assay has undergone an interlaboratory validation in Europe (Ehling et al 2005a and 2005b). The "positive" level determined for this mouse strain in the validation study is a cell count index of approximately 1.4. The authors of this test report note a more precise "positive" level of 1.35. GLP compliant.

RESULTS

Concentration (% w/w)	*Proliferative response*		*Irritant response*	
	Lymph node weight index	*Cell count index*	*Ear swelling index**	*Ear weight index**
0	1.00	1.00	1.00	1.00
2	0.88	0.90	1.00	1.01
10	0.81	0.89	1.01	1.03
50	1.10	1.39†	1.17†	1.19

* Test/control ratio calculated from changes in measurements from day 4 compared to day 1.
† Statistically significant increase ($p \leq 0.05$)

Remarks - Results	Animals treated with 50% test substance showed a statistically significant increase in the stimulation indices for cell counts compared to control animals. In addition, this increase represents a slight increase above the "positive" level for cell count indices (see the above discussion in the 'Remarks – Method' section). Statistically significant and dose related increases in the ear swelling and ear weights were observed in animals treated with the highest dose compared to control animals. It was also determined that the level of swelling observed exceeded the "positive" level. Overall, the results of this study indicate the possibility of sensitisation and/or irritation potential. Further studies may clarify whether the effects seen are due to sensitisation or irritation only.
CONCLUSION	There was evidence of induction of a lymphocyte proliferative response that may be indicative of skin sensitisation to the notified polymer.
TEST FACILITY	Bayer (2003)

A.5. Skin sensitisation – mouse local lymph node assay (LLNA) Assay 2

TEST SUBSTANCE: Solution containing ~70% notified polymer

METHOD: Adaptation of OECD TG 429: Skin Sensitisation: Local Lymph Node Assay and OECD TG 406: Skin Sensitisation.

Species/Strain: Mouse/SPF Hsd Win:NMRI
Vehicle: Methyl ethyl ketone
Positive Control: 1-Chloro-2,4-dinitrobenzene
Remarks - Method: This assay is based on Assay 1, however, with challenge test application.

The test material (50%) and vehicle were applied epicutaneously to the flanks of the animals on days 1-3 (induction) and then the test substance was applied on the dorsal part of both ears on days 15-17 (challenge). The "positive" level for this mouse strain is a cell count index of 1.4. It was noted that residual test item was observed on the ears before sacrifice. This may have affected the ear swelling measurements.
GLP compliant.

RESULTS

Group	*Concentration*	*Lymph node weight index*	*Cell count index (Test/Control Ratio)*	*Ear swelling index**	*Ear weight index**
	Test Substance				
1	0% (induction & challenge)	1.00	1.00	1.00	1.00
2	0% (induction), 50% (challenge)	1.45	1.61†	1.15†	1.10†
3	50% (induction & challenge)	1.46†	1.65†	1.12†	1.10†
	Positive Control				
4	0% (induction), 0.5% (challenge)	1.00	1.00	1.00	1.00
5	0.5% (induction), 0.5% (challenge)	1.46†	1.44	1.19†	1.41†

* Test/control ratio calculated from changes in measurements from day 18 compared to day 1.
† Statistically significant increase ($p \leq 0.05$)

Remarks - Results: Animals treated with the test substance showed statistically significant increases in the stimulation indices for cell counts and for weights of the draining lymph nodes after application of the test item and the positive control. The positive level of the cell count index was statistically significantly exceeded following both challenge applications of the test substance. A significant difference was not observed between the primary response group (Group 2) and the secondary response group (Group 3). In addition, the level of ear swelling exceeded the positive level in animals treated with test substance. This was also accompanied by a statistically significant increase of ear weights compared to controls.

The authors note that an increase in ear swelling determined after challenge treatment is not a measure for acute skin irritation but for skin sensitisation in this type of test. Based on the results obtained, the proliferative effects on the lymph node cannot be established as solely due to irritation effects. Therefore, the test substance is considered to have skin sensitisation potential.

CONCLUSION: There was evidence of induction of a lymphocyte proliferative response

	indicative of skin sensitisation to the notified polymer.
TEST FACILITY	Bayer (2007b)

A.6. Genotoxicity – bacteria

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	OECD TG 471 Bacterial Reverse Mutation Test. EC Directive 2000/32/EC B.13/14 Mutagenicity – Reverse Mutation Test using Bacteria. Plate incorporation procedure and Pre incubation procedure
Species/Strain	*S. typhimurium*: TA1535, TA1537, TA98, TA100, TA102
Metabolic Activation System	S9 mix from Sprague-Dawley rat liver induced with Aroclor 1254
Concentration Range in Main Test	a) With metabolic activation: 50 - 5000 µg/plate b) Without metabolic activation: 50 - 5000 µg/plate
Vehicle	Dimethyl sulfoxide
Remarks - Method	No negative control (i.e. vehicle only) was tested in this experiment.
RESULTS	
Remarks - Results	Substance precipitation occurred at 1581µg per plate and above. At doses higher than 500 µg per plate, some weak and strain-specific bacteriotoxic effects were observed. There were no indications of mutagenic effects of the test substance at doses up to 5000µg per plate in any of the strains used.
CONCLUSION	The notified polymer was not mutagenic to bacteria under the conditions of the test.
TEST FACILITY	Bayer (2007c)

APPENDIX B: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

B.1. Ecotoxicological Investigations

B.1.1 Algal growth inhibition test

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	EC Directive 92/69/EEC C.3 Algal Inhibition Test.
Species	*Selenastrum capricornutum*
Exposure Period	72 hours
Concentration Range	Nominal: 12.5 - 100 mg/L Actual: Not reported
Auxiliary Solvent	None
Water Hardness	22.5 mg $CaCO_3$/L
Analytical Monitoring	Infrared spectrometry for DOC determination. Cell densities are measured in a microcell counter or, alternatively, are determined by means of a microscopic counting chamber.
Remarks - Method	No significant protocol deviations. Considering the relatively low water solubility of the notified polymer, Water Accomodated Fractions (WAFs) were tested with loading rates of 12.5, 25, 50 and 100 mg/L. To give the desired series of test concentrations, the test item was added to 1 litre of dilution water for each test item concentration, treated for 60 seconds at 8000 rpm with an ultra turrax and afterwards stirred for 24 h on a magnetic stirrer. Finally, undissolved particles of the test item were removed by filtration using folded filters of pore size 7-12 µm. The determination of DOC would give an indication of actual concentrations.

RESULTS

*Biomass**		*Growth**	
E_bL_{50} *mg/L at 72 h*	*NOEC ($t_{\alpha\ 0.05}$) mg/L*	E_rL_{50} *mg/L at 72 h*	*NOEC ($t_{\alpha\ 0.05}$) mg/L*
193	12.5	Not determined	12.5

* All the concentrations refer to WAFs.

Remarks - Results	No information is available on a potential correction between effective loadings and measured DOC values, which is probably attributed to the relatively low water solubility of below the limit of quantitation for DOC determination. Analysis of the growth and growth rate of the algal population within the 72 hour exposure period was conducted by probit analysis and Dunnett's test, respectively. The NOEC and LOEC values were determined according to the Dunnett test. The E_bL_{10} and E_rL_{10} values were determined to be 25.6 mg/L and 168 mg/L, respectively. The E_rL_{50} value could not be determined. The notified polymer showed no adverse effect on alga up to the saturation concentration.
CONCLUSION	The notified polymer is non-toxic to algae up to the limit of its water solubility.
TEST FACILITY	Bayer (2007d)

B.1.2 Inhibition of microbial activity

TEST SUBSTANCE	Solution containing ~70% notified polymer
METHOD	EC Directive 88/302/EEC C.11 Biodegradation: Activated Sludge Respiration Inhibition Test
Inoculum	Activated sludge from local domestic sewage treatment plant (Municipal STP Cologne-Stammheim).
Exposure Period	3 hours
Concentration Range	Nominal: 100 – 10,000 mg/L Actual: Not reported
Remarks – Method	No significant protocol deviations. Test was conducted with dispersions of the notified polymer at concentrations of 100, 1000, 100,000 mg/L. The effect value related to nominal concentration, since no analytical monitoring was performed. 3, 5- Dichlorophenol was employed as a reference substance.
RESULTS	
IC50	>10,000 mg/L
NOEC	10,000 mg/L
Remarks – Results	All validity criteria of the test method were met. The notified polymer showed 0.0% respiration inhibition of activated sludge up to the test concentration of 10,000 mg/L.
CONCLUSION	The notified polymer is not considered inhibitory to activated sludge under the conditions of this test.
TEST FACILITY	Bayer (2007e)

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