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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in Setalux 6756 AQ-40

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Director
NICNAS

TABLE OF CONTENTS

FULL PUBLIC REPORT

Polymer in Setalux 6756 AQ-40

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Nuplex Industries (Aust) Pty Ltd (ABN: 25 000 045 572)
49-61 Stephen Road
Botany NSW 2019

NOTIFICATION CATEGORY
Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Polymer identity, Manufacture/Import Volume

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)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Polymer in Setalux 6756 AQ-40

MOLECULAR WEIGHT (MW)
Number Average Molecular Weight (Mn) >1000

REACTIVE FUNCTIONAL GROUPS
The notified polymer contains only low concern functional groups.

3. PLC CRITERIA JUSTIFICATION

Criterion	*Criterion met*
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazardous Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. PHYSICAL AND CHEMICAL PROPERTIES

Comments	The notified polymer is not isolated during the manufacturing process. It is manufactured as a 40% aqueous dispersion.
Appearance at 20°C and 101.3 kPa	White viscous liquid
Melting Point/Glass Transition Temp	Not determined. Polymer not isolated from dispersion.
Density	1040 kg/m^3 for the aqueous polymer dispersion. Estimated to be 1010 kg/m^3 for the polymer itself.
Water Solubility	The polymer is not soluble in water. The polymer is manufactured in situ in water and is represented by the solid content in the resultant aqueous dispersion. Further, as the polymer consists mainly of hydrophobic components and a very small % of an anionic constituent, the water solubility is expected to be low.
Dissociation Constant	pKa_1 of free acid around 4.85-4.90. Successive pKa's are progressively higher (towards 7). The polymer contains a small amount of anionic functionality expected to have typical acidity.
Reactivity	Stable under normal environmental conditions
Degradation Products	None under normal conditions of use

5. INTRODUCTION AND USE INFORMATION

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	300-1000	300-1000	300-1000	300-1000	300-1000

USE AND MODE OF INTRODUCTION AND DISPOSAL

Mode of Introduction

The notified polymer will be manufactured at Nuplex Industries (Aust) Pty Ltd, 1-5 Gibson Street Wangaratta, Victoria 3677. The notified polymer will be manufactured as a 40% aqueous dispersion and then sold for formulation into coating products.

Reformulation/manufacture processes

Manufacturing

At the manufacturing site, the raw materials are charged to the reactor (5000 L registered pressure vessel fitted with a condensor), stirred, and the prescribed thermal cycle followed under controlled conditions to manufacture the notified polymer. All vapours from monomers and water are contained due to the presence of a condensor and returned through piping to the sealed reactor. After polymerisation is complete, the resulting dispersion containing 40% of the notified polymer is pneumatically pumped through a sealed filter into intermediate bulk storage (20–30 tonne tanks) or directly into Intermediate-Bulk Containers (IBCs, 1000 L) or 200 L drums for transport.

Reformulation

At customer sites, the dispersion is pumped from its packaging container into mixing tanks where it is blended with other raw materials to produce water-based surface coatings, both pigmented and unpigmented (clear coats) for the painting of timber products. The finished coatings will contain approximately 4-36% of the notified polymer. Although the processes are likely to be carried out on a large scale and be semi-automated, at some sites the polymer may be manually poured. Similarly the filling of surface coatings into a range of container sizes (500 mL, 1 L, 4 L and 20 L) is likely to be

semi-automated at most but not all reformulation sites.

End use
The surface coatings will be applied to mainly timber substrates by industrial painting operations, trade painters or home handymen. Although the notifier did not specify the methods of application, it is likely that the coatings would be applied through spraying, rollers and paint brushes.

Use
Surface coating for timber substrates

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

OCCUPATIONAL EXPOSURE
Manufacturing
Dermal and ocular exposure to the notified polymer could occur during the manufacturing process at four stages:

(1) During testing of the dispersion to check for complete polymerisation. This is achieved through purpose built sampling valves;
(2) Cleaning of the reactor, filters and product tanks after manufacture and packing off. This is done by hosing down the equipment with water;
(3) In the case of accidental spillage during filtering and packing off; or
(4) During quality control checks by laboratory technicians

However, exposure to significant amounts of the notified polymer is limited because of the engineering controls and personal protective equipment worn by workers. PPE includes, safety glasses, gloves, safety footwear and protective clothing (overalls for manufacture workers and laboratory coats for laboratory technicians).

Transport and Storage
During transport and storage, workers are unlikely to be exposed to the notified polymer except when packaging is accidentally breached.

Reformulation
Dermal and ocular exposure to the notified polymer (at a concentration up to 40%) may occur during the reformulation process. Appropriate engineering controls are expected to prevent significant exposure to the notified polymer.

End use application of paint
The potential exposure of workers to coatings containing the notified polymer may vary, depending on the scale of painting operations and mode of application, eg spray, roller or brush. It is expected that appropriate engineering controls would reduce or prevent inhalation exposure during spray application.

PUBLIC EXPOSURE
Paint containing the notified polymer at up to 36% may be used by home handymen. Dermal and ocular exposure may occur during the painting process but good work practices and use of appropriate clothing (including gloves and safety glasses) is stated on the material safety data sheet.

After application and once dried, the paint containing the notified polymer is cured into an inert matrix and is hence unavailable.

6.2. Toxicological Hazard Characterisation

No toxicological data were submitted. The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

6.3. Human Health Risk Assessment

OCCUPATIONAL HEALTH AND SAFETY

The OHS risk presented by the notified polymer is expected to be low for manufacturers, formulators and end-users, based on the expected low hazard of the notified polymer. Workers are instructed to wear protective clothing and equipment and are warned against possible irritation to eyes, respiratory tract and skin.

PUBLIC HEALTH

The notified polymer is intended for use by trade painters and home handymen (up to 36% notified polymer). The notified polymer is present in products in significant concentrations, however, as the polymer is considered to be of low hazard, with appropriate personal protective equipment the overall risk to the public from exposure to the notified polymer is low.

Members of the public may make dermal contact with products containing the notified polymer. However, the risk to public health will be low because the notified polymer is bound within a matrix and is unlikely to be bioavailable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Exposure Assessment

ENVIRONMENTAL RELEASE

During Polymer manufacture

Any vapours generated during the manufacture of the polymer will be caught in the condenser attached to the reaction vessel with the resultant condensate being returned to the reactor. After the polymerisation is complete, the polymer dispersion is pumped through enclosed filters to bulk storage tanks or directly to transport containers. The main source of release of the notified polymer is process equipment cleaning with a minor amount lost due to spillages, these account for up to 5% of the annual volume of the notified polymer manufactured (i.e. up to 50 tonnes annually). The cleaning is done by hosing with water with the resultant wash-water being collected and then transferred to the Wangaratta liquid trade waste treatment plant. The treatment plant carries out biological oxidation and polymer flocculation with the resultant waste water passing through a settling pond discharge point and the sludge (containing the flocculated polymer) going to landfill. Flocculated polymer and polymer film from drying of the dispersion are expected to be inert in the environment.

During Coating manufacture

The main sources of release of the notified polymer during coating manufacture include spillage (up to 1% or 10 tonnes), transport/storage container residues (up to 2%) and the cleaning of coating manufacture equipment (up to 2%). Any liquid effluent generated during cleaning operations (containing up to 20 tonnes of notified polymer annually) is likely to be disposed of via a licensed liquid waste contractor who will treat it. The polymer is likely to end up in the resultant sludge, which will be disposed of to landfill. Any spilt material will be contained, collected with absorbent material and placed in suitable containers and disposed of to landfill. Empty containers with any residual notified polymer (up to 20 tonnes annually) will be disposed of via licensed solid waste contractors to landfill or to incineration.

During Coating Use

The coatings containing the notified polymer will be used by professionals and the general public (DIY projects) and will be applied via roller, brush or spray gun. Depending on the age and type of the spray gun, the amount of overspray can generally vary from 30% (the newer HPLV spray guns) to 70%, however an overspray of 30% is generally accepted (i.e. up to 300 tonnes annually). Since the paint is water-based, it is assumed that 5% (i.e. up to 50 tonnes) of the brush and roller use mainly by handymen will be released to the sewer through washing of painting equipment.

The residues in empty coating containers will be allowed to solidify and then will be disposed of with the container to landfill either in domestic recycling programs or via licensed solid waste contractors. It is estimated that up to 2% of the notified polymer will be disposed of in this manner annually.

Any spilt material will be contained, collected and disposed of to landfill.

After application to timber products and once dried, the coating containing the notified polymer is cured into an inert matrix and is hence unavailable for exposure.

ENVIRONMENTAL FATE

The notified polymer's high molecular weight suggests that it is unlikely to cross biological membranes and bioaccumulate. As the notified polymer is not water soluble, if released to water it would be expected to partition to sediments.

Although the disposal quantity of the notified polymer is relatively large, the waste will be disposed of mainly in landfill in a dispersed manner and in solid form. Any waste water containing the notified polymer from cleaning of the application/manufacture equipment will be treated at a waste treatment plant.

In landfill, solid wastes containing the notified polymer will be immobile and will not leach into the aquatic compartment, but should slowly degrade and become associated with the soil matrix. Although the notified polymer contains hydrolysable groups, hydrolysis will not occur in the environmental pH range due to low water solubility.

7.2. Environmental Hazard Characterisation

No ecotoxicological data were submitted. 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. The highest toxicity is when the acid is on alternating carbons of the polymer backbone. 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.

7.3. Environmental Risk Assessment

The coating products, containing the notified polymer, are likely to be used throughout Australia. The major environmental exposure is expected to be due to the disposal of waste from the coatings manufacture and overspray to landfill and from the washing of brushes and rollers to sewer. If spilt on land, the notified polymer is expected to become immobilized in the soil layer. Waste generated during paint manufacture and spray application, which are expected to be landfilled either directly or in resultant sludges, account for up to 37% of the annual volume of notified polymer produced (i.e. up to 370 tonnes annually). It is estimated that up to 5% (i.e. up to 50 tonnes of notified polymer annually) may be discharged to sewer in domestic wash waters due to the washing of brushes and rollers. Due to its expected low water solubility, the polymer will remain bound within the soils and sediments of the landfill and be slowly degraded by abiotic processes.

If it is assumed that 5% of notified polymer will eventually be released into the aquatic environment as a result of washing of brushes and rollers, a worst-case scenario daily PEC can be calculated as follows, assuming there is no adsorption or degradation in the sewer prior to release:

Amount released to sewer (5% of max. amount manufactured in a year)	50 tonnes
Number of days coating used	365
Population in Australia	20.1 million
Amount water used per person	200 L
PEC_{sewer}	$\frac{50\ 000\ 000\ 000\ mg}{365x200x20\ 100\ 000\ L}$ = 0.034 mg/L = 34 μg/L
$PEC_{inland\ water}$ (dilution 1:1)	34 μg/L
PEC_{ocean} (dilution 1:10)	3.4 μg/L

As noted above, aquatic toxicity is expected to be low providing sufficient safety margin.

The majority of the notified polymer will remain attached to the timber product and will be disposed of with the timber at the end of its useful life this may be either to landfill or incineration. If incinerated then the polymer will be destroyed with the release of water and oxides of carbon and nitrogen.

Given the above, the overall environmental risk is expected to be acceptable.

8. CONCLUSIONS

8.1. Level of Concern for Occupational Health and Safety

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

8.2. Level of Concern for Public Health

There is No Significant Concern to public health when used in the proposed manner.

8.3. Level of Concern for the Environment

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

9. MATERIAL SAFETY DATA SHEET

9.1. 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.

10. 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 the polymer manufacturer to minimise environmental exposure during manufacture of the notified polymer:
  - All process areas should be bunded with any drains present going to an onsite treatment plant or collection point.

Disposal

- The notified polymer should be disposed of to landfill or by incineration, where available.

Emergency procedures

- Spills and/or accidental release of the notified polymer should be handled by containment, collection with an inert absorbent material and then placed in a sealable, labelled container ready for disposal as per local/state regulations.

10.1. 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.