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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in ACRONAL® AX 9056

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FULL PUBLIC REPORT

Polymer in ACRONAL® AX 9056

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
BASF Australia Ltd (ABN: 62 008 437 867)
500 Princes Highway
Noble Park VIC 3174

NOTIFICATION CATEGORY
Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Chemical Identity, Details of Polymer, Manufacture 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)
ACRONAL® AX 9056 (~50% notified polymer in water)

MOLECULAR WEIGHT (MW)
Number Average Molecular Weight (Mn) >10000

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

SPECTRAL DATA An FTIR spectrum of the notified polymer was provided.

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
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	The polymer dispersion in water appears as a milky white liquid.
Melting Point/Glass Transition Temp	23°C
Density	1140 kg/m^3
Water Solubility	The notified polymer is miscible in water.
Dissociation Constant	Not determined. Potentially anionic functional groups are present in the notified polymer.
Particle Size	Not applicable.
Reactivity	The notified polymer is stable under the conditions of use as it will not hydrolyse, undergo thermal or photodegradation and will not depolymerise.
Degradation Products	Burning of the polymer is likely to release oxides of carbon and oxides of nitrogen.

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	1000-3000	1000-3000	1000-3000

USE AND MODE OF INTRODUCTION AND DISPOSAL

Mode of Introduction

Manufactured as a 50% polymer dispersed in water.

Reformulation/manufacture processes

Manufacture

The notified polymer in dispersion will be manufactured in Australia at the notifier's site at Kororoit Creek Road, Altona, Victoria, 3018. Production will involve a batch polymerisation process, using separate feed lines of prepared raw materials (eg. catalysts, surfactants), and monomers feeding directly into a reaction vessel. The reaction is typically fed over a number of hours with a polymerisation reaction taking place in the reaction vessel. At the completion of the reaction, the polymer dispersion is transferred via pump to an outloading vessel, which could hold up to 200 tonnes of finished product. The polymer is manufactured as a 50% dispersion in water. After manufacture, the notified polymer will be filtered and filled into road tankers. Local exhaust ventilation will be utilised.

Paint manufacture

The polymer is intended for one customer and will be shipped by road using a bulk road tanker (typically about 22 tonnes). It will be discharged into a bulk storage tank at the paint manufacturing site of the customer.

The notified polymer will be used in the manufacture of water-based paints. The notified polymer will be metered directly from the bulk storage tank by pipeline to the industrial mixer. Manufacturing typically involves pumping of the polymer dispersion with other ingredients such as fillers, thickeners, biocides and pigments into an industrial mixer. The final concentration of polymer in the paint formulation will be 5-20%. The next stage of manufacture will involve high speed dispersion of the ingredients and blending within the mixer. The viscosity of the paint formulation will then be adjusted and further testing performed. All quality control testing of paint involving spray painting is performed in an approved booth subject to regular maintenance procedures. The finished paint will be filtered and filled into 500mL, 1L, 4L and 20L metal cans. Exhaust ventilation will be in place over the mixers and filling facilities to capture vapour emissions from volatiles used in the paint manufacturing process.

End use
The final paint products are expected to be used by a large number of professional painters and domestic users. The paint containing the notified polymer is likely to be applied by spray guns, brushes or rollers. For roller applications, the finished paint is likely to be stirred and poured into drip trays.

Use
Acrylic binder for use in water-based architectural paints.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

OCCUPATIONAL EXPOSURE
Transport and warehousing personnel
Workers involved in the transport of the notified polymer dispersion, and the finished paint products, as well as warehousing personnel (maximum of 5, maximum exposure of 10 minutes per week for 47 weeks per year) are not expected to be exposed to the notified polymer, except in the case of an accident. Workers are expected to wear long sleeve clothing. In the case of spillage, overalls, impervious gloves and goggles will be worn.

Manufacture and laboratory personnel
The maximum exposure concentration of the notified polymer during such processes will be approximately 50%. Dermal and ocular exposure may potentially occur during the manufacture of the notified polymer. However, exposure is limited because the manufacturing processes are fully automated and enclosed. Operators can come into contact with the product when transferring it via hoses or cleaning out vessels and filters.

Dermal and ocular exposure may occur during filtration of the notified polymer following manufacture, and the filling of road tankers. This should be reduced by the use of local exhaust ventilation. Approximately 1-2 bulk road tankers per week will be loaded with the product, together with intermediate bulk container (IBC) packing (approx. 3-4 packs per week). The number of production operators is expected to be no more than 20, with the expected exposure a maximum of 1 hour per day for 50 days per year for the road tanker, and 40 minutes per week for the IBCs. A maximum of 5 laboratory personnel would conduct in-process testing (30 minutes per day) for 50 days per year.

Paint manufacture
During paint manufacture, the maximum concentration of the notified polymer to which workers are likely to be exposed is approximately 50%. There is potential for dermal and ocular exposure of workers to the notified polymer, perhaps by spills and drips of the polymer dispersion during mixing/blending. However, exposure should be minimised by the automation of the processes, and the wearing of overalls, impervious gloves and goggles. Up to 40 workers (approx. 25 production operators and 15 laboratory technicians) may be exposed to the notified polymer for approximately 30 minutes per day, 47 weeks per year.

During adjustment and testing of the paint formulation, workers may be exposed to the notified polymer by dermal, ocular or inhalation routes, perhaps by drips and spills of the polymer dispersion. This may affect up to 10 workers for 8 hours a day, 40 days per year. Such workers will wear overalls, impervious gloves, and goggles. Spray paint testing will be carried out in a ventilated spray paint booth and thus exposure should be minimised. Use of a respiratory device would further minimise the inhalation of aerosols. In addition, the low vapour pressure of the notified polymer should mean that inhalation hazard is low. During laboratory quality control tests, dermal exposure will be minimised by the use of protective gloves, laboratory coats, and safety glasses with side shields.

Dermal and ocular exposure of workers to the notified polymer may occur when the finished paint product is filtered and filled into the metal cans. Local exhaust ventilation will be in place to minimise such routes of exposure and workers will wear overalls, impervious gloves and goggles.

End use
Dermal, ocular and inhalation exposure of professional painters to the notified polymer is likely to occur during the use of the paints by spraying, or using brushes or rollers. Exposure may occur when stirring the finished paint and pouring into drip trays prior to roller brushing. Users could be exposed during cleaning of equipment. Professional users are likely to wear overalls, impervious gloves and goggles, and respirators may also be used during spray application. The concentration of the notified polymer to which users will be exposed is 5-20%. After coating and curing, the polymer coalesces and cross-links, forming an inert paint film that would not be bioavailable.

PUBLIC EXPOSURE
Public exposure to the notified polymer during the manufacturing and distribution process is unlikely.

The notified polymer will be blended into paints to a final concentration of 5-20% and distributed to customers in standard 0.5 to 20L containers. A large number of domestic users will apply the paint containing the notified polymer by means of spray, brush or roller. The use of personal protective clothing, gloves, goggles and if necessary, a respirator is recommended, though such measures can not be controlled. Public exposure to the notified polymer via the use of architectural paints will be considerable. However, there should be low adsorption of the notified polymer by exposed humans due to the high molecular weight of the polymer. After coating and curing, the polymer coalesces and cross-links, forming an inert paint film that would not be bioavailable.

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, based on the minimal exposure to workers and the low intrinsic hazard of the polymer.

PUBLIC HEALTH
The notified polymer is intended for use by a large number of domestic painters. Although the wearing of personal protective equipment during use is recommended, it can not be controlled. Where exposure occurs, the low hazard of the polymer translates to low risk. Following application and curing, 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 low.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Exposure Assessment

ENVIRONMENTAL RELEASE
Manufacture
The product containing the notified polymer will be manufactured at one site in Victoria. Manufacture involves a batch polymerisation process, using separate feed lines of prepared raw materials and monomers feeding directly into a reaction vessel. At the completion of the reaction, the polymer dispersion is transferred via pump to an out-loading vessel (final composition is 50% dispersion in water). After manufacture the notified polymer will be filtered and filled into road tankers.

Reformulation
Reformulation takes place for the production of water based paints. Here the product containing the notified polymer will be discharged into a bulk storage tank and will be delivered from the storage tank by pipeline to processing equipment. Reformulation involves pumping of the polymer dispersion with other ingredients such as fillers, thickeners, biocides and pigments into an industrial mixer (final concentration of notified polymer is between 5 and 20%). The next step involves high speed dispersion of the ingredients and blending with the mixer. Finally the finished product will be filtered and filled into 0.5 to 20 litre containers.

End User
The final product will be used by professional painters and domestic users Australia wide.

Release
Waste generation during formulation. Manufacture happens in a closed system where waste generation has been calculated as follows:

- 0.7% per year from filtration, filling operations and minor spillages, which will be released to STP.
- 1% per year from cleaning up minor spills, cleaning out of manufacture equipment and rinsing out the bulk storage tank. The aqueous waste will be disposed of through a licensed waste disposal contractor. Following treatment the solids from the polymer latex and paint will be buried in approved landfill.

Waste generation during reformulation. The customer has an on-site effluent treatment plant where waste production is treated as follows:

- solids are flocculated out
- clear water is discharged to waste
- solid flocculated material is sent to a prescribed waste contractor
- a maximum of 2% is released to wastewater during this process
- In the case of spillage, the polymer latex will be contained on site by bunding or absorbed using inert material

Waste generation during end use. The polymer is also released to the environment during washings of paint application equipment and disposal of empty cans. The notifier stated that waste generation during end-use was 4000 kg, where 3000 kg is sent to landfill and 1000 kg is released to STP. However, this calculation is considered to be low for domestic use and a default value is used for total waste of 4%, where 1% is disposed to STP and 3% is sent to landfill.

ENVIRONMENTAL FATE
Given the expected low water solubility and the high molecular weight, the notified polymer disposed of to landfill is expected to associate with soil and organic material and should be immobile and persistent to degradation within the landfill environment. Over time, the notified polymer is expected to degrade by biotic and abiotic means to form oxides of carbon and nitrogens.

A percentage of the notified polymer is expected to be released to the STP during manufacture (2.7%) and end-use (1%). Based on the typical use of the notified polymer, a worst-case (assuming no partitioning to sludge within the sewage treatment works) and a mitigation case (assuming 70% partitioning to sludge within the sewage treatment works) predicted environmental concentration (PEC) had been estimated for release during formulation and end-use.

Process or Dilution Factor	Formulation (0% removal)	Formulation (70% removal)	Australia Wide
Typical notified polymer use expected per year	8190 kg	8190 kg	30000 kg
Typical notified polymer use expected per day	1170 kg	1170 kg	82.2 kg
Number of days used per year	265	265	365
STP daily Volume	395 ML	395 ML	4000 ML
Concentration in effluent from sewage treatment plant	782 µg/L	235 µg/L	20.55 µg/L
Predicted environmental concentrations (PECs) in receiving waters			
Ocean (Dilution Factor 1:10)			
PEC	78 µg/L	23 µg/L	2.05 µg/L
River (Dilution Factor 1:1)			
PEC	782 µg/L	235 µg/L	20.55 µg/L

In the STP the notified polymer is likely to sorb to the solid phase due to the expected low water solubility, large molecular weight and chemical composition. Therefore, it is expected that the notified

polymer will be mainly found in the solid phase with a small amount in the water phase.

The potential for bioaccumulation is also low mainly due to the large molecular weight of the notified chemical.

A SIMPLETREAT model cannot be used for mitigation due to the lack of data. However, mitigation can be done by using the analogue removal results (>70% was removed during activated sludge treatment). This value is only an indication as the name or chemical composition of the analogue is unknown.

7.2. Environmental Hazard Characterisation

No ecotoxicological data were submitted for the notified polymer. Information on environmental endpoints was provided in the MSDS for ACRONAL AX 9056. The data was based on an analogue structure (identity of the analogue is not known).

Using the effect test concentration of >100 mg/L and a safety factor of 1000 (based on no experimental results for the notified polymer) for fish/Daphnia/algal acute toxicity endpoints, a Predicted No Effect Concentration (PNEC) for aquatic ecosystems of >0.10 mg/L is estimated.

Endpoint	*Result*	*Test Guideline*
Fish Toxicity	EC50 >100 mg/L	OECD TG 203
Daphnia Toxicity	EC50 >100 mg/L	OECD TG 202
Algal Toxicity	EC50 >100 mg/L	OECD TG 201
Inhibition of Bacterial Respiration	EC50 >100 mg/L	OECD TG 209

7.3. Environmental Risk Assessment

	Location	PEC* µg/L	PNEC µg/L	Risk Quotient (RQ)
Formulation release - 0% removal	Ocean outfall	78*	>100	<0.78*
	Inland River	782*	>100	<7.82*
Formulation release - 70% removal	Ocean outfall	23**	>100	<0.23**
	Inland River	235**	>100	<2.35**
Australia wide release	Ocean outfall	2.05*	>100	<0.02*
	Inland River	20.55*	>100	<0.21*

* The worst-case PEC and the RQ values calculated assuming the notified chemical is not removed during the STP process.
** The PEC and RQ values calculated assuming the notified chemical is >70% removed during the STP process.

The resulting risk quotient (RQ = PEC/PNEC) values for on site release to the aquatic environment, assuming that the chemical is not removed in the communal STP, is greater than 1 for freshwater environment indicating an unacceptable risk for this aquatic compartment. However, the RQ for STP releasing to the marine environment indicated an acceptable risk.

The resulting risk quotient (RQ = PEC/PNEC) values for on site release to the aquatic environment, assuming that 70% of the chemical is removed in the communal STP, is greater than 1 for freshwater environment indicating an unacceptable risk for this aquatic compartment. However, the RQ for STP releasing to the marine environment indicate an acceptable risk.

The resulting risk quotient (RQ = PEC/PNEC) values for Australia-wide release to the aquatic environment, assuming that the chemical is not removed in the communal STP, is < 1 for freshwater and marine environment indicating no risk for these aquatic compartments.

The above RQ values are based on the analogue structure results, which may not represent the notified polymer behaviour during the STP process. Based on the chemical composition of the notified polymer and molecular weight, the majority of the notified polymer is expected to be absorbed to sludge and expected to pose an acceptable risk to the health of aquatic life.

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 considered to pose no significant 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

Disposal

- The notified polymer should be disposed of by landfill or incineration.

Emergency procedures

- Spills and/or accidental release of the notified polymer should be handled by using absorbent material and dispose the absorbent material in accordance to regulation.

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.