

File No: LTD/1212

31 October 2005

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

FULL PUBLIC REPORT

Polymer in RE3698

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**Director
NICNAS**

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Polymer in RE3698

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

BASF Coatings Australia Pty Ltd
51 McIntyre Rd Sunshine Vic 3020
ABN: 91 092 127 501

and

Akzo Nobel Pty Ltd
51 McIntyre Rd Sunshine Vic 3020
ABN: 91 000 017 354

NOTIFICATION CATEGORY

Limited: Polymer with NAMW ≥ 1000

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical identity
Identity of impurities
Spectral data
Detail of use
Introduction Volume
Formulation details
Identity of recipients

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

The notified polymer is introduced in a polymer solution named RE3698

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL	Infrared (FTIR) Spectroscopy
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METHOD	
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Remarks	Comparison of FTIR trace to the standard provided will enable identification of the notified polymer.
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The molecular weight distribution was determined by Gel Permeation Chromatography (GPC)

3. COMPOSITION

DEGREE OF PURITY

> 99%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

All residual monomers and hazardous impurities are present below the relevant cut-offs for classification of the notified polymer as a hazardous substance.

DEGRADATION PRODUCTS

No detailed examination of degradation products has been carried out. Polymer decomposition will not occur during curing (180 °C). Degradation, decomposition or depolymerisation of the notified polymer would only be expected in the event of a fire. Combustion products of pyrolysis (oxygen limited) are likely to include miscellaneous hydrocarbons, carbon monoxide, carbon dioxide, nitrogen oxide and water.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

The notified polymer and coatings containing it are rarely exposed to the atmosphere, as production and formulation operations take place in closed systems and storage is in sealed vessels. Losses of monomers and impurities due to volatility are therefore likely to be minimal. In addition, the level of residual monomers of the notified polymer is very low.

The notified polymer is a component of a mixture which will be cured to form a hard surface coating, and which will usually be covered by further layers of surface coatings. Losses due to volatility, exudation or leaching are not expected to occur after this time

4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will not initially be manufactured in Australia, but will be imported as a polymer solution at a concentration of 10-30%. At a later date the notified chemical may be manufactured in Australia.

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

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	10-30	10-30	10-30	10-30	10-30

USE

Component of OEM automotive coating

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY

Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS

Formulation of the automotive coating and potential future manufacture of the notified chemical will be carried out at Akzo Nobel Pty Ltd, Sunshine, Victoria. Application of the coating will occur at a car manufacturing site in Victoria.

TRANSPORTATION AND PACKAGING

The notified polymer at a concentration of 10-30 % will be imported in 200 L steel drums to the Akzo Nobel Pty Plant. The formulated coating product containing <10% notified polymer will be stored and transported in 200 L steel drums by road.

5.2. Operation description

Although initially the notified polymer will only be imported into Australia, there is the potential for manufacture to occur in the future. As such an operation description for both polymer manufacture and coating formulation has been included below.

Import

The polymer solution will be imported in 200 L steel drums and transported to the manufacturing plant in Victoria.

Notified polymer manufacture

Alternatively, the polymer solution containing 10-30% notified polymer will be manufactured in closed reactors. Following manufacture a sample will be removed for quality control purposes. When approved the polymer will be filtered and filled through fixed transfer lines into drums. The drums are stored until the polymer solution is required for reprocessing.

Coating Formulation

During formulation, the polymer solution (containing 10-30% notified polymer) will be pumped from 200 L drums into the closed mixer. Following mixing with other ingredients, a sample of the coating formulation containing < 10% notified polymer will be removed for quality control purposes. When approved, the formulated coating is filtered and filled into 200 L drums and stored in a warehouse prior to distribution to car manufacturing facilities by road.

Coating Application

The coating formulation containing < 10% notified polymer will be pumped via a vacuum pump into the application tank and mixed with other ingredients. A sample may be removed for quality control purposes. The coating is then automatically applied to car bodies in a process isolated from workers. The coating will be cured on the car bodies by baking.

5.3. Occupational exposure

Number and Category of Workers

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration</i>	<i>Exposure Frequency</i>
Transport and warehousing	12	4 hours/day	20-130 days/year
Manufacture	32	2-8 hours/day	80-100 days/year
Formulation	150	2-8 hours/day	30 days/year
End use	60	2-8 hours/day	200 days/year

Exposure Details

Transport and warehousing workers may come into dermal and ocular contact with the notified polymer through accidental leaks and spillages of the drums and containers.

During manufacture and formulation, raw materials (including the polymer solution) are automatically added to the mixing vats. Mixing is an enclosed process and fixed lines are used to transport substances. Workers will wear impermeable gloves, eye protection and coats. Exposure from the notified polymer to these workers can occur by either dermal or ocular routes, however significant exposure will be limited due to the engineering controls, workplace practices and personal protective equipment used. Inhalation exposure is unlikely as the notified polymer has low vapour pressure, is present in aqueous solution, and aerosols are unlikely to be generated.

During preparation and application of the final coating, there is the potential for dermal, oral and ocular exposure from spills and splashes. Exposure will be limited during application and cleaning using exhaust ventilation and impermeable gloves, eye protection and coats.

After application and once dried, the coating containing the notified polymer is cured into an inert matrix and the polymer is hence unavailable to exposure.

5.4. Release

RELEASE OF CHEMICAL AT SITE

Since initially the notified polymer will be manufactured overseas there will be no release in Australia due to its manufacture. Until it reaches the coating manufacturing site, release to the environment during shipping, transport and warehousing will only occur through accidental spills or leaks of the drums or steel packaged containers.

Potential polymer manufacture

When it is manufactured in Australia, it would be expected that a maximum of 2% of the total volume produced per year would be released to the environment from the disposal of spilt material and equipment cleaning to landfill. The manufactured polymer solution would be stored in 200 L steel drums.

Coating Formulation

At the coating manufacturing site, the annual release of the notified polymer will be via the following points:

Spills	- less than 1%, up to 300 kg
Import container residue	- less than 3%, up to 900 kg to waste contractor
Equipment cleaning	- up to 1%, up to 300 kg to onsite treatment plant.

During the coating formulation operations, it is anticipated that there will be minimal release of the notified polymer during manual transfer from the storage containers to the mixers and during filling of coating into containers or during blending since it is undertaken in enclosed systems. Spills will be within bunded areas and collected with inert absorbent material (eg sand) and placed in a sealable container ready for disposal. All generated washing effluent from the process equipment, including blending tanks and mixers, will go to an interceptor pit where the polymer would be collected in the solids/sludge, possibly by flocculation/precipitation, and then sent to landfill. The treated effluent, containing no or small amounts of notified polymer, will then enter the sewer under a Trade Waste Agreement.

RELEASE OF CHEMICAL FROM USE

Annual release of the notified polymer to the environment as a result of its use in the automotive industry will include:

Container residue	- less than 0.1%, up to 30 kg
Spills, application losses and	
Equipment cleaning	- up to 15%, up to 4500 kg

All spills will be contained, collected with inert absorbent material (eg sand) and placed in a sealable container ready for disposal. The application process is fully contained and automated. All application losses will be contained, collected and treated ready for disposal. Application equipment will generally be cleaned with solvent. This effluent will be collected and treated before disposal.

Any coating residue in empty coating containers will be allowed to dry and then disposed of with the container to a licensed drum recycler

5.5. Disposal

Any spilt material will be disposed of to landfill in sealed labelled containers.

Any solids (containing approximately 7000 kg of notified polymer) produced during the potential polymer manufacture and the coating manufacture and use will be disposed of via landfilling or possibly by incineration at installations with scrubbers and atmospheric emission treatments. Incineration of the notified polymer will produce water and oxides of carbon, and nitrogen.

Import and coating containers will be disposed of via a licensed drum recycler offsite, who will either incinerate any residues present or send them to landfill.

5.6. Public exposure

The notified polymer will not be available to the public. Members of the public will come into contact with the notified polymer once it is dried and cured, and not available for exposure.

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Pale yellow liquid (Product RE3698)
Melting Point/Freezing Point	Not determined
Remarks	Polymer is not isolated from solution.
Boiling Point	Not determined
Remarks	Polymer solution boils at around 100°C (From the MSDS, test report not seen by NICNAS)
Density	Not determined
Remarks	Density of polymer solution is 1050 kg/cm ³ at 20°C (From the MSDS, test report not seen by NICNAS)
Vapour Pressure	Not determined
Remarks	Polymer not isolated from solution
Water Solubility	Not determined
Remarks	The notified polymer contains some hydrophilic groups that may confer a degree of water solubility. However, it contains mainly hydrophobic functional groups therefore it is expected to be insoluble in water.
Hydrolysis as a Function of pH	Not determined.
Remarks	Due to the functional groups present the notified polymer may undergo some hydrolysis in the environmental pH range 4-9.
Partition Coefficient (n-octanol/water)	Not determined.
Remarks	The expected lack of water solubility of the notified polymer would indicate a high partition coefficient. Hence, the notified polymer is likely to partition out of the water compartment and bind strongly to soils and sediments.
Adsorption/Desorption	Not determined.
Remarks	Due to the functional groups present and its insolubility in water the notified polymer will adsorb to soil and sediment.
Dissociation Constant	Not determined.
Remarks	The notified polymer contains functional groups that will remain cationic throughout the environmental pH range (4-9).
Particle Size	Not relevant.
Remarks	Polymer not isolated from solution.

Flash Point Not determined

Remarks Polymer not isolated from aqueous solution.

Flammability Limits Not expected to be flammable.

Remarks Polymer not isolated from aqueous solution.

Autoignition Temperature Not determined

Remarks Polymer not isolated from aqueous solution.

Explosive Properties Not predicted to be explosive.

Remarks Polymer not isolated from aqueous solution. From examination of the structure, there are no chemical groups that would infer explosive properties, therefore the result has been predicted negative.

Reactivity No decomposition occurs below 180°C.

7. TOXICOLOGICAL INVESTIGATIONS

No toxicity data were submitted

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted.

8.2. Ecotoxicological investigations

No ecotoxicity data were submitted.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

Initially, exposure will only occur due to use of the notified polymer as it will not be manufactured in Australia. It will be reformulated into coatings that will be used by specialist technicians in the automotive industry, i.e. will not be available for general consumer use. The proposed use pattern and waste management indicate that solid wastes (containing up to 7000 kg annually of the notified polymer) resulting from the potential polymer manufacture, coating manufacture and coating use will be collected and sent to landfill or incineration. A small amount of the notified polymer may be present in the final effluent from the effluent treatment plant, which will be either returned to the sludge tank or released to sewer.

The notified polymer will interact with other coating components to form a stable chemical matrix and, once dry, is expected to be immobile and pose little risk to the environment. After the useful life of the coated article, the notified polymer will suffer the same fate as the article. If the article is recycled then the notified polymer will be destroyed during the heating process to release water vapour, oxides of carbon and nitrogen.

9.1.2. Environment – effects assessment

No ecotoxicity data were provided.

The notified polymer is polycationic. Polycationic polymers that are soluble are known to display toxicity to aquatic organisms (Boethling and Nabholz 1997). However, the expected low water solubility and minimal exposure to the aquatic compartment resulting from the proposed use pattern indicate that the overall environmental hazard should be low.

Following application and curing, the notified polymer will be within an inert matrix and be unavailable to organisms. Due to its large molecular weight, the potential for bioaccumulation is very low.

9.1.3. Environment – risk characterisation

The notified polymer contains functional groups which have the potential to hydrolyse in the environmental pH range 4-9, however it is expected to occur at a very slow rate. The notified polymer is not expected to be readily biodegradable. Due to its expected water insolubility, it is expected that the notified polymer will partition to soil and sediments where it will be immobile. Over time the polymer will slowly degrade via abiotic and biotic means. During automobile recycling the polymer will be destroyed.

Within a landfill environment, the notified polymer contained in waste from coating manufacture and coating application, including cured coating, will be immobile and is expected to breakdown at a very slow rate due to biotic and abiotic processes over time.

Adverse ecotoxicological effects to aquatic organisms are not expected due to the low aquatic exposure. The notified polymer is not likely to present a risk to the environment when it is stored, transported, used, recycled and disposed of in the proposed manner.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Polymer manufacture/coating formulation

The majority of the polymer manufacture/coating formulation process, including filling, is automated and hence exposure is expected to be negligible. In situations where contact to the notified polymer could occur, exposure is expected to be low due to the concentration of the notified polymer (< 30%) and the use of PPE.

Coating Application

Although exposure to the notified polymer could occur during preparation of the final coating and cleaning of equipment, this is expected to be low due to the concentration of the notified polymer (< 10%) and the use of PPE. The coating is automatically applied to car bodies in a process isolated from workers and exposure to the notified polymer is not expected during this process.

Once the coating surface has dried, the notified polymer is bound within an inert matrix and as such exposure is expected to be negligible.

9.2.2. Public health – exposure assessment

Public exposure to the notified polymer is expected to be negligible as the notified polymer will not be directly available to the public and although the public will come into contact with the exterior of car bodies coated with notified polymer, the notified polymer will be bound within an inert matrix and hence unavailable for exposure.

9.2.3. Human health – effects assessment

No toxicological data have been provided for the notified polymer and therefore the substance cannot be classified in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004).

The polymer has a high molecular weight and is therefore unlikely to be absorbed across biological membranes, however, as the notified polymer is polycationic it may have irritant properties.

9.2.4. Occupational health and safety – risk characterisation

Due to the largely automated nature of the polymer manufacture, coating formulation and coating application processes, minimal exposure to the notified polymer is expected and hence the risk to workers is expected to be low. Where contact with the notified polymer could occur, the use of PPE (impermeable gloves, eye protection and coats) and the concentration of the notified polymer (< 30%) would limit exposure and thus the risk of adverse irritant effects.

9.2.5. Public health – risk characterisation

Public exposure to the notified polymer is expected to be negligible and therefore the risk to public health is also expected to be negligible.

10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

10.1. Hazard classification

No toxicological data have been provided for the notified polymer and therefore the substance cannot be classified in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004).

10.2. Environmental risk assessment

The chemical is not considered to pose a risk to the environment based on its reported use pattern.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

10.3.2. Public health

There is Negligible Concern to public health when used in the proposed manner.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS for RE3698 containing the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 2003). It is published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for RE3698 provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC 1994). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer as introduced and in formulated coating products:
 - Avoid skin and eye contact
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced and in formulated coating products:
 - Impermeable gloves;
 - Overalls;
 - Chemical goggles/face shields

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

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment

- The following control measures should be implemented by coating formulator to minimise environmental exposure during use of the notified polymer:
 - All process equipment and storage areas should be bunded with process drains going to an on-site effluent treatment plant or collection tank.

Disposal

- The notified polymer should be disposed of to landfill or by incineration, where available.

Emergency procedures

- Spills of the notified polymer should be handled by containment and collection by

absorbent material, then storage of absorbent material in sealable labelled container ready for disposal to landfill.

12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(2) of the Act:
 - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

13. BIBLIOGRAPHY

Boethling, S.B. and Nabholz, J.V. (1997). Environmental assessment of polymers under the US Toxic Substances Control Act. In: Hamilton, J.D. and Sutcliffe, R. (eds.), Ecological Assessment of Polymers, p 211. Van Nostrand Reinhold, USA.

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