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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in RW 3210

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.

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

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1. APPLICANT

BASF Akzo Nobel Automotive OEM Coatings Pty Ltd (ACN 092 127 501) and Akzo Nobel Pty Ltd (ACN 000 119 424) of 51 McIntyre Road Sunshine VIC 3020 have submitted a limited notification statement in support of their application for an assessment certificate for Polymer in RW 3210.

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.

Marketing Name: Polymer in RW 3210

Other Names: Modified epoxy resin

3. PHYSICAL AND CHEMICAL PROPERTIES

No test reports were provided for the determination of physico-chemical properties.

The polymer is not isolated from solution. The following physico-chemical properties are for the aqueous emulsion containing >99% notified polymer, unless otherwise stated.

Appearance at 20°C & 101.3 kPa: milky non-viscous liquid

Boiling Point: Not determined

Density: 1050 kg/m^3

Vapour Pressure: Not determined. However based on its MW and structure, it is not expected to be volatile.

Water Solubility:	Not determined. 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.
Partition Co-efficient (n-octanol/water):	Not determined. The notifier indicates that due to the low water solubility of the polymer, it is expected to partition into the organic phase.
Hydrolysis as a Function of pH:	Not determined. The notified polymer contains carbamate, ester and amide 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 its low solubility.
Adsorption/Desorption:	Not determined. In its emulsified form, as a consequence of its cationic nature, the notified polymer is expected to associate with the soil matrix and sediments, and as such will be immobile in soil.
Dissociation Constant:	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.
Flammability Limits:	Not available. The polymer is combustible but not flammable.
Autoignition Temperature:	Not determined
Explosive Properties:	Not explosive
Reactivity/Stability:	The polymer degrades above 150-175°C and is incompatible with strong mineral acids, strong alkalis and strong oxidising agents.

4. PURITY OF THE CHEMICAL

Degree of Purity:	> 99% w/w
Hazardous Impurities:	none

Non-hazardous Impurities (> 1% by weight):	none
Maximum Content of Residual Monomers:	All residual monomers are present below the relevant concentration cut-offs for classification as hazardous substances.
Additives/Adjuvants:	All additives/adjuvants are present below the relevant concentration cut-offs for classification as hazardous substances.

5. USE, VOLUME AND FORMULATION

The notified polymer will be manufactured in Australia and incorporated into a locally manufactured emulsion which forms part of an automotive primer paint. It will be present in the emulsion at <30% and in automotive paints at <10%.

The emulsion containing the notified polymer will be supplied to car manufacturers as part of a primer paint for application onto car bodies and parts. At the car manufacturing site, the paint will be pumped via a fixed line to application tank, mixed with pigment pastes and water. The paint will be applied by a dipping process, followed by curing in an oven. The paint is usually covered by further layers of other surface coatings.

The notified polymer will be manufactured at the rate of <1500 tonnes/year for the first 5 years.

6. OCCUPATIONAL EXPOSURE

Manufacture of polymer solution and final paint emulsion
The notified polymer is manufactured locally in a closed reactor and formulated into an aqueous emulsion. The intermediate emulsion containing the notified polymer is transferred via enclosed lines to a closed blend tank where additional components are added to form the paint additive emulsion. The paint emulsion is stored prior to transport in bulk containers to the automobile manufacturing facilities.

During routine operations, several groups of workers may receive transient dermal and/or ocular exposure to the notified polymer.

Twenty-five reactor operators working 12 hours/day for 80-100 days/year may be exposed by skin contact to the polymer during processing and collection of samples of the polymer emulsions (containing <30% polymer) for QC analysis. Exposure may also occur from inadvertent leaks and during transfer of finished emulsion to storage tanks. Sample collection is conducted under exhaust ventilation and so inhalation exposure is unlikely.

One to two 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 upkeep.

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 in 20-25 kilo lots to the end-user. Bulk tanker filling will be conducted under exhaust ventilation. 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. The control systems in place are adequate to control exposure not only to the notified polymer but also to 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 will be 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 site, 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 a 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 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. 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 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 primer 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 public may be exposed to the notified polymer only in the event of spills or leaks during transportation of the emulsion and the primer paint. In the event of an accidental spill, the spillage should be contained to prevent run-off into drains and waterways, and collected with absorbent materials (sawdust, vermiculite) into containers. Recovered waste polymer from accidental spills or leaks, filter residue and cleaning manufacturing equipment and the dip tank will be disposed to landfills, in accordance with local environment protection legislation. In the rare event of rejected product (up to 6000 kg/batch), it would be disposed by incineration at a licensed facility.

After application, the notified polymer cross-links to form a hard film during the heat curing process and this film is usually coated with at least one more layer of paint. Hence, the potential for public exposure to the notified polymer after its final application is considered to be low.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

During coatings production, the notifier estimates that up to 720 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 700 kg per annum of the notified polymer will be disposed of during coating application and up to 100 kg of the notified polymer will be disposed of 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 be 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. Waste water 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 (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 ecotoxicology 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 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. The notified polymer has a high NAMW, and absorption across biological membranes and resultant systemic toxicity would be restricted. It contains a low proportion of reactive functional group and a low content of residual monomers. Therefore, the notified polymer is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

The Material Safety Data Sheet (MSDS) for RW 3210 emulsion indicates that the emulsion may be slightly irritating to skin, eyes and respiratory tract. The reported heath effects are likely to relate to other components of the emulsion, such as solvents, rather than the notified polymer.

Occupational Health and Safety
The notified polymer is manufactured in Australia for formulation into an 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 automobile manufacturing facilities. Incidental exposure to the notified polymer may occur during transfer of RW 3210 to storage tanks or mixing vessels.

The notified polymer is never isolated and therefore occupational exposure to the polymer for process, maintenance and laboratory workers would only occur from contact with the aqueous polymer emulsions (containing <30% notified polymer). Contact may result in slight skin and eye irritation. Given the engineering controls, personal protective equipment available to these workers, and the low probability of exposure and likely low systemic toxicity of the notified polymer, the overall health risk for workers involved in polymer manufacture and 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 would be assessed as low.

The paint additive containing the notified polymer will be mixed in a tank which will be used to coat automotive bodies 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.

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.

Given the controls in place and the likely low toxicity of the notified polymer, the health risk to workers involved in end use of the notified polymer is assessed as low.

Public Health
The polymer emulsion and the final paint additive will not be sold to the public and the application will be restricted to car manufacturers. The public may contact with the notified polymer only after it has been applied to and becomes an integral part of a hard film covered by more layers of paint on motor vehicles. Therefore, the risk to the public induced by the notified polymer is considered to be low.

13. MSDS AND LABEL ASSESSMENT

13.1. MSDS

The MSDS of the polymer emulsions 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.

13.2. Label

The label for the polymer emulsion 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.

14. RECOMMENDATIONS

Control Measures

Occupational Health and Safety

No specific precautions are required for the notified polymer itself, however, due to the presence of hazardous components in the aqueous emulsions and final primer paint:

- Employers should implement the following engineering controls to minimise occupational exposure:
  - Enclosed fixed transfer lines for transfer operations
  - Closed reactor, emulsification tank and blend tank
  - Exhaust ventilation during manufacture, QC analysis, storage and paint application;

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the polymer emulsions and the final primer paint:
  - Prevent splashes and spills;

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the polymer emulsion and the final primer paint:
  - chemical goggles or safety glasses with side shields
  - chemical resistant industrial clothing
  - PVC or rubber gloves
  - protective 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.

15. REFERENCES

Connell D. W. (1990) General Characteristics of Organic Compounds which Exhibit Bioaccumulation. In Connell D. W., (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA.

National Occupational Health and Safety Commission (1994a) 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 (1994b) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(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.