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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in KZX-864

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Director
NICNAS

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Polymer in KZX-864

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
PPG Industries Australia Pty Ltd (ABN 82 055 500 939) of McNaughton Road, Clayton, Victoria, 3168.

NOTIFICATION CATEGORY
Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Chemical identity
Polymer constituents
Molecular weight
Spectral data
Identity of impurities
Estimated import volume
Detailed Use
Formulation details

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

Boiling Point
Hydrolysis as a Function of pH
Partition Coefficient
Adsorption/Desorption
Dissociation Constant

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None.

NOTIFICATION IN OTHER COUNTRIES
None known.

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
KZX-864 (solvent solution of the notified polymer)

CAS NUMBER
None allocated

METHODS OF DETECTION AND DETERMINATION

METHOD	Infrared Spectroscopy (FTIR)
Remarks	Comparison of FTIR traces to the standard provided will enable identification of the notified polymer.

3. COMPOSITION

DEGREE OF PURITY
>88%

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
The notified polymer is expected to be stable under normal conditions of processing and use. If the polymer is exposed under high temperature, i.e. >200ºC for a long time, some thermal degradation forming some monomer or monomer fragments may occur. The polymer is stable for photoirradiation since it has no photosensitive chemical structure.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
There is expected to be no loss of monomers, additives or impurities during the product life-time of the automobile.

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will not be manufactured in Australia, but will be imported as a component in the polymer solution KZX-864 at a concentration of 50%.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 1.0	0.4 – 2.0	0.4 – 2.0	0.4 – 2.0	0.4 – 2.0

USE
The notified polymer will be formulated in Australia into finished automotive spray paints. It will be spray applied by robots and operators onto car bodies and then baked to form part of the paint finish of the car.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
The notified polymer will initially be imported through Melbourne, by wharf.

IDENTITY OF MANUFACTURER/RECIPIENTS
KZX-864, the product containing the notified polymer, will be stored and used in production at the notifiers site in Clayton, VIC. The manufactured product containing the notified polymer will be distributed from the notifier's site to the Toyota Altona facility for use

TRANSPORTATION AND PACKAGING
KZX-864 will be imported in 200 L closed head steel drums. The drums of KZX-864 will be transported by road from the wharf to the notifier's site. After conversion at the manufacturing site into the product for sale, 200 L steel drums of the product will be transported by road to the Toyota Altona facility.

5.2. Operation description

Paint Formulation

Laboratory Work

The required amount of ingredients for making the premix, including the notified polymer, are weighed into a container and mixed. This premix is then combined with other ingredients required for making the paint in a container in the laboratory under stirring. The paint is then sprayed onto panels in a spraybooth under appropriate extraction. The panels are baked in an oven and the finished paint film is subjected to various tests.

Production Work

The polymer solution (containing 50% notified polymer) is weighed into a pot and mixed with other

ingredients to form a premix. The notified polymer is added by pouring from a 200 L drum into the pot using specialized drum-handling/weighing equipment. The premix containing the notified polymer is pumped or gravity fed from the outlet at the bottom of the pot into the mixer where the paint is made. Solvent is used to wash remaining premix from the pot (and through the pump) into the mixer. The other ingredients are added to the mixer and stirred to make the paint. Following mixing with other ingredients, approximately 500 mL of the formulated paint (containing 0.2-2% notified polymer) is sampled for testing. When approved the formulated paint is filled through dedicated pipework and filling equipment into closed head 200 L drums. The filling equipment automatically places a short fill pipe through the bung hole in the top of the drum and fills the drum.

QC Testing
The operator adjusts the paint containing the notified polymer and sprays panels for baking and testing. Several tests such as solids, viscosity and weight per litre are performed on the wet paint.

Paint Application
The 200 L drums of paint (containing 0.2-2% notified polymer) are pumped into the circulating mix tank using a dedicated lance, pipework and pump. Once in the tank, solvent is added to adjust the paint to application viscosity. This paint is pumped around a circulation system from which it is sprayed onto car bodies by robots and operators in a dedicated ventilated spray area. Operators spray the paint onto specific areas of the car that are not painted by the robots. The painted cars travel through an oven where the notified polymer undergoes a heat activated chemical reaction with other polymers in the paint, thereby forming the final paint film on the car.

During production breaks, operators use cloths dampened with solvent to clean residual paint from the spray equipment.

5.3. Occupational exposure

Number and Category of Workers

Category of Worker	*Number*	*Exposure Duration*	*Exposure Frequency*
CLAYTON SITE			
Laboratory			
paint manufacture and testing	3	8 hours/day	80 days/year
Paint manufacture			
Paint make-up	18	4 hours/day	200 days/year
QC testing	3	4 hours/day	200 days/year
Filling into drums	3	4 hours/day	200 days/year
CUSTOMER SITE			
Paint application			
Adding paint to circulation tank	18	2 hours/day	200 days/year
Hand spray pick-up	30	8 hours/day	200 days/year
Cleaning of spray equipment	18	2 hours/day	

Exposure Details
Paint Formulation
Laboratory Scale
There is the potential for exposure to the notified polymer up to a concentration of 50% from drips and spills during the weighing and transfer of the polymer solution and/or premix to the mixing container. Following formulation of the paint, dermal, ocular and inhalation exposure to the notified polymer at a concentration of 0.2-2% could occur during transfer and spray application of the paint formulation or contact with the wet paint surface. Workers are to be provided with appropriate PPE.

Once the paint surface has been cured the polymer is bound within an inert matrix and therefore will be unavailable for exposure.

Production Scale
Potential for worker exposure to the notified polymer at a concentration of 50% during premix formulation comes from skin contact with polymer residues on the top of the drum after pouring. These

residues are removed by wiping with a cloth. During paint manufacture there is potential for exposure to <50% notified polymer from skin contact with premix residues on the pot. Following paint formulation, exposure to the notified polymer at a concentration of 0.2-2% would be due to skin contact with residues dripping off the fill pipe, and during the manual cleaning of the pipe. Workers are to be provided with appropriate PPE.

QC Testing
There is potential for dermal exposure to the notified polymer at a concentration of 0.2-2% during sampling and testing of the paint formulation. There is the additional potential for inhalation exposure to paint droplets during spray application. Workers are to be provided with appropriate PPE.

Once the paint surface has been cured the polymer is bound within an inert matrix and therefore will be unavailable for exposure.

Paint Application
During transfer of the paint to the circulating mix tank, potential for worker exposure to the polymer at a concentration of 0.2-2% comes from skin contact with paint residues on the exterior of the lance. Dermal, ocular and inhalation exposure to the notified polymer at a concentration of 0.2-2% could occur during spray application of the paint formulation. Workers wear full protective clothing and vapour masks that filter atomised paint out of the air they breathe.

There is potential for exposure to paint residues containing 0.2-2% notified polymer during cleaning.

Once the paint surface has been cured the polymer is bound within an inert matrix and therefore will be unavailable for exposure.

5.4. Release

RELEASE OF CHEMICAL AT SITE
Since the notified polymer is manufactured overseas there will be no release in Australia due to manufacture. Until it reaches the paint 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.

Paint Formulation

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

Spills	- less than 1%, up to 20 kg
Import container residue	- less than 3%, up to 60 kg to waste contractor
Equipment cleaning	- up to 0.5%, up to 10 kg to onsite solvent recovery plant.

During the paint 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 paint 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. The process equipment, including blending tanks and mixers, will be cleaned with suitable solvent, which is collected and sent to an on-site solvent recovery plant. The solvent recovery process will produce recovered solvent, water/effluent with minor amounts of the notified polymer which is returned to the sludge tank, and sludge/solids (containing the waste notified polymer) which will be collected and disposed of offsite.

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:

Spills	- less than 1%, up to 20 kg
Container residue	- less than 0.01%, up to 0.2 kg
Overspray and Equipment cleaning	- up to 40%, up to 800 kg

All spills will be contained, collected with inert absorbent material (eg sand) and placed in a sealable container ready for disposal. The paint will be applied within specialised spray booth, generally by robots, therefore transfer efficiency will be quite high (approximately 70%). All overspray will be contained, collected and allowed to harden ready for disposal. Painting equipment will generally be cleaned with solvent. This effluent will be collected, allowed to harden before disposal.

Any paint residue in empty paint 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 up to 10 kg of notified polymer) produced during the solvent recovery, at the paint manufacturing site, will be disposed of by incineration in cement kilns. Incineration of the notified polymer will produce water and oxides of carbon and phosphorous.

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

Any resultant overspray and cleaning effluent will be allowed to harden and will then be disposed of to landfill.

It is estimated that annually the proposed use pattern will produce less than 910 kg of solid wastes containing the notified polymer, which will be collected and sent to landfill or incineration.

5.6. Public exposure

The notified polymer will not be directly available to the public. The notified polymer is used in an automotive paint that is cured prior to reaching the public. Therefore, although the public will come into contact with the exterior of car bodies, the notified polymer will not be available for exposure.

6. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is not isolated from solution and therefore it is not possible to determine physicochemical properties for the notified polymer itself. Limited physicochemical data has been provided for KZX-864 which contains approximately 50% notified polymer in various solvents.

Appearance at 20°C and 101.3 kPa	A clear viscous slightly yellow liquid (KZX-864).
Boiling Point	Not determined
Remarks	By analogy with other polymers this polymer is not volatile under the normal conditions of use. The polymer solution KZX-864 is expected to boil initially at the boiling point of iso-butanol 108°C.
Density	1206 kg/m^3 at 20°C (notified polymer, estimated)
Remarks	This figure has been calculated from the density of the polymer solution (1020 kg/m^3) and the density of the solvents in that solution.
Vapour Pressure	1.1 kPa at 20°C (KZX-864)
Remarks	This vapour pressure is considered to be due to the solvent content of the polymer solution. The notified polymer is not expected to be volatile. Data taken from MSDS. Study report not provided.
Water Solubility	2.6 g/L

METHOD 10 g of polymer solution KZX-864 was added to 50 g of deionized water, shaken for 1 minute then left for 48 hours at 20 ºC. An aliquot (1 g) of the water was transferred to an aluminium dish and the solids content determined after drying at 130 ºC for one hour. This study was repeated.

Remarks The water solubility was based on the solid residue content in the two studies was 2.4 g/L and 2.8 g/L respectively.

While solid material was observed on the bottom and walls of the mixing flask, this is due to the vast excess material attempted to be dissolved (10% w/v). The result seems appropriate given the presence of strong anionic functionalities. This result indicates that the polymer is readily soluble (Mensink, 1995).

TEST FACILITY Kansai (2005)

Hydrolysis as a Function of pH Not determined

Remarks Despite the presence of hydrolysable functionalities and water solubility, it is unlikely that the polymer will undergo hydrolysis in the environmental pH range (4-9).

Partition Coefficient (n-octanol/water) Not determined

Remarks Due to its water solubility the partition coefficient is likely to be low.

Adsorption/Desorption Not determined

Remarks Due to its water solubility and likely partition coefficient, it is likely that the polymer will be mobile in soil and sediments.

Dissociation Constant Not determined

Remarks The notified polymer contains a relatively strong anionic functionality and hence is expected to remain dissociated throughout the environmental pH range of 4-9.

Particle Size Not determined

Remarks Notified polymer is not isolated from solution
TEST FACILITY

Flash Point 29.5ºC (KZX-864, pressure not specified)

Remarks This flash point is considered to be due to the solvent content of the polymer solution. Data taken from MSDS. Study report not provided.

Flammability Limits Upper: 11.8% (KZX-864)
Lower: 1.2% (KZX-864)

Remarks These flammability limits are based on the solvent content of the polymer solution. The notified polymer is not expected to be flammable. Data taken from MSDS. Study report not provided.

Autoignition Temperature 430ºC (KZX-864)

Remarks This autoignition temperature is considered to be due to the solvent content of the polymer solution. The notified polymer is not expected to autoignite. Data taken from MSDS. Study report not provided.

Explosive Properties Not predicted to be explosive

Remarks From examination of the structure, there are no chemical groups that would infer explosive properties, therefore the result has been predicted negative.

Reactivity

Remarks	The notified polymer will thermally degrade at temperatures above 200 ºC although the specific temperature is unknown. KZX-864 is incompatible with strong mineral acids, strong alkalis and strong oxidising agents.

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

Exposure will only occur due to use of the notified polymer as it will not be manufactured in Australia. It will be reformulated into paints 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, including from solvent recovery, (containing up to 920 kg annually of the notified polymer) resulting from the paint manufacture and paint 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 solvent recovery, which will be returned to the sludge tank.

The notified polymer will interact with other paint 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 painted 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.

Within a landfill environment, the notified polymer contained in waste from paint manufacture and paint application, including cured paint, will be mobile while uncured but will be immobile when cured, and is expected to breakdown at a very slow rate. If released into the aquatic environment, the notified polymer will degrade due to biotic and abiotic processes over time. Adverse ecotoxicological effects to aquatic organisms are not expected.

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.

9.1.2. Environment – effects assessment

Anionic polymers are known to be moderately toxic to algae. The mode of toxic action is overchelation of nutrient elements needed by algae for growth. Based on structural considerations, the highest toxicity to algae observed for anionic polymers may apply to the notified polymer. The toxicity to algae is likely to be reduced due to the presence of calcium ions, which will bind to the functional groups (Boethling and Nabholz, 1997). The aquatic toxicity may be expected to be relatively low.

Further, 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 extreme pH conditions. However, in the environmental pH range 4-9 it is expected that it will be hydrolytically stable. The notified polymer is not expected to be readily biodegradable. Due to its water solubility, it is expected that the notified polymer will remain in the water column and be mobile in soil and sediments. Over time the polymer will slowly degrade to water, simple carbon and phosphate compounds via abiotic and biotic means. During automobile recycling the polymer will be destroyed.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Paint Formulation

Laboratory Scale

Dermal and possibly ocular exposure to the notified polymer at a concentration of 50% (pre-manufacture) and 0.2-2% (post-manufacture) could occur. However, exposure is expected to be low due to the relatively small amounts involved and the use of PPE. Exposure by inhalation during spray application is not expected as the paint is only sprayed in a properly designed spraybooth. Once the paint surface has dried, the notified polymer is bound within an inert

matrix and as such exposure is expected to be negligible.

Production Scale
There is potential for dermal exposure to the notified polymer at a concentration of 50% and 0.2-2% during transfer and filling and cleaning operations respectively. Exposure will be limited by the use of PPE.

QC Testing
There is potential for dermal exposure to the notified polymer at a concentration of 0.2-2% during sampling and testing of the paint formulation. However, exposure is expected to be low due to the relatively small amounts involved, the low concentration of the notified polymer and the use of PPE. Certain quality control tests involve spraying but inhalation exposure is expected to be negligible as the paint is only sprayed in a properly designed spraybooth. Once the paint surface has dried, the notified polymer is bound within an inert matrix and as such exposure is expected to be negligible.

Paint Application
Dermal exposure to the notified polymer at a concentration of 0.2-2% could occur from contact with paint residues during transfer and cleaning operations. However, exposure is expected to be low due to the use of PPE and the low concentration of the notified polymer. The majority of the spray application is automatic (by robots) and hence exposure to the notified polymer is not expected. Although there is potential for inhalation exposure where manual spray coating occurs, this is considered to be negligible due to the use of engineering controls (ventilated (downdraft) spray area) and respiratory PPE (vapour masks).

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 painted 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).

No toxicological data was provided for the notified polymer. The notified polymer contains phosphoric acid functionality which may infer the potential for irritation effects. However, the notified polymer has a high number average molecular weight (>1000) and is therefore unlikely to be absorbed across biological membranes and as such is considered to be of low toxicity.

9.2.4. Occupational health and safety – risk characterisation

The major route of exposure to workers involved in paint formulation and paint application is expected to be dermal. Dermal exposure may occur during transfer of the notified polymer and formulated paint product, collection of quality control samples, quality control testing, cleaning of the tanks and general maintenance. Dermal exposure is limited by the use of PPE. In addition, the notified polymer is expected to have a low order of toxicity. Therefore, the risk to workers is expected to be low.

Significant inhalation exposure to the notified polymer during spray application of the paint is not expected due to the low concentration of the notified polymer, the use of engineering controls (spraybooth/ventilated (downdraft) spray area) and in the case of spray application at the Toyota plant respiratory PPE (vapour masks). As such the risk to workers involved in spray application is expected to be low.

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 KZX-864 provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 1994a). 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 KZX-864 provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC 1994b). 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 engineering controls to minimise occupational exposure to the notified polymer in formulated paint products:
  - Spray application should be conducted in a down draft spray booth.

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer as introduced and in formulated paint products:
  - Use of spray paints containing the notified polymer should be accordance with the NOHSC National Guidance Material for Spray Painting (NOHSC, 1999)

- 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 paint products:
  - Impermeable gloves;
  - Overalls;
  - Chemical goggles/face shields for industrial spray painters;
  - Vapour respirators if required.

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 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 paint 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/release 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.

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