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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in RP0971

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act* 1989 (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 National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Aged Care.

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Director
Chemicals Notification and Assessment

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1. APPLICANT

Akzo Nobel Pty Ltd of 51 McIntyre Rd, Sunshine, Victoria 3020 (ABN 59 000 119 424) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) "Polymer in RP0971". .

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and purity and the site and volume of manufacture have been exempted from publication in the Full Public Report.

Marketing names: Polymer in RP0971

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition and have been exempted from publication in the Full Public Report.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
Appearance	Clear viscous liquid	
Melting point	Approximately 50-100ºC	Very broad softening point.
Density	1250 kg/m^3	Calculated
Water solubility	Not determined.	Insoluble in water.
Particle size	Not applicable	Imported as a solution
Flammability	Upper Explosive Limit = 6.0 % Lower Explosive	Polymer solution.

	Limit = 0.8 %	
Flash Point	47°C (closed cup)	Polymer solution.
Autoignition temperature	471°C	Polymer solution.
Explosive properties	Not explosive.	
Vapour Pressure	2.67 kPa at 20°C	Polymer solution.
Stability/reactivity	Incompatible with amines. Avoid contact with strong alkalis, strong mineral acids and strong oxidising agents.	Polymer solution.
Hydrolysis as function of pH	Not determined.	The polymer is not expected to undergo hydrolysis.
Partition coefficient	Not determined	
Adsorption/desorption	Not determined	
Dissociation constant	Not determined	

5.1 Comments on physical and chemical properties

The water solubility of the notified polymer, a polyester, was not determined. Polyesters are known to be insoluble in water. According to the notifier, the polymer is designed to be insoluble in water and soluble in organic solvents with a high hydrocarbon content.

The partition coefficient was not determined. The polymer is expected to partition into the n-octanol phase as it is soluble in organic solvents.

Hydrolysis was not determined. Saponification of esters may take place under extreme conditions such as elevated temperatures, and in the presence of acid or base catalysts. However, in the absence of a catalyst, and under ambient temperatures and in pH conditions found in the environment, no hydrolysis of the notified polymer is anticipated. The polymer is not expected to undergo hydrolysis, thermal degradation, photodegradation or depolymerisation under normal environmental conditions.

The adsorption coefficient was not determined. The polymer is not expected to be mobile in soils due to its low water solubility.

The dissociation constant was not determined. The polymer is not ionic and is therefore not expected to dissociate. Although it may contain a small amount of free carboxylic acid functionalities expected to have typical acidity.

6. USE, VOLUME AND FORMULATION

Use:
The notified polymer will be used as a film-forming component of paint that will be used only in industrial applications as a primer for heat cured external coil coating.

Manufacture/Import volume:
The notified polymer is to be manufactured in Australia. Akzo Nobel intends to manufacture less than 500 tonnes of the notified chemical per year.

Formulation details:
The notified polymer is manufactured at approximately 240ºC in an enclosed reactor. It is cooled to approximately 200ºC and transferred via an insulated pipe to a thinning tank containing solvent where the polymer solution is formed with agitation of the mixture. The polymer solution RP0971 contains 60% w/w notified polymer in light aromatic naphtha solvent solution. RP0971 is transferred from the thinning tank to a 30 000 L bulk storage tank via insulated pipes under local exhaust ventilation and stored onsite until required.

During the production of the paint formulations, RP0971 is pumped from the bulk storage tank directly to the paint formulation vessel where it is blended with other components. The formulated paint is transferred via pipes under local exhaust ventilation to 200 litre drums or 1000 L bulk containers. The blended paint formulations contain the notified polymer at between 10-30%. Paint formulations are stored onsite until transported to the user's facility.

The paint formulations are applied at the user's facility, either as supplied or after thinning. The paint formulations are pumped into a paint tray and applied by roller coating to a continuous steel coil or flat strip by and then heat cured. Solvents are removed during baking.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
Manufacture (polymer synthesis)		
Reactor operators (20 workers, 4 hours per day, 50 days per year), vessel charging and sampling, drum filling.		
Dermal and occular	Possible dermal and ocular exposure to drips, spills and splashes when taking samples for testing and during filling of the 30 000 L bulk storage tanks.	The polymer solution is manufactured in enclosed vessels in fixed areas with local exhaust ventilation. Operators wear safety glasses at all times and gloves, overalls and respirators as required.
Formulation (paint manufacture)		
Paint plant operators (20 worker per year, 4 hours per day, 100 days per year), vessel charging and sampling, drum filling.		
Dermal and occular	Possible dermal and ocular exposure when charging mixing vessel, during paint synthesis, when taking samples for testing	The paint is formulated in enclosed vessels in fixed areas with local exhaust ventilation. Operators wear safety glasses at all times and gloves, overalls

	and during filling of the 200 L drums or 1000 L bulk containers.	and respirators as required.

Quality control and development (polymer solution and paint synthesis)

Laboratory technicians/QC operators (4 workers per year, 4 hours per day, 150 days per year), testing and troubleshooting.

Dermal	Possible dermal exposure to drips and spills when performing laboratory tests.	Testing is performed in laboratories with local exhaust ventilation. Operators wear safety glasses at all times and gloves, overalls and respirators as required.

Development personnel (10 workers per year, 4 hours per day, 50 days per year), product development.

Dermal	Possible dermal exposure to drips and spills when performing laboratory tests.	Testing is performed in laboratories with local exhaust ventilation. Operators wear safety glasses at all times and gloves, overalls and respirators as required.

Maintenance (polymer solution and paint manufacture)

Maintenance personnel (2 workers per year, 1 hours per day, 25 days per year), breakdown repair.

Dermal	Possible dermal exposure to drips and when performing repairs.	Maintenance personnel wear safety glasses at all times and gloves, overalls and respirators as required.

End use (heat cured external coil coating)

Forklift drivers (18 workers, 8 hrs per day 250 days per year)

Dermal	Exposure to the polymer is unlikely except in cases of accidental spillage.	Not specified.

Coating operators (36 workers, 8 hrs per day 250 days per year), paint solution thinning, solution pumping, coil coating and heat curing.

Dermal and inhalation	Possible dermal exposure to spills and splashes when thinning the paint solution. Possible dermal exposure to drips and spills when connecting pump lines between the tanks or drums and the coating operations. Possible inhalation and dermal exposure to fumes during coating and baking.	The coating system will be located in a bunded area or a bulk vessel. The coating process is controlled from a panel that is removed from the application site. The baking system uses a fully enclosed air forced oven. Local exhaust ventilation is present in areas used for set-up, application, and baking. Personal protective equipment, such as gloves and safety glasses, will be available.

Transport and storage

Transport and storage personnel (number not specified), handle and transport the polymer

(60% notified polymer) and paint (10-30%) solutions.

Dermal	Exposure to the polymer and paint solutions is unlikely except in cases of accidental spillage.	Storage personnel wear safety glasses at all times and gloves, overalls and respirators as required.

8. PUBLIC EXPOSURE

The notified polymer is intended for industrial use only and will not be sold to the public. Public exposure through manufacture, storage and disposal is likely to be negligible. There is a low probability of public contact with spillage as a result of a transportation accident. Public exposure to the polymer in the paint of finished products is expected to be negligible, as the polymer is bound to the paint during curing and not biologically available.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

Release during manufacturing of the notified polymer, blending of the polymer-solvent blend, and formulation of the paint is expected to be minimal, but waste could be generated as a result of accidental spills, residues on filters and in drums, and in discarded wash solvent and off-specification test samples. An estimated 5-10 kg of polymer is expected to remain as residues on filters, another 15-25 kg may remain in empty drums, about 15 kg of polymer will reside in wash solvent residues, and 5 kg will be discarded test samples. This equates to a total of about 55 kg per month or 660 kg per year of polymer generated for disposal as a result of residues and wastes from the manufacturing and blending processes.

Incidental spills will be contained by bunding, and collected for disposal. All of the solid wastes generated during manufacturing and blending are discarded in landfill or by incineration, while liquid wastes are discarded through an authorised waste disposal facility. Drums are collected by licensed drum dealers for recycling.

Release during coil coating at customer sites is not expected. All excess paint left after application to the metal coil substrate is returned to the Day Tank and is continually recycled and reused. Release is possible in the event of accidental operational spills. However, all spills are contained on site by bunding, and are collected and placed in labelled containers for disposal through a licensed dealer. Empty drums are collected for recycling by licensed drum dealers and it is expected that the residue remaining in the drums will be disposed of by the dealers through the appropriate channels. Any coated metal, which is rejected after curing, is recycled through a metal recycling facility. Approximately 100 tonnes of steel is disposed of through metal recyclers each month.

Release at end use from coil coated products is not expected because once the polymer is cured it will be inert.

9.2. Fate

Ultimately, most of the notified polymer will form an inert, heat-cured coil coating on steel. The fate of the polymer will therefore follow the fate of the steel products onto which it is

coated. About 660 kg per year of notified polymer wastes generated from manufacturing and blending may be disposed of directly into the environment. Most of this material will be either incinerated or sent to landfill.

At the end of their useful life, most of the household appliances containing the notified polymer coating will be disposed of in landfill through domestic waste collection, or recycled for scrap metal. Metal recycling processes will expose the polymer to high temperatures in blast furnaces and destroy the polymer, converting it to oxides of carbon and water vapour. Polymer incorporated as coating on domestic appliances which are disposed of in landfill would degrade over much longer time scales after being released from the metal substrates by degradation processes such as rusting.

Polymer wastes generated during manufacturing and disposed of by incineration would result in destruction of the polymer and release of oxides of carbon and water vapour. Polymer wastes disposed of directly in landfill, would eventually enter the soil environment, where it is expected to remain and not leach out due to its low water solubility. No degradation data were provided in the notification dossier. However, the polymer is not expected to degrade rapidly, but rather will undergo slow degradation through biotic and abiotic processes.

Under normal usage, the notified chemical is not expected to enter the aquatic environment. In any case, the polymer is not soluble in water. The polymer is not expected to cross biological membrane or bioaccumulate, given the high molecular weight.

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The MSDS for the product RP0971 (which contains the notified polymer at 60% w/w) indicates it is harmful if swallowed, can result in eye and skin irritation, and is toxic by inhalation. The toxic effects indicated are due to the presence of solvents and not the notified polymer.

The MSDS for the paint product (which contains the notified polymer at 10-30%) indicates it is also harmful if swallowed, can result in eye and skin irritation, and is toxic by inhalation. Again the effects indicated are due to the presence of solvents and other additives and not the notified polymer.

One polymer constituent is a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999) and is classified as Irritating to Eyes. One additive/adjuvant present in the polymer is classified as harmful, as it may cause lung damage if swallowed and may cause cancer. A second additive/adjuvant, as well as being flammable, is also classified as harmful when in contact with skin and irritating to eyes.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided in the notification dossier.

12. ENVIRONMENTAL RISK ASSSESSMENT

The notified polymer is not expected to pose a significant hazard to the environment. Most of the polymer will form inert, heat-cured coil coating on steel. At the end of their useful life, the steel products will be recycled for scrap metal or disposed of in landfill. Metal recycling will destroy the polymer converting it to oxides of carbon and water vapour. Polymer incorporated in domestic appliances discarded in landfill would degrade over the longer term.

A small amount of polymer may enter the environment directly as a result of wastes generated during the manufacturing and blending processes. Most of the wastes will be sent to landfill or incinerated. In landfill, the polymer is expected to eventually enter the soil environment where it will be broken down through biotic and abiotic processes. Incineration will destroy the polymer and release oxides of carbon and water vapour.

Under normal usage, the notified chemical is not expected to enter the aquatic environment. The polymer will not cross biological membrane or bioaccumulate, given the high molecular weight.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

The notified polymer in RP0971 is considered stable under normal conditions of use. No toxicological information has been provided for the notified polymer, however, due the high molecular weight and lack of reactive functional groups, it is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). Since the notified polymer has a high NAMW, absorption across biological membranes would be restricted.

13.2. Occupational health and safety

The notified polymer will be manufactured in Australia and blended into paint that is used only in industry as a primer for coil coating. Exposure to the notified polymer in its pure form (97% notified polymer) is expected to constitute the most significant exposure scenario. Reactor operators may be exposed to polymer dust during formulation of the product RP0971 (60% w/w notified polymer). The use of an enclosed vessel and local exhaust ventilation and personal respirators should serve to limit inhalation exposure.

Dermal and ocular exposure of reactor and paint plant operators to the 60% notified polymer solution may occur when taking samples for testing, during connecting and disconnecting pump lines during drum filling and reaction vessel charging. Laboratory technicians and development and maintenance personnel are only expected to receive incidental dermal contact to RP0971. The use of gloves, safety goggles and overalls should serve to limit dermal and ocular exposure.

Dermal exposure of paint plant operators to the paint product (10-30% notified polymer) may occur when taking samples for testing, during connecting and disconnecting pump lines during drum filling. Laboratory technicians and development and maintenance personnel are

only expected to receive incidental dermal contact to the paint product. In all cases the use of personal protective equipment, such as gloves and safety glasses, should limit exposure.

Coating operators may experience dermal and ocular exposure to spills and splashes of the paint product (10-30% notified polymer) when connecting pump lines between the tanks or drums and the coating operations and when thinning the paint solution. The use gloves and safety glasses should limit dermal exposure. Possible inhalation and dermal exposure to fumes may also occur during coating and baking. Inhalation and dermal exposure to fumes of the notified polymer during coating and baking is unlikely, as the coating process is controlled from a panel that is removed from the application site, the baking system uses a fully enclosed air forced oven, and both occur in the presence of a local exhaust ventilation.

The notified polymer becomes biologically unavailable for absorption once it is incorporated in the paint during curing. The health risk for workers handling products coated with paint containing the notified polymer is considered to be negligible.

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the polymer or paint solutions other than in the event of an accidental spill.

Given the risk reduction measures indicated and that the notified polymer is unlikely to be hazardous, Polymer in RP0971 is of low concern to human health and safety in the workplace.

13.3. Public health

Given that public exposure is expected to be negligible, it is considered that Polymer in RP0791 will not pose a significant risk to public health when used in the proposed manner.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of 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, 1994a). It is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

The label for the notified polymer 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.

15. RECOMMENDATIONS

Control Measures

Occupational Health and Safety

- 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.

15.1 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.

16. REFERENCES

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National Occupational Health and Safety Commission (1994a) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Australian Government Publishing Service, Canberra.

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National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]. In: Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999a) List of Designated Hazardous Substances [NOHSC:10005(1999)]. Australian Government Publishing Service, Canberra.

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