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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in RW0978

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.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, National Occupational Health and Safety Commission, Plaza level, Alan Woods Building, 25 Constitution Avenue, Canberra ACT 2600 between 9 AM and 5 PM Monday to Friday.

Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

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Director
Chemicals Notification and Assessment

TABLE OF CONTENTS

FULL PUBLIC REPORT

Polymer in RW0978

1. APPLICANT

Akzo Nobel Pty Ltd and BASF Akzo Nobel Automotive OEM Coatings Pty Ltd both of 51 McIntyre rd Sunshine Victoria 3020 have submitted a limited notification statement in support of their application for an assessment certificate for Polymer in RW0978.

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 details of exact import volume and customers have been exempted from publication in the Full Public Report and the Summary Report.

Marketing Name:	Polymer in RW0978.
Other Names:	RW0978. Modified epoxy resin. FDR-9500 Solution.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C & 101.3 kPa:	Milky liquid emulsion (polymer solution)
Melting Point:	Not determined
Specific Gravity:	1.05 (aqueous solution)
Vapour Pressure:	Not determined – see comments below
Water Solubility:	Not determined – see comments below
Partition Co-efficient (n-octanol/water):	Not determined – see comments below
Hydrolysis as a Function of pH:	Not determined – see comments below
Adsorption/Desorption:	Not determined – see comments below

Dissociation Constant:	Not determined – see comments below
Particle Size:	Not applicable – the polymer is in emulsion form
Flash Point:	Not applicable – the polymer is in a non-flammable aqueous emulsion
Flammability Limits:	Not available – the polymer is combustible but not flammable
Autoignition Temperature:	Not determined
Explosive Properties:	Not explosive
Reactivity/Stability:	Stable under normal conditions. The polymer degrades above 150-175°C and is incompatible with strong mineral acids, strong alkalis and strong oxidising agents.

3.1 Comments on Physico-Chemical Properties

The vapour pressure of the notified polymer was not determined for this notification. However based on its MW and structure, the notified polymer is not expected to be volatile.

The water solubility was not determined for this notification. The notifier indicates that while the notified polymer is part of a water based formulation, it is not soluble in water but is infinitely dispersible. The resinous particles of the emulsion are stabilised by the ionisation of amine groups on the polymer.

The partition coefficient was not determined for this notification. The notifier indicates that due to the notified polymer's low water solubility it is expected to partition into the organic phase.

The notified polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, in the environmental pH range of 4 to 9, significant hydrolysis of these is unlikely to occur due to low water solubility.

The notifier indicates that no adsorption/desorption tests were conducted for this notification. In its emulsified form, as a consequence of its hydrophobicity and cationic nature, the notified polymer is expected to associate with the soil matrix and sediments and as such will be immobile in soil.

No dissociation constant tests were conducted for the notified polymer although it is fully ionised. However, at the usual environmental pH of above 5 the ionized amine groups are expected to dissociate to the free amine.

4. PURITY OF THE CHEMICAL

Details of the purity of the notified polymer have been exempted from publication in the Full Public Report and the Summary Report.

Hazardous Impurities:	None
Non-hazardous Impurities (> 1% by weight):	None
Additives/Adjuvants:	None
Maximum Content of Residual Monomers:	All residual monomers are present at less than 0.1 %.

5. USE, VOLUME AND FORMULATION

The notified polymer is manufactured in Australia and incorporated into a locally manufactured emulsion (RW0978) that forms part of an automotive primer paint. The polymer emulsion will be supplied to a car manufacturer as part of a primer for application onto car bodies and parts.

The notified polymer is manufactured in a closed reactor then converted into an intermediate aqueous emulsion. The emulsion containing the polymer in RW0978 is transferred via enclosed lines to a closed blend tank where additional components e.g. stabilisers, are added to form the final paint additive emulsion ("finished emulsion"). The finished emulsion is then stored prior to transport in bulk containers.

At the paint application site, the finished emulsion will be unloaded from bulk transport containers through enclosed transfer lines to an electrocoat tank where the emulsion is mixed with other paint components prior to application to automotive bodies and parts. The primer will be applied by a dipping process then cured by oven baking. This coating is usually covered by layers of other surface coatings.

The notified polymer will be present in the emulsion at 27.5 % and in automotive paints at < 10 %.

Polymer in RW0978 (the notified polymer) will be manufactured at less than 20 tonnes/year for 5 years.

6. OCCUPATIONAL EXPOSURE

Manufacture of Polymer Solution and Final Paint Emulsion

Although the notified polymer and final paint additive emulsion are manufactured in closed vessels, several groups of workers may receive transient dermal and/or ocular exposure to the notified polymer during routine operations. Twenty-five reactor operators working 12 hours/day for 80-100 days/year may be exposed by skin contact to the polymer during quality analysis sampling of the RW3210 polymer emulsion (containing <30% polymer) and finished

emulsion (containing <30% polymer). Exposure may also occur from inadvertent leaks and during transfer of finished emulsion to storage tanks. Quality sampling is conducted under exhaust ventilation and so inhalation exposure is unlikely. Two maintenance personnel working 1-2 hours/day for 80-100 days/year may be exposed also via the skin and eyes during routine equipment upkeep. Reactor operators and maintenance personnel will wear chemical resistant gloves, coveralls, and goggles. Organic vapour respirators may also be used to minimise exposure to the organic solvents present.

Four on-site storage/transport personnel working 2-4 hours/day for 100-130 days/year may be exposed to the polymer during storage prior to bulk transport. Ten transport personnel working 1-2 hours/day for 40-50 days/year will be responsible for transport of the bulk emulsion to the end-user. Bulk filling will be conducted under exhaust ventilation. Again, exposure to the finished emulsion containing <30% polymer is likely to be limited to splashes to skin and eyes as a result of manipulation of transfer lines. In addition to the use of enclosed vessels and transfer lines and local exhaust ventilation to control exposure during the manufacture process, plant personnel will also wear chemical resistant gloves, coveralls and goggles. Organic vapour respirators may also be used if required. This personal protective equipment will be worn to minimise exposure to the notified polymer and other components of the paint additive emulsion.

Laboratory Analysis – Emulsion

Five laboratory technicians/chemists working 12 hours/day for 80-100 days/year may be exposed to the notified polymer during sample analysis. Exposure to the notified polymer and other emulsion ingredients in the laboratory environment will be controlled through the use of ventilated fume cupboards and personal protective equipment consisting of coveralls/laboratory coats, gloves and safety glasses conforming to recognised standards.

Storage and Transport

The notified polymer is transported for end-use in the form of an emulsion to be added to automotive primer paint. The emulsion will be transported in bulk tanker. Exposure to the notified polymer during storage and transport would be considered low and would only be envisaged following accidental puncture of the bulk containers.

End Use (Paint Mixing and Application)

At the car manufacturing facility, the finished emulsion will be unloaded by up to 10 tank operators working 1-2 hours/day for 20 days/year from bulk transport containers through enclosed transfer lines to an electrocoat tank where the emulsion is mixed with other paint components prior to application to automotive bodies. At this point, the polymer is present at <10%. Skin contact with the notified polymer may occur during transfer and mixing operations. Ten application/curing operators working 1-2 hours/day for 20 days/year may be exposed to the notified polymer during application of the final paint to automotive bodies and parts by dipping. Subsequent curing of the paint by oven baking will occur under exhaust ventilation. Although this is a totally enclosed automated process, dermal and ocular exposure of these workers may occur as a result of accidental splashes. Two maintenance personnel working 1-2 hours/day for 15 days/year who will conduct routine equipment upkeep may be exposed similarly. Tank operators, application/curing operators and maintenance personnel will wear chemical resistant gloves, coveralls, and goggles. Organic

vapour respirators may also be used.

After curing, the notified polymer will be locked in a paint matrix and so worker exposure at this stage is not possible.

Laboratory Analysis – Final Paint

Five laboratory technicians/chemists working 1-2 hours/day for 50 days/year may be exposed to the notified polymer (at <10%) during sampling of final paint. Exposure to the polymer and other paint ingredients will be controlled through the use of ventilated fume hoods and personal protective equipment consisting of coveralls/laboratory coats, gloves and safety glasses conforming to recognised standards.

7. PUBLIC EXPOSURE

The emulsion containing less than 10 % of the notified polymer will not be sold to the public and the application will be restricted to car manufacturers. The public will be exposed to the notified polymer only in the event of spills or leaks during transportation of the finished emulsion. Any contact that occurs is most likely to be dermal and of an infrequent and transient nature. As a component of a cured automotive primer paint layer covered by additional layers of paint, the notified polymer will be inaccessible to human contact. Therefore the potential for public exposure is low.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

During coatings production, the notifier estimates that up to 120 kg per annum of waste containing the notified polymer will be generated from cleaning up minor spills and quality control testing. The notifier further estimates that up to 110 kg per annum of the notified polymer will be disposed of during coating application and up to 20 kg will be disposed of during bulk tank cleaning.

8.2 Fate

The majority of the notified polymer will be combined with other coating components where heat induces reaction of alcohol with isocycanate groups to form a very high molecular weight and stable coating. Therefore, once incorporated into the coating formulation, the notified polymer is expected to be immobile in the environment. As the coating degrades over time, any fragments, chips and flakes of the coating will be of little concern as they are expected to be inert. The metal panels and car bodies coated with the polymer are likely to be either recycled for steel reclamation or placed into landfill at the end of their useful life. When recycled the polymer would be destroyed in furnaces and converted to water vapour and oxides of carbon and nitrogen.

The notified polymer in waste from spills and equipment cleaning will be passed through interceptor pits and treated on-site by flocculation. The resulting solid containing the notified

polymer will be dried followed by disposal into landfill while the water will be tested prior to release into the sewer. Wastewater resulting from the cleaning of bulk transportation tanks will be collected and used in the formulation of new polymer batches.

As a consequence of its hydrophobic nature, the notified polymer is expected to associate with the soil matrix and sediments and not be mobile in landfill where it will slowly degrade. The notified polymer is not expected to cross biological membranes due to its high molecular weight and is therefore not expected to bioaccumulate (Connell 1990).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided for the notified polymer. However, the high molecular weight of the polymer indicates that it would be unlikely to cross biological membranes readily. Therefore, the toxicity of the polymer is anticipated to be low.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of the notified polymer will be combined with other coating components to form a very high molecular weight and stable coating. Therefore, once incorporated into the coating formulation, the notified polymer is expected to be immobile and pose minimal risk to the environment.

The notified polymer in waste from spills and equipment cleaning will be passed through interceptor pits and treated on-site by flocculation. The resulting solid containing the notified polymer will be dried followed by disposal into landfill while the water will be tested prior to release into the sewer. Wastewater resulting from the cleaning of bulk transportation tanks will be collected and used in the formulation of new polymer batches.

As a consequence of its hydrophobic nature, the notified polymer is expected to associate with the soil matrix and sediments. The notified polymer is not expected to cross biological membranes due to its high molecular weight and is therefore not expected to bioaccumulate.

The notified polymer is not likely to present a hazard to the environment when it is stored, transported and used in the proposed manner.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Hazard Assessment

No toxicological data have been provided for the notified polymer. However, given its high molecular weight, low proportion of reactive functional groups (amine groups) and low concentration of residual monomers, the notified polymer is unlikely to be a hazardous

substance in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances (NOHSC 1999). The systemic toxicity of the notified polymer is likely to be low, given its high molecular weight and consequent low bioavailability.

The Material Safety Data Sheet (MSDS) for RW0978 emulsion indicates that the emulsion may be irritating to skin and eyes and may cause kidney and liver damage if swallowed; these effects are based on the effects of organic solvents present in RW0978.

Occupational Health and Safety
The notified polymer is manufactured and emulsified in closed vessels. The resulting polymer emulsion is then transferred in enclosed lines to a closed blend tank where additional components are added to form the final paint additive emulsion. After sampling for quality analysis, the aqueous emulsion is then stored prior to transport in bulk containers.

The notified polymer is never isolated and therefore exposure to the polymer for process, maintenance and laboratory workers would only occur from contact with diluted polymer emulsion or final paint additive containing <30% notified polymer. Contact may result in slight skin and eye irritation. However, given the engineering controls and personal protective equipment worn by these workers, the low probability of exposure and likely low systemic toxicity of the notified polymer renders the overall health risk for workers involved in polymer manufacture low.

The notified polymer is transported in bulk containers for end-use in the form of an emulsion to be added to automotive primer paint. The potential for exposure to the notified polymer during storage and transport would be considered low and would only be envisaged following accidental puncture of the bulk containers. Therefore the health risk for transport workers would be assessed as low.

The paint additive containing the notified polymer will be mixed in an electrocoat tank which will be used to coat automotive bodies and parts by dipping. At this point, exposure to diluted notified polymer (<10%) would only occur as a result of contact with the final paint. As this process is automated, the possibility of exposure is low and would be envisaged only following accidental spillage during routine operations, maintenance or laboratory analysis. Given the likely low toxicity of the notified polymer, the health risk to these workers involved in end use would be assessed as low.

Following curing of the paint, the polymer will be cross-linked with other paint components to form a high molecular weight stable film. In this form, the polymer is essentially unavailable for absorption and thus the health risk to workers from the notified polymer after paint curing would be negligible.

Public health
The very low likelihood of contact with the notified polymer and the low toxicity of the notified polymer suggest that the notified polymer will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

Control Measures

Occupational Health and Safety

No specific precautions are required to control exposure to the notified polymer. However, the following precautions should be taken when handling the aqueous emulsions and paints containing the notified polymer:

- Good ventilation;
- Protective eyewear, impermeable gloves and chemical resistant industrial clothing and footwear.

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.

Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

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.

No additional secondary notification conditions are stipulated.

14. MATERIAL SAFETY DATA SHEET

The MSDS for RW0978 was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REFERENCES

Connell, D.W. (1990). General Characteristics of Organic Compounds Which Exhibit Bioaccumulation. In: Bioaccumulation of Xenobiotic Compounds, pp. 47-57. CRC Press, Boca Raton, USA.

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

National Occupational Health and Safety Commission (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

Attachment 1

The Draize Scale (Draize, 1959) for evaluation of skin reactions is as follows:

Erythema Formation	*Rating*	*Oedema Formation*	*Rating*
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale (Draize *et al*., 1944) for evaluation of eye reactions is as follows:

CORNEA

Opacity	*Rating*	*Area of Cornea involved*	*Rating*
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	*Rating*	*Chemosis*	*Rating*	*Discharge*	*Rating*
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	*Rating*
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe

Draize, J. H., Woodward, G., Calvery, H. O. (1944) Methods for the Study of Irritation and Toxicity of Substances Applied Topically to the Skin and Mucous Membranes, J. Pharmacol. Exp. Ther. 82 : 377-390.

Draize J. H. (1959) Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. Association of Food and Drug Officials of the US, 49 : 2-56.