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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in XR1004 Acrylic Polymer Solution

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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FULL PUBLIC REPORT**Polymer in XR1004 Acrylic Polymer Solution****1. APPLICANT**

PPG Industries Australia Pty Ltd of McNaughton Rd, CLAYTON, VIC 3169 (ACN 055 500 939) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Polymer in XR1004 Acrylic Polymer Solution.

2. IDENTITY OF THE CHEMICAL

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

Trade names: XR1004 Acrylic Polymer Solution

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition 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

The notified polymer is produced in solution in water, n-butanol and 2-butoxyethanol and is never isolated. The physico-chemical properties below are for the polymer solution unless otherwise stated.

Property	Result	Comments
Appearance	clear viscous liquid	
Melting point	not determined	the notified polymer is never isolated from solution

Density	1040 kg/m ³ (solution) 1190 kg/m ³ (notified polymer, calculated)	
Water solubility	highly soluble	
Flammability	not determined	the notified polymer is never isolated from solution
Explosive properties	not explosive	
Stability/reactivity	stable under normal environmental conditions	
Hydrolysis as function of pH	not determined	the notified polymer contains ester groups which may hydrolyse at extreme pH
Partition coefficient	not determined	
Adsorption/desorption	not determined	
Dissociation constant	not determined	pH of solution is 7

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer will be manufactured in Australia and isolated as an intermediate in the production of another polymer which will be used as a packaging coating. The production of the notified polymer and further reaction to produce the final coating polymer will take place at a single site.

Manufacture/Import volume:

The notifier estimates that 220 tonnes of notified polymer will be manufactured per annum during the first two years of manufacture, increasing to 630 tonnes notified polymer per annum in years three to five.

Formulation details:

The notified polymer will be produced as a 40 % solids solution in water, n-butanol and 2-butoxyethanol, and never isolated. This solution will be stored in 200 L polylined steel drums, then charged into the reactor where the final coating polymer is produced.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
Manufacture		
<i>Manufacture, drum filling and further reaction (9 workers, 8 h/day, 10 days/year)</i>		
dermal, 40 % solution	workers may be exposed to drips and spills of polymer solution while	enclosed reactor; local exhaust ventilation used during transfers

connecting and disconnecting impervious gloves, coveralls and transfer hoses and cleaning reactor, safety goggles will be worn also during sampling and testing

Laboratory development

Polymer manufacture (3 workers, 8 h/day, 10 days/year)

dermal, 40 % solution	polymer solution expected to be handled in small quantities under laboratory conditions	local exhaust ventilation impervious gloves, coveralls and safety goggles will be worn
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Surface coating manufacture and testing (3 workers, 8 h/day, 20 days/year)

dermal, 40 % solution	polymer solution expected to be handled in small quantities under laboratory conditions	local exhaust ventilation impervious gloves, coveralls and safety goggles will be worn
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8. PUBLIC EXPOSURE

The notified polymer will not be sold separately or be available to the public and will not be transported away from the site of manufacture. Exposure of the general public to the notified polymer is therefore unlikely, except in the case of an accidental spill.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

There is the possibility for release of the notified polymer at all stages of the manufacturing process. The notifier estimates that up to 4000 kg per annum of the notified polymer may be released during the manufacturing process. Up to 1500 kg of the polymer is expected to be released as a result of cleaning the reactor while accidental spills during drum filling and emptying may result in the release of 500 kg per annum. The remaining 2000 kg per annum is due to residues in the storage drums.

Any spills that occur during the manufacturing process will be contained to the plant by bunding.

9.2. Fate

The notified polymer is a resin intermediate for packaging coatings and will undergo conversion to another polymer at the production plant. The notified polymer will not leave the manufacturing site.

The polymer is never isolated from solution and liquid waste containing the notified chemical that is generated during the manufacturing process will be collected by licensed waste contractors for incineration.

Any spills will be contained by bunding at the plant and hence there should be no release to waterways or sewer.

Storage drums may be recycled on site with liquid residues generated incinerated by licensed waste contractors. In addition, the drums may be sent to recyclers for cleaning by incineration.

In the event of accidental release to the environment, the notified chemical will be mobile due to its high water solubility. There is potential for chelation with Mg^{2+} and Ca^{2+} ions present in water resulting in a neutral species that may associate with soils and sediments (Boethling, 1997). The notified polymer is not expected to cross biological membranes or bioaccumulate due to its high molecular weight (Connell, 1990).

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The health hazards of the constituents and hazardous impurities, additives and adjuvants are tabulated below.

Chemical	Health hazards (NOHSC, 1999a)	Regulatory controls (NOHSC, 1995)
Constituents		
No residual monomers are present at concentrations where they may present a hazard in the use of the notified polymer.		
Hazardous impurities		
none present		
Additives/adjuvants		
n-butanol	Harmful by inhalation	Exposure standard 50 ppm peak limitation; skin notation
2-butoxyethanol	Harmful by inhalation, in contact with skin and if swallowed Irritating to respiratory system	Exposure standard 25 ppm TWA; skin notation

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided. As the notified polymer contains an amino counter ion, it may show some toxicity to aquatic organisms. However, although amines are of high concern due to their ecotoxicity, in this case a close analogue of the amine counterion is only slightly toxic to fish (Verschuere, 1996) and exposure of the notified polymer to the aquatic compartment is likely to be low.

12. ENVIRONMENTAL HAZARD (RISK) ASSESSMENT

Manufacture of the notified polymer will be site limited. It will be prepared and further reacted at the same site. The notifier estimates that up to approximately 4 tonnes per year of notified polymer will be released and incinerated with waste. When incinerated, the notified polymer will be converted to water vapour and oxides of carbon and nitrogen. There should be no release of the notified polymer to sewer.

The low environmental exposure of the polymer as a result of the proposed manufacture and use indicates the overall environmental hazard should be low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). The notified polymer is not expected to be a hazardous substance because of the lack of reactive functional groups and because the high molecular weight will prevent absorption across biological membranes.

The polymer solution XR1004 is a hazardous substance, due to the presence of co-solvents. The Material Safety Data Sheet (MSDS) for the polymer solution XR1004 lists a number of potential health effects, including headaches, dizziness, nausea, vomiting and irritation of the eyes, skin, stomach and respiratory system, along with liver, kidney and blood disorders on repeated exposure. These relate mainly to the co-solvents, n-butanol and 2-butoxyethanol, rather than the notified polymer.

13.2. Occupational health and safety

The only potential for significant occupational exposure to the notified polymer will occur during manufacture, drumming off and reactor charging for further reaction.

During these processes, the main exposure route for the notified polymer will be dermal. The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin. Standard protective measures including local exhaust ventilation, coveralls, protective eyewear and impervious gloves used during these processes should provide sufficient protection against the notified polymer.

There are NOHSC exposure standards for the two co-solvents, n-butanol and 2-butoxy ethanol, and both solvents have skin notation, indicating that dermal absorption may be a significant source of exposure. The employer is responsible for ensuring that these exposure standards are not exceeded in the workplace.

The notified polymer presents a low hazard to human health, and the control measures required due to the more hazardous components of the notified polymer solution will ensure sufficient protection against the notified polymer itself.

Conclusion

The notified polymer is of low concern to human health and safety and no specific risk reduction measures are necessary.

13.3. Public health

The notified polymer will be site limited and will not be available to the public. The risk to the general public of the notified polymer is considered to be low.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of the notified polymer solution 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 solution 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

To minimise occupational exposure to Polymer in XR1004 Acrylic Polymer Solution, the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards for all of the components of the polymer solution are not exceeded in the workplace;
- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used;
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c).

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

- (i) any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of Polymer in XR1004 Acrylic Polymer Solution becomes aware of any of these circumstances, they must notify the Director within 28 days; or
- (ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

17. REFERENCES

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