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

FULL PUBLIC REPORT

Polystyrene Formation Inhibitor in AROPOL 995000 RESIN

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of Sustainability, Environment, Water, Population and Communities.

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

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

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**Director
NICNAS**

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FULL PUBLIC REPORT**Polystyrene Formation Inhibitor in AROPOL 995000 RESIN****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Ashland Pacific Pty Ltd (ABN 47 000 075 641)
46A Princes Highway Eumemmerring VIC 3177

NOTIFICATION CATEGORY

Limited-small volume: Chemical other than polymer (1 tonne or less per year).

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, spectral data, purity, impurities, additives/adjuvants, use details, analogue details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: melting point, boiling point, density, vapour pressure, water solubility, hydrolysis as a function of pH, partition coefficient, absorption/desorption, dissociation constant, flash point, flammability limits, autoignition temperature and reactivity.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

AROPOL 995000 RESIN (product containing the notified chemical)

MOLECULAR WEIGHT

< 500 Da

ANALYTICAL DATA

Reference UV spectra and IR data were provided.

3. COMPOSITION

DEGREE OF PURITY 90-100%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: crystalline yellow/orange powder

Property	Value	Data Source/Justification
Melting Point	36-40°C	MSDS
Boiling Point	328.26°C (pressure unknown)	Calculated (analogue)
Density	1020 kg/m ³ at 20°C	Calculated (analogue)
Vapour Pressure	4.95 × 10 ⁻⁷ kPa at 25°C	Calculated (analogue)
Water Solubility	47.92 g/L at 25°C	Calculated (analogue)
Hydrolysis as a Function of pH	Not determined	Not expected to hydrolyse
Partition Coefficient (n-octanol/water)	log Pow = 0.12	Measured (analogue)
Adsorption/Desorption	log K _{oc} = 1.143, 1.785	Calculated (analogue)
Dissociation Constant	Not determined	No dissociable functionality
Particle Size	Not determined	Imported in solution.
Flash Point	109.5°C (pressure unknown)	Calculated (analogue)
Flammability	Not expected to be highly flammable	Based on calculated flash point.
Autoignition Temperature	Not determined	Imported in solution.
Explosive Properties	Not expected to be explosive	The structural formula contains no explosophores.

DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity

Decomposition will not occur if stored according to specifications. Materials to be avoided are oxidising agents. No dangerous reactions are known.

Dangerous Goods classification

Based on the submitted physical-chemical data in the above table the notified chemical is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However the data above do not address all Dangerous Goods endpoints. Therefore consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the chemical.

5. INTRODUCTION AND USE INFORMATION

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

The notified chemical will not be manufactured in Australia. It will be imported as a component in different polyester resin formulations (< 0.01% notified chemical), which will be distributed to end-users for use in laminates, composites or coatings in the manufacture of a variety of end-products.

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

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

PORT OF ENTRY

Melbourne and Sydney

TRANSPORTATION AND PACKAGING

Resin products (containing the notified chemical) packaged in 205 L drums will be transported from the port of entry to the notifier's warehouse or delivered directly to the end users by road.

USE

Additive in polyester resins.

OPERATION DESCRIPTION

There will be no processing or reformulation of resins containing the notified chemical in Australia. The resins will be manually applied to articles by laminating or coating according to the amount of resin required and how the articles are being used.

Gel-coat process

The first step is the application of resin gel-coat with hand rollers or by spray using a chopper gun to the mould. Paint brushes can be used to cover restricted corners. A colour pigment, catalyst and accelerator will be added to uncoloured gel-coat immediately prior to application. Single or multiple coatings may be required on surfaces.

Laminating process

Following curing of the gel-coat, layers of chopped strand mat (CSM) emulsion are either laid by hand roller or sprayed onto the gel-coat. Following application of the correct number of layers and curing, catalyst is added to the laminating resin, which is applied by rollers or squeegee.

For thermally cured resins, the article may be placed in an oven and cured at the required temperature. Following curing, the article is removed from the mould and any protruding resin or CSM is removed by sanding or trimming.

The finished articles will be packaged and transported to a storage area for distribution to customers or point of sale.

6. HUMAN HEALTH IMPLICATIONS

6.1 Exposure assessment

6.1.1 Occupational exposure

NUMBER AND CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
<i>Transport and storage</i>			
Transporting from dock to customer's site for warehousing (loading/unloading trucks)	2-3	2-3	5-10
<i>Laminating/coating</i>			
Preparing resins and application to article mould	100	1-6	200

EXPOSURE DETAILS

Transportation and storage

Workers involved in transport and storage of imported resins may be exposed to the notified chemical in the case of an accident where packaging is breached.

Laminating/Coating processes

Workers involved in applying resins to articles may be exposed to the notified chemical at < 0.01% from oral, dermal and inhalation routines.

During gel-coating, exposure may occur from mixing of resin with other components, and during application by roller or spray and cleaning of tools. Breathing aerosol and/or mist is possible when material is sprayed.

During lamination, workers may also be exposed during resin mixing and application using hand roller or spray. If articles require thermal curing, increased exposure to vapours is likely during loading/unloading into ovens.

Following curing, workers may be exposed to resin dusts during edge trimming and sanding operations.

Due to the presence of styrene as the solvent in the resins, workers (including laminators and workers applying

coatings) are expected to wear protective clothing including a filter face masks to protect against breathing fumes or resin dusts and chemical resistant gloves to protect against skin irritation. In addition, the work area is expected to be force ventilated or exhausted to maintain levels of airborne contaminants below relevant exposure limits for styrene.

Once the resin is completely cured, a rigid cross-linked polymer is produced and negligible amount of notified chemical in unreacted form will be available for exposure.

6.1.2. Public exposure

The notified chemical will be imported at < 0.01% in resin products for industrial use only. Public exposure to the notified chemical will therefore be negligible, even in the event of an accidental spillage during transport.

Exposure to the notified chemical from end-use products will also be negligible, as once the resin is completely cured, a rigid cross-linked polymer is produced, with negligible amount of notified chemical in unreacted form.

6.2. Human health effects assessment

No toxicity data were submitted. Given the low molecular weight of the notified chemical and its log K_{ow} of 0.12, it is likely to be significantly absorbed following oral, dermal or inhalation exposure. However, the notified chemical is calculated to have a low vapour pressure of 4.95×10^{-7} kPa at 25°C, imported in solution at < 0.01% and thus inhalation exposure is not expected.

The notified chemical contains a structure similar to structural alerts which may have irritating and sensitising potential. No study was available for irritation or sensitisation, however, the notifier has classified the notified chemical as irritating to eyes, respiratory system and skin.

A positive *in vitro* genotoxicity result for the notified chemical has been reported only in a chromosomal aberration assay using Chinese hamster fibroblast cells (Nutrition research, 1984).

Health hazard classification

Based on the limited information provided, the notified chemical cannot be classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

However, the notified chemical has been classified by the notifier as irritating to eyes, respiratory system and skin (R36/37/38).

6.3. Human health risk characterisation

6.3.1. Occupational health and safety

Based on the limited information provided, the notified chemical may be an irritant to eyes, respiratory system and skin, and may have sensitising and genotoxicity potential.

Given the very low concentration of the notified chemical (< 0.01%) in the resin and expected use of personal protective equipment by workers to minimise the exposure to hazardous solvent in the product, exposure to the notified chemical is expected to be negligible for application workers; hence the risk to these workers from use of the notified chemical is not considered unacceptable.

6.3.2. Public health

As the public will not be exposed to the notified chemical except in the cured end-use products where negligible amount of notified chemical is in unreacted form, the risk to the public from exposure to the notified chemical is expected to be low.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1 Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified chemical will be imported into Australia in finished resin product. Accidental spills and leaks during transport are expected to be physically contained and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

During lamination/coating procedures, the mixing and application of the components containing the notified chemical will be conducted in a mould. Hand rollers, brushes or chopper spray guns are also used to apply the resin. The tools are cleaned with solvent which is expected to be collected and dried. Using the chopper gun method, an estimated 1-2% of the resin may be released as overspray. The overspray and any spillages of the resin are expected to be collected on sand spread on the factory floor to facilitate the daily cleanup. The sand-resin mixture as well as dusts from exhaust ventilation, dried cleaning waste and mould trimmings will be disposed of to landfill.

The notified chemical is consumed during the polymerisation process.

RELEASE OF CHEMICAL FROM DISPOSAL

Empty containers may be reused or discarded directly to landfill. In case of spills, resins will be contained and adsorbed with inert adsorbents (e.g. sand) and sealed in containers for disposal. Resin waste (containing the notified chemical) and spent fabricated end-use products such as boat hulls and bathtubs will be sent to landfill or the notified chemical will be thermally decomposed during metal reclamation.

7.1.2 Environmental fate

No environmental fate data were submitted. The notified chemical is not expected to be released to aquatic environments. The majority of the notified chemical will be consumed during the polymerisation process and immobilised within a cured polymerised resin matrix on coated articles. The majority of the notified chemical will be disposed of to landfill and thermally decomposed during metal reclamation. In landfill and during metal reclamation the notified chemical is expected to degrade to water and oxides of carbon and nitrogen.

7.1.3 Predicted Environmental Concentration (PEC)

The notified chemical is not expected to be released to surface waters.

7.2. Environmental effects assessment

No ecotoxicity data were submitted. It is expected that the notified chemical will react to form the analogue chemical if it is exposed to the aquatic environment. The analogue of the notified chemical and hence the notified chemical are estimated to have moderately low log K_{ocs}, are anticipated to be readily water soluble and hence are expected to partition to water. However, the analogue chemical's low log K_{ow} (0.12) indicates the analogue and hence the notified chemical are not expected to bioaccumulate.

7.2.1 Predicted No-Effect Concentration

Since no ecotoxicity data were submitted and the notified chemical is not expected to be exposed to the aquatic compartment, the PNEC was not calculated.

7.3. Environmental risk assessment

All spillages, trimmings, dried cleaning waste and overspray of the notified chemical are expected to be disposed to landfill. The majority of the notified chemical will be consumed during the polymerisation process and immobilised within a cured polymerised resin matrix on coated articles rendering it unavailable to the environment. Since there is expected to be limited exposure to aquatic organisms, the notified chemical is therefore not expected to pose an unacceptable risk to the environment based on its proposed use pattern.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

Based on the limited information provided, the notified chemical cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC:1008(2004)).

However, the notified chemical has been classified by the notifier as irritating to eyes, respiratory system and skin (R36/37/38).

Human health risk assessment

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

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

Environmental risk assessment

On the basis of the reported use pattern, the notified chemical is not expected to pose a 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 chemical in resin products at < 0.01%, 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 chemical are classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)], workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified chemical should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(2) of the Act; if

- the function or use of the chemical has changed from an additive at < 0.01% in polyester resins, or is likely to change significantly;
- the amount of chemical being introduced has increased from 1 tonne per year, or is likely to increase, significantly;
- the chemical has begun to be manufactured in Australia;
- additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

No additional secondary notification conditions are stipulated.

Material Safety Data Sheet

The MSDS of product containing the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES**Boiling Point** 328.26°C (pressure unknown) (analogue)

Method Adapted Stein and Brown method
Remarks EPI Suite 4.00

Density 1020 ± 60 kg/m³ at 20°C (analogue)

Remarks Calculated using ACD/I-lab service.

Vapour Pressure 4.95 × 10⁻⁷ kPa at 25°C

Method Modified Grain method
Remarks EPI Suite 4.00. Calculated for an analogue of the notified chemical.
Test Facility US EPA (2009)

Water Solubility 47.92 g/L at 25°C

Method WSKOW (v1.41)
Remarks EPI Suite 4.00. Calculated for an analogue of the notified chemical.
Test Facility US EPA (2009)

Partition Coefficient (n-octanol/water) log K_{ow} = 0.12

Method KOWWIN (v1.67)
Remarks Experimental database match. Calculated for an analogue of the notified chemical.
Test Facility US EPA (2009)

Adsorption/Desorption log K_{oc} = 1.143, 1.785

Method KOCWIN (v2.00)
Remarks The two values were calculated by the Kow and MCI methods respectively. Calculated for an analogue of the notified chemical.
Test Facility US EPA (2009)

Flash Point 109.5 ± 24.3°C (pressure unknown) (analogue)

Remarks Calculated using ACD/I-lab service.

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- NOHSC (1994) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.
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- NTC (National Transport Commission) 2007 Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code), 7th Edition, Commonwealth of Australia
- US EPA (2009) Estimations Programs Interface Suite™ for Microsoft® Windows, v 4.00. United States Environmental Protection Agency. Washington, DC, USA.