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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in KH-726

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Director
Chemicals Notification and Assessment

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
PPG Industries Australia Pty Ltd

NOTIFICATION CATEGORY
Synthetic Polymer of Low Concern

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, Polymer Constituents, Residual Monomers/Impurities, Use Details, Manufacture/Import Volume, and Site of Manufacture/Reformulation

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)
No

NOTIFICATION IN OTHER COUNTRIES
No

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Polymer in KH-726

3. PLC CRITERIA JUSTIFICATION

Criterion	*Criterion met (yes/no/not applicable)*
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
No Substantial Degradability	Yes
Not Water Absorbing	Yes
Low Concentrations of Residual Monomers	Yes
Not a Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. INTRODUCTION AND USE INFORMATION

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

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	10-30	30-100	30-100	30-100	30-100

USE
The notified polymer will be used as a component of a clearcoat for use in the automotive industry.

5. PROCESS AND RELEASE INFORMATION

5.1. Operation Description
The notified polymer will be imported as an ingredient of KH-726 at a concentration of 65%. After import, the notified polymer will be formulated.

Paint Formulation
Laboratory Scale
The ingredients required for making the paint, including the notified polymer (concentration 65%), will be combined in a container in the laboratory under stirring. The paint (containing 43% notified polymer) will then be sprayed onto panels in a spraybooth having appropriate extraction. The panels are then baked in an oven and the finished paint film subjected to various tests.

Production Scale
The polymer solution (containing 65% notified polymer) will be pumped from 200L drums into the closed mixer via a lance the operator places in the drum. The lance is manually transferred from drum to drum until the required amount of polymer has been added to the mixer. Following mixing with other ingredients, approximately 500 mL of the formulated paint (containing 43% notified polymer) will be sampled for testing. When approved the formulated paint will be filled through dedicated pipework and filling equipment into closed head 200L 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 will adjust the paint containing the notified polymer and spray panels for baking and testing. Several tests such as solids, viscosity and weight per litre are performed on the wet paint.

Paint Application
The 200L drums of paint (containing 43% notified polymer) will be 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 will be 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.

6. EXPOSURE INFORMATION

6.1. Summary of Occupational Exposure
Exposure to the notified polymer at a concentration of 65% (pre-manufacture) and 43% (post-manufacture) is expected. However, the possibility of dermal exposure to drips and spills exists during opening and closing of container, transfer of the notified polymer and formulated paint product, collection of quality control samples, quality control testing, cleaning of the tanks and general maintenance. Workers are provided with appropriate protective equipment i.e. safety glasses, gloves, and protective clothing as per the MSDS.

Certain quality control tests involve spraying. The potential for exposure by inhalation of paint is prevented as the paint is only sprayed in a properly designed spray-booth.

Paint Application
The majority of the spray application is automatic (by robots). Where manual spray coating occurs (to certain areas of the car) the worker will wear a fully body suit and vapour masks. Exposure to the notified polymer at a concentration of 43% could occur during transfer of the paint and cleaning of the spray equipment. However, workers will use PPE and of engineering controls will also be in place.

6.2. Summary of 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.

6.3. Summary of Environmental Exposure

6.3.1. Environmental Release

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

During storage and paint manufacture the notified polymer will be released in the following ways:

Spills	- less than 1%, up to 1 tonne annually
Import container residue	- less than 3%, up to 3 tonne annually to waste contractor
Equipment cleaning	- up to 0.5%, up to 0.5 tonne 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 to landfill. The process equipment, blending tanks and mixers, will be cleaned with suitable solvent, which is collected and sent to an onsite solvent recovery plant, with resultant solids being disposed of by incineration in cement kilns.

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

Paint Application

Release of the notified polymer to the environment as a result of its use in the automotive industry is expected to include:

Spills	- less than 1%, up to 1 tonne annually to landfill
Container residue	- less than 2%, up to 2 tonne annually to landfill
Overspray	- less than 37.5%, up to 37.5 tonne annually to landfill
Equipment cleaning	- less than 0.5%, up to 0.5 tonne annually to landfill.

All spills will be contained, collected with inert absorbent material (eg sand) and placed in a sealable container ready for disposal to landfill. 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 to landfill. Painting equipment will generally be cleaned with solvent. This effluent will be collected, allowed to harden and then disposed of to landfill with overspray wastes.

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

6.3.2. Environmental Fate

Waste paint will mostly be landfilled after hardening. 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 low water solubility, it is expected that the notified polymer will associate with sediments and organic phases of soils and not be mobile. Over time the polymer will slowly degrade to water, simple carbon and nitrogen compounds via abiotic and biotic means. During automobile recycling the polymer will be destroyed.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	The imported polymer solution is a viscous transparent polymer solution
Melting Point/Glass Transition Temp	Not determined
Autoignition Temperature	450°C
Density	1115 kg/m^3
Water Solubility	140 mg/L at 20°C This was a gravimetric determination of the soluble fraction. A measured amount of the polymer (10 g) was vigorously shaken with a known amount of water (50 g), then allowed to settle after which an aliquot of the water fraction was taken, weighed, dried and reweighed. The water solubility was determined by the change in weight of the sample.
Dissociation Constant	The notified polymer is not expected to dissociate under normal environmental conditions (pH 4 - 9).
Degradation Products	The notified polymer will thermally degrade at temperatures above 200°C.
Reactivity	KH-726 is incompatible with strong mineral acids, strong alkalis and strong oxidising agents.

8. HUMAN HEALTH IMPLICATIONS

8.1. Toxicology

No toxicity data were submitted

8.2. Human Health Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

9. ENVIRONMENTAL HAZARDS

9.1. Ecotoxicology

No toxicological data were submitted.

9.2. Environmental Hazard 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. This is unlikely to apply to the notified polymer. The toxicity to algae is likely to be further reduced due to the presence of calcium ions, which will bind to the functional groups (Nabholz *et al*. 1993). The aquatic toxicity may be expected to 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.

10. RISK ASSESSMENT

10.1. Environment

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, ie will not be available for general consumer use. The proposed use pattern and waste management indicates that solid wastes (containing up to 45 tonnes annually of the notified polymer) resulting from the paint manufacture and paint use will be collected and sent to landfill or incineration.

Liquid effluents (containing up to up to 0.5 tonne) of the notified polymer produced from paint formulation will be sent to solvent recovery plants, where, due to its expected low water solubility, the notified polymer will end up in any resultant sludge which will be disposed of by incineration. A small amount of the notified polymer may be present in the final effluent, 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 immobile and is expected to breakdown at a very slow rate. If released into the aquatic environment, the notified polymer is expected to partition to particulate matter and accumulate in sediments. 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.

10.2. Occupational Health and Safety

The OHS risk presented by the notified polymer is expected to be low due to limited exposure as a result of the use of engineering controls and PPE, and the predicted low toxicity of the notified polymer.

10.3. Public Health

The paint formulated with the notified polymer is intended for use by professional spray painters in automotive manufacturing plants only, and will not be sold to the public. Following application, the notified polymer will become trapped within a film and will not be bioavailable. Therefore, the risk to public from exposure to the notified polymer is considered to be negligible.

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

11.1. Environmental Risk Assessment

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

11.2. Human Health Risk Assessment

11.2.1. Occupational health and safety

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

11.2.2. Public health

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

12. MATERIAL SAFETY DATA SHEET

12.1. Material Safety Data Sheet

The notifier has provided MSDS as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

13. 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 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.

13.1. 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 subsection 64(1) of the Act; if
  - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

(2) Under subsection 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.

14. REFERENCE

Nabholz JV, Miller P & Zeeman M (1993) Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act (TSCA) Section Five. In: Landis WG, Hughes JS & Lewis MA eds, Environmental Toxicology and Risk Assessment. ASTM STP 1179. American Society for Testing and Materials, Philadelphia, p 49.