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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in RC0977

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 Ageing.

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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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Chemicals Notification and Assessment

TABLE OF CONTENTS

FULL PUBLIC REPORT.....	4
1. APPLICANT	4
2. IDENTITY OF THE CHEMICAL.....	4
3. PHYSICAL AND CHEMICAL PROPERTIES	4
3.1 Comments on Physico-Chemical Properties	5
4. PURITY OF THE CHEMICAL.....	6
5. USE, VOLUME AND FORMULATION	6
6. OCCUPATIONAL EXPOSURE	6
7. PUBLIC EXPOSURE	8
8. ENVIRONMENTAL EXPOSURE.....	9
8.1 Release	9
8.2 Fate.....	9
9. EVALUATION OF TOXICOLOGICAL DATA	9
10. ASSESSMENT OF ENVIRONMENTAL EFFECTS	9
11. ASSESSMENT OF ENVIRONMENTAL HAZARD	9
12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS.....	10
13. RECOMMENDATIONS	12
14. MATERIAL SAFETY DATA SHEET	13
16. REFERENCES	13

FULL PUBLIC REPORT**Polymer in RC0977****1. APPLICANT**

Akzo Nobel Pty Limited and BASF Akzo Nobel Automotive OEM Coatings Pty Ltd both of 51 McIntyre Road, SUNSHINE, VICTORIA, 3020 have submitted a [limited](#) notification statement in support of their application for an assessment certificate for **Polymer in RC0977**.

2. IDENTITY OF THE CHEMICAL

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

Other Names: Polymer in RC0977
Acrylic resin

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is never isolated as a defined entity so most physicochemical data are for the polymer solution RC0977.

Appearance at 20°C & 101.3 kPa: RC0977 is a viscous pale yellow liquid with a solvent odour

The aqueous suspension (containing the notified polymer) is a non volatile, milky non viscous liquid.

Melting/Boiling Point: Not determined (the polymer decomposes before boiling)

Density: 0.94 at 20°C (RC0977)

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 as polymer is in solution form
Flash Point:	14°C for the imported polymer solution
Flammability Limits:	Not available; the notified polymer does not form flammable vapours; the polymer solution is expected to have flammability limits between 1.2% (LEL)-8% (UEL)
Autoignition Temperature:	Not determined
Explosive Properties:	Not explosive
Reactivity/Stability:	Under normal ambient conditions, the polymer and products containing it are considered stable. The polymer solution can react with strong alkalis, strong mineral acids and/or strong oxidising agents

3.1 Comments on Physico-Chemical Properties

The vapour pressure of the notified polymer was not determined. However based on its Molecular weight and structure, the notified polymer is not expected to be volatile.

The water solubility was not determined. The notified polymer is not expected to be water-soluble. This is consistent with its predominantly hydrocarbon structure, though it is noted that close to 10% of an amine functionality, plus a minor amount of free carboxylic acid, both expected to increase water solubility, are present.

The partition coefficient was not determined for the notified polymer. 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 is unlikely to occur due to low water solubility.

The notifier indicates that no adsorption/desorption tests were conducted for this notification. As a consequence of its hydrophobic 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. However, the

notified polymer contains about 10% of a tertiary amine and a small amount of carboxylic acid functional groups, both expected to have typically basicity and acidity.

The imported solution containing the notified polymer is classified as a Flammable liquid Class 3, packing group II. It is shipped in UN approved steel drums and according to the international Maritime Dangerous Goods Code.

The finished emulsion containing RC0977 is not classified as Dangerous Goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code, 1998). The finished emulsion will be stored in a bulk storage tank.

4. PURITY OF THE CHEMICAL

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

Maximum Content of Residual Monomers:	All residual monomers are present at less than 0.01%.
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5. USE, VOLUME AND FORMULATION

The notified polymer will be imported as part of a polymer solution called RC0977 (containing 50% notified polymer) in bulk containers. RC0977 is formulated in Australia as part of an aqueous emulsion (containing 0.98% notified polymer). The aqueous emulsion is an intermediate product, which is then blended with other ingredients to form a finished emulsion (containing 0.9% notified polymer). The finished emulsion is to be stored on-site in bulk containers, transported to car manufacturing facilities by road transport and applied to car bodies as a primer in an automated paint application process.

Transport of the emulsion will be in bulk by a road tanker. The size of the load will be from 20-25 KL but smaller volumes may occasionally be transported.

The notified polymer is ultimately a small component (<0.1%) of the automotive primer. The primer will be applied by a dipping process, then cured by oven baking. This coating will be covered by further layers of other surface coatings.

The import volume is less than 20 tonnes per year for the first 5 years.

6. OCCUPATIONAL EXPOSURE

Workers are likely to be exposed to the notified polymer during the following activities:

- Storage and transport of the imported polymer in RC0977 to the formulation plant.
- Formulation of the intermediate aqueous emulsion and the finished emulsion.
- Transport of the finished emulsion to the car manufacturing facility and application of the paint primer.

Dockside and transport personnel are unlikely to be exposed to the imported polymer solution

in RC0977 unless there is accidental puncture of the bulk containers.

Formulation of aqueous emulsion and finished paint emulsion

Formulators:

Although the intermediate aqueous emulsion and final paint additive emulsion are formulated 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 polymer emulsion (containing <1% polymer) and finished emulsion (containing <1% 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. One to 2 maintenance personnel working up to 2 hours/day for 80-100 days/year may be exposed also via the skin and eyes during routine equipment cleaning and maintenance.

In addition to the use of enclosed vessels and transfer lines and local exhaust ventilation to control exposure during the formulation 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 (PPE) will be required to control exposure not only to the notified polymer but also to other components of the paint additive emulsion, for example, organic solvents.

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 PPE consisting of coveralls/laboratory coats, gloves and safety glasses conforming to recognised standards.

Storage and Transport

Four on-site storage/transport personnel working 2-4 hours/day for 100-130 days/year may be exposed to the polymer during storage of the finished emulsion and loading in tankers prior to bulk transport.

Bulk filling will be conducted under exhaust ventilation. Again, exposure to the final emulsion containing <1% polymer is likely to be limited to splashes to skin and eyes as a result of manipulation of transfer lines.

The notified polymer is transported for end-use in the form of an emulsion (finished emulsion) to be added to automotive primer paint. Ten transport personnel working 1-2 hours/day for 40-50 days/year will be responsible for transport of the bulk emulsion in 20-25 kL lots to the end user.

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 end-user site, the finished aqueous 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 the immersion tank where the emulsion is mixed with other paint components prior to application to automotive bodies. At this point, the polymer is present at <1% and the process is fully enclosed and automated. 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 an 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. Workers involved in application and maintenance will wear chemical resistant gloves, coveralls and goggles. Organic vapour respirators may also be worn if required. Details of personal protective equipment to be worn by these workers involved in end-use have not been provided.

After curing, the notified polymer will be locked in a paint matrix and so worker exposure at this stage is unlikely.

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 <1%) 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

Members of the public may be exposed to the notified polymer contained in the imported formulation or in the locally produced aqueous emulsion following transport accidents. Such accidents are unlikely. The regulated disposal of any waste containing the notified polymer means that environmental contact with the notified polymer is also unlikely. The products containing the notified polymer are not available to the public. In its end use, the notified polymer is a bound cross-linked component of the cured primary paint coat of vehicle metal body work and is not accessible to human contact. The primary coating is covered by several other coats of paint and public contact with the notified polymer is further prevented. The potential for public exposure to the notified polymer is assessed as negligible.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

During coatings production, up to 70 kg per annum of waste containing the notified polymer will be generated from cleaning up minor spills and quality control testing. Further estimates of up to 45 kg per annum of the notified polymer will be disposed of during coating application and up to 10 kg of the notified polymer during bulk tank cleaning.

8.2 Fate

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 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 will be 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 import drums and 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.

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 will be 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 import drums and 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.

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. It has a NAMW of greater than 1000, contains low levels of residual monomers and low levels of low molecular weight species. In addition, the polymer contains a low proportion of reactive functional group (amine group) identified as high concern. However, the high molecular weight of the polymer indicates that it would be unlikely to cross biological membranes readily. Therefore, the systemic toxicity of the polymer is anticipated to be low. The notified polymer is not likely to be a hazardous substance in accordance with the National Occupational Health and Safety Commission (NOHSC) *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b).

The polymer solution is a flammable liquid, packing group II as defined by the Australian Dangerous Goods Code. It contains 2-butoxyethanol and methyl isobutyl ketone and is classified by the notifier as hazardous in accordance with the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). The Material Safety Data Sheet (MSDS) for RC0977 states that it is harmful if swallowed and may cause severe eye and skin irritation. Chronic inhalation of excessive concentrations of vapours may produce effects on the central nervous system. These effects are based on the effects of organic solvents in RC0977.

NOHSC has allocated the following exposure standards for the following chemicals contained in the polymer solution (NOHSC, 1995):

Methyl isobutyl ketone	50 ppm TWA ¹
2-Butoxyethanol ^φ	25 ppm TWA sk ²

¹ TWA: Time weighted average concentration of a substance over an eight-hour working day for a five day working week.

Triethylamine

3 ppm TWA STEL³ 5 ppm

There is no NOHSC exposure standard allocated for solvent 2-propanol, 1-methoxy, acetate. However, NOHSC has allocated an exposure standard for a similar chemical, 1-methoxy 2-propanol: 100 ppm TWA (NOHSC, 1995).

Occupational Health and Safety

Polymer in RC0997 is imported for formulation into automotive primer. The intermediate and final aqueous emulsions are formulated in closed vessels: the intermediate polymer emulsion is 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 emulsion is then stored prior to transport in bulk containers to car manufacturing facilities. Incidental exposure to the notified polymer may occur during transport of RC0977 to storage tanks or mixing vessels.

Exposure to the polymer for process, maintenance and laboratory workers may also occur from contact with diluted polymer emulsion or final paint additive containing <1% notified polymer. Given the engineering controls and PPE worn by these workers (ie. chemical resistant gloves, coveralls, and goggles, and if required organic vapour respirators), and likely low systemic toxicity of the notified polymer, the overall health risk for workers involved in polymer emulsion formulation is assessed as 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 is assessed as low.

The paint additive containing the notified polymer will be mixed in the immersion tank, which will be used to coat automotive bodies by dipping. At this point, exposure to diluted notified polymer (<1%) 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 not be significant.

Public Health

Public exposure to the notified polymer will most likely be limited to exposure to the imported formulation or to the locally produced emulsion occurring following transport accidents or to contact with them as environmental contaminants. Such accidents are not

^φ ACGIH revised the exposure standard for 2-butoxy ethanol to 20 ppm (TWA) (ACGIH, 2001)

² Skin notation

³ STEL: Short-term Exposure Limit

likely and the closely regulated nature of waste disposal from the reformulation and vehicle assembly plants will mean that environmental contact is also not very likely. Any exposure that does occur is likely to be dermal and of an infrequent or transient nature. The low likelihood of exposure to 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 special precautions are required for the notified polymer; however, due to the presence of hazardous components in the aqueous emulsion and final paint:

- Employers should implement the following engineering controls to minimise occupational exposure:
 - Enclosed fixed transfer lines for transfer operations;
 - Enclosed mixing vessels;
 - Exhaust ventilation during re-formulation, quality control analysis, storage and paint application;
- Employers should implement the following safe work practices to minimise occupational exposure during handling of polymer emulsion and final paint:
 - NOHSC exposure standards for all of the components of the final paint mix should not be exceeded in the workplace;
 - Prevent splashes and spills;
- Employers should ensure that the following PPE is used by workers to minimise occupational exposure to the polymer emulsion and final paint:
 - Safety glasses or goggles, chemical resistant industrial clothing and footwear, and, impermeable gloves (cotton, PVC or rubber). Where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an organic vapour respirator should also be used;
 - 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.

14. MATERIAL SAFETY DATA SHEET

The MSDS for RC0977 (Acrylic resin) is provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994).

The 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.

16. REFERENCES

ACGIH, (2001); The American Conference of Governmental Industrial Hygienists (ACGIH): Threshold Limit Values for Chemical Substances and Physical Agents and Biological Indices 2001; ACGIH Cincinnati, Ohio.

ADG Code, (1998); Australian Dangerous Goods Code: The Australian Code for the Transport of Dangerous Goods by Road and Rail Sixth Edition; Commonwealth of Australia, Canberra.

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.

NOHSC (1994); 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.

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

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