File No: LTD/1695

November 2013

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Polymer in RX6725

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 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.

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

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

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

Director
NICNAS

TABLE OF CONTENTS

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
LTD/1695	Akzo Nobel Pty Ltd	Polymer in RX6725	ND*	< 40 tonnes per annum	Component of automotive paints

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

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

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

Environmental risk assessment
On the basis of the assessed used use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

CONTROL MEASURES
Occupational Health and Safety

- No specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified polymer itself. However, these should be selected on the basis of all ingredients in the formulation.

  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 polymer are classified as hazardous to health in accordance with the *Globally Harmonised System for the 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.

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 polymer, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified polymer 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 Da;

or

(2) Under Section 64(2) of the Act; if
- the function or use of the polymer is proposed to change from a component of automotive paints and coatings;
- the amount of polymer being introduced has increased, or is likely to increase, significantly;
- the method of manufacture of the polymer in Australia has changed, or is likely to change, in a way that may result in an increased risk of an adverse effect of the polymer on occupational health and safety, public health, or the environment;
- additional information has become available to the person as to an adverse effect of the polymer 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 product 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.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Akzo Nobel Pty Ltd (ABN: 59 000 119 424)
8 Kellaway Place WETHERILL PARK NSW 2164

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, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities, additives/adjuvants and manufacture volume

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: all physico-chemical endpoints

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
RX6725 (containing the notified polymer at 80-90%)

MOLECULAR WEIGHT
> 1,000 Da

ANALYTICAL DATA
Reference GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
> 90%

DEGRADATION PRODUCTS
The notified polymer is not expected to degrade under normal conditions of use.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: brown liquid*

Property	Value	Data Source/Justification
Melting Point/Freezing Point	< 15 °C	Estimated
Boiling Point	168-172 °C at 101.3 kPa	MSDS*
Density	1060 kg/m^3 at 20 °C	MSDS*
Vapour Pressure	Not determined	Expected to be low based on the high molecular weight.
Water Solubility	Not determined	Expected to have limited solubility based on its predominantly hydrophobic structure.
Hydrolysis as a Function of pH	Not determined	Contains hydrolysable functionalities, however, hydrolysis is expected to be slow under environmental conditions (pH 4 – 9).
Partition Coefficient (n-octanol/water)	Not determined	Expected to partition from water to n-octanol on the basis of its hydrophobicity.
Adsorption/Desorption	Not determined	Expected to adsorb to soil, sediment and sludge and have low mobility in soil based on its hydrophobicity.
Dissociation Constant	Not determined	Does not contain dissociable functionalities.
Particle Size	Not determined	Manufactured in solution
Flash Point	62 °C (closed cup)	MSDS*
Flammability	Not determined	Not expected to be flammable
Autoignition Temperature	Not determined	Not expected to autoignite under normal conditions of use.
Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties.
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidising properties.

*For the product containing the notified polymer at 80-90%

DISCUSSION OF PROPERTIES

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

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

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The polymer solution containing 80-90% notified polymer will be manufactured in Australia.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 40	< 40	< 40	< 40	< 40

PORT OF ENTRY
Manufactured

TRANSPORTATION AND PACKAGING
After manufacture and/or formulation, the solutions containing the notified polymer at up to 90% will be distributed to car manufacturing facilities by road in bulk tanks.

USE
The notified polymer will be used as a component of automotive paints and coatings at concentrations of 3-5%.

OPERATION DESCRIPTION
Manufacture
The notified polymer will be manufactured from its starting materials with heating in closed reactors. When polymerisation is complete the resulting solution containing the notified polymer at 80-90% concentration will be transferred into bulk tanks. Samples of the polymer solution containing the notified polymer will be taken for quality control testing.

Formulation
During formulation, the polymer solution (80-90% notified polymer) will be pumped into a closed mixing system. Following mixing with other ingredients, a sample of the formulation (7-10% notified polymer) will be taken for quality control purposes. After approval by quality analysis, the formulated coating will be filtered and filled into bulk tanks.

End use
The formulated coating (7-10% notified polymer) will be pumped via vacuum pump into the application tank and mixed with other ingredients. A sample may be taken for quality control purposes. The coating containing 3-5% notified polymer will then be automatically applied to car bodies in a process isolated from workers. The coating will be cured on the car bodies by baking.

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)*
Reactor Operator, QC Samplers	8	80-100

Maintenance Workers	1-2	80-100
Laboratory Staff	8	80-100
Storage & Internal Transport	2-4	100-130
Formulation, Dispersing	4	30
Formulation, Makeup	2	30
Formulation, QC	8	30
Formulation, Packaging	8	30
Application, Coater Trays	8	200
Application, Dip Coating	8	200
Application, Equipment Cleaning	2	200

EXPOSURE DETAILS

Transport and storage

During transport and storage, workers are not expected to be exposed to the notified polymer under normal conditions unless a spill event occurs. In the case of a spill, workers may have dermal, ocular or inhalation exposure to solutions containing the notified polymer at up to approximately 90%.

Manufacture

During manufacture of the notified polymer, dermal and ocular exposure of workers to the notified polymer at up to 90% concentration may occur during quality control analysis, connection and disconnection of transfer lines, and cleaning and maintenance of equipment. Exposure is expected to be minimised through the use of enclosed systems and personal protective equipment (PPE) such as coveralls, safety glasses and impervious gloves.

Coating Formulation

Dermal and ocular exposure to the notified polymer at concentrations up to approximately 90% may occur during transfer, removal and testing of the coating formulation. Dermal and ocular exposure to the notified polymer at up to 5% concentration may also occur during formulation, packaging and transfer of the formulated coating, and during general cleaning and maintenance of the coating equipment. Inhalation exposure is not expected to occur due to its expected low vapour pressure. Under normal conditions of operation, exposure to the notified polymer would be limited by the use of local exhaust ventilation and personal protection equipment (PPE), including coveralls, safety glasses and impervious gloves.

Coating Application

Exposure to the notified polymer at up to 5% is likely to be low during the largely automated and isolated coating and curing processes. Under normal conditions of operation, exposure to the notified polymer would also be reduced by use of PPE such as impervious gloves, coveralls and goggles. Once the coatings are applied to the metal surfaces and cured, the notified polymer is expected to be bound within an inert matrix and will not be bioavailable for exposure.

6.1.2. Public Exposure

The notified polymer is intended for industrial use only and exposure of the general public is not expected. Once the coating processes are complete, the notified polymer will be cured into inert coatings on motor vehicles and automotive parts, and will not be bioavailable for exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted.

Based on the high molecular weight (> 1000 Da) of the notified polymer and its expected low water solubility, the potential of the notified polymer to cross the gastrointestinal (GI) tract or to be dermally absorbed after exposure is expected to be limited. However, the polymer contains a high proportion of low molecular weight species (< 1000 Da) that may be absorbed.

Health hazard classification

As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

Coating manufacture/reformulation/application operators and laboratory staff may come into contact with the solutions containing the notified polymer at up to up to 90%. Exposure is expected to be limited during these processes by the engineering controls and PPE used, and the enclosed and automated processes. After the coating has been applied and cured, the notifier polymer will be bound into an inert matrix and will not be bioavailable for further exposure. Under the proposed occupational settings and control measures, the notified polymer is not considered to pose an unreasonable risk to workers.

6.3.2. Public Health

Members of the public may come into contact with surfaces coated with coating products containing the notified polymer. However, after the coatings are cured, the notified polymer will be bound into an inert matrix and will not be bioavailable for exposure. Based on very low exposure potential, the risk of the notified polymer to public health is not expected to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer will be manufactured in Australia. The manufacturing process is expected to take place in a closed chamber, hence, accidental spillage from this process is expected to be limited. Accidental spills/leaks of the notified polymer and residues of the notified polymer on filters are expected to be collected using absorbent materials and disposed of to landfill.

During coating production, it is estimated by the notifier that up to 12 kg of the total annual import volume of the notified polymer (due to sampling, maintenance and waste from the cleaning of equipment) may be released to the environment. Wastes from spills and leaks are expected to be disposed of through licensed waste disposal contractors. Wastewaters from coating production are expected to be contained in the internal interceptor pit before being released to the sewer.

RELEASE OF CHEMICAL FROM USE

The materials containing the notified polymer are currently only used in the automotive industry. The potential release scenarios of the notified polymer at the industrial coating plants include:

a) Road tanker delivery to plants

No significant release of the product containing the notified polymer is expected during transport. In the unlikely event of a spill, the product containing the notified polymer will either be contained and disposed to landfill or will be drained to the on-site interceptor pit.

b) Electrocoat (e-coat) immersion tank

Automotive bodies and parts are passed through the electrocoat tank by conveyor where the electrodeposition coating (e-coating) is deposited on the surface. The e-coat tank will be replenished with additional coating. Overflow and excess coating is expected to be recycled or directed to internal interceptor pits. Residues collected from filtration of the e-coat tank contents are also expected to be directed to internal interceptor pits. It is expected the filters will eventually be dried and disposed to landfill. No significant release of the notified polymer is expected at this stage.

c) E-Coat wash water tanks

Rinsing of the automotive metal surfaces after deposition will be conducted by a closed loop process, with successive rinses, each feeding back to the previous rinse. The final rinse drainings and filtration residues are expected to be directed to the on-site interceptor pits. Sludge from the on-site interceptor pits, containing residues of the notified polymer, is expected to be disposed of to landfill, and effluent is expected to be directed to local sewage treatment plants (STPs).

During a typical e-coating process, the application transfer efficiency of e-coating is generally near unity and a

typical transfer rate is approximately 97%. The 3% losses include 0.5% lost in water via the ultrafiltrate and 2.5% lost as sludge during the cleaning and rinsing of the electrodip tank. A release of up to 200 kg/year (40,000 kg × 0.5%) of the notified polymer is expected to be directed to the internal interceptor pits.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified polymer is expected to share the fate of the coated automobile parts, and at the end of the car's useful life, the coated metal articles will be sent to metal reclamation facilities or be disposed of to landfill. Residual notified polymer in empty import containers (up to 1% of the total import volume) is expected to be disposed of to landfill during drum recycling.

7.1.2. Environmental Fate

No environmental fate data were submitted. The notified polymer will become irreversibly cross-linked to form part of an inert coating matrix during the heat curing process. The notified polymer will share the fate of the coated automotive parts, which will involve eventual disposal to landfill or thermal decomposition during metal reclamation. In its cross-linked form, the notified polymer is not expected to be bioavailable or mobile in the environment. Bioaccumulation of the uncured/cured polymer is unlikely as it is not expected to cross biological membranes due to its high molecular weight.

Most of the residues of the notified polymer in waste streams generated from the e-coating process are expected to be captured by on-site interceptor pits. However, a small amount of the notified polymer may not be captured by these systems and could be released to the sewer. In sewage treatment plants, most of the notified polymer is expected to partition to sludge and sediment as the notified polymer is a nonionic polymer and has high molecular weight. Sludge from treatment plants may be collected for disposal to landfill or used in soil remediation. The notified polymer will eventually degrade in landfill, or by thermal decomposition during metal reclamation processes, to form water and oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

The notified polymer in waste waters from manufacturing and use is expected to be contained in internal interceptor pits (12 kg + 200 kg = 212 kg) and it is expected that 90% of the notified polymer will be removed within internal interceptor pits based on its nonionic characteristics and high molecular weight (Boethling and Nabholz, 1997). Therefore, release of the notified polymer to a local Sewage Treatment Plant (STP) is up to 21.2 kg/annum (212 kg/year × 10%). The Predicted Environmental Concentration (PEC) was calculated assuming that 10% of the total notified polymer contained in wastewater treated on site will be released to sewer annually. It was assumed that a further 90% of the notified polymer released to the local STP will partition to sludge. The release of the notified polymer will occur over 260 days per annum into an individual sewage treatment plant. This corresponds to release only on working days, based on a 5 day work week. The results of the calculation are shown in the table below.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Annual quantity of chemical released to internal interceptor pits	212	kg/year
Removal within internal interceptor pits	90%	
Annual quantity of chemical released to sewer	21.2	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	0.082	kg/day
Individual Sewage Treatment Plant Average Daily Flow:	329	ML/day
Removal within STP	90%	Mitigation
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.025	µg/L
PEC - Ocean:	0.0025	µg/L

Partitioning to biosolids in STPs Australia-wide may result in an average biosolids concentration of 2.2 mg/kg (dry wt). Biosolids are applied to agricultural soils, with an assumed average rate of 10 t/ha/year. Assuming a soil bulk density of 1500 kg/m^3 and a soil-mixing zone of 10 cm, the concentration of the notified polymer may approximate 0.01 mg/kg in applied soil. This assumes that degradation of the notified polymer occurs in the soil within 1 year from application. Assuming accumulation of the notified polymer in soil for 5 and 10 years under repeated biosolids application, the concentration of notified polymer in the applied soil in 5 and 10 years may approximate 0.08 mg/kg and 0.15 mg/kg, 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 polymer in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1500 kg/m^3). Using these assumptions, irrigation with a concentration of 0.03 µg/L may potentially result in a soil concentration of approximately 0.16 µg/kg. Assuming accumulation of the notified polymer in soil for 5 and 10 years under repeated irrigation, the concentration of notified polymer in the applied soil in 5 and 10 years may be approximately 0.83 µg/L µg/kg and 1.7 µg//kg, respectively.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. The notified polymer is a nonionic polymer and is generally of low concern to the aquatic environment. Furthermore, the majority of the notified polymer will be cured into an inert, cross-linked matrix. Hence, it is not expected to be bioavailable.

7.2.1. Predicted No-Effect Concentration

A predicted no-effect concentration (PNEC) has not been calculated for the notified polymer as the ecotoxicity data were not submitted.

7.3. Environmental Risk Assessment

A Risk Quotient (RQ = PEC/PNEC) is unable to be quantified as PNEC was not calculated. Release of the notified polymer to the aquatic environment in ecotoxicologically significant quantities is not expected based on its reported use pattern. In its cured state the notified polymer will be irreversibly bound into an inert matrix and is unlikely to leach or be bioavailable. On the basis of the assessed use pattern and assumed low hazard, the notified polymer is not considered to pose an unreasonable risk to the environment.

BIBLIOGRAPHY

Boethling RS & Nabholz JV (1997) Environmental Assessment of Polymers under the U.S. Toxic Substances Control Act. In: Hamilton JD & Sutcliffe R, ed. Ecological Assessment of Polymers; Strategies for product stewardship and regulatory programs. New York, Van Nostrand Reinhold, pp 187–234.

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