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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME**

# FULL PUBLIC REPORT

## Polymer in Dispersing Resin RCP-17916

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Director
Chemicals Notification and Assessment

# FULL PUBLIC REPORT

## Polymer in Dispersing Resin RCP-17916

## 1. APPLICANT

Dulux Australia of McNaughton Road CLAYTON VIC 3169 has submitted a limited notification statement in support of their application for an assessment certificate for **Polymer in Dispersing Resin RCP-17916**.

## 2. IDENTITY OF THE CHEMICAL

The notified polymer is unlikely to be hazardous based on the nature of the chemical and the data provided. Therefore 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:** | Dispersing Resin RCP-17916 |
| **Number-Average Molecular Weight:** | > 1 000 g/mol |
| **Weight-Average Molecular Weight:** | > 5 000 |
| **Maximum Percentage of Low Molecular Weight Species** | |
| **Molecular Weight < 500:** | < 5% |
| **Molecular Weight < 1 000:** | < 10% |
| **Method of Detection and Determination** | infrared (IR) spectrum for identification; determined by gel permeation chromatography (GPC); the level of unreacted monomers was analysed by Gas Chromatography-Mass Selective Detection (GC-MSD) |

## 3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is never isolated from the polymer solution. The physico-chemical data given below are for the polymer solution unless otherwise stated

| | |
|---|---|
| **Appearance at 20°C and 101.3 kPa:** | viscous, clear, white liquid with a solvent odour |
| **Boiling Point:** | anticipated to be 82°C (the boiling point of isopropanol) |
| **Specific Gravity:** | polymer solution: 0.99; polymer 1.18 (calculated) |
| **Vapour Pressure:** | 4.4 kPa at 25°C (isopropanol) |
| **Water Solubility:** | insoluble |
| **Partition Co-efficient (n-octanol/water):** | not provided |
| **Hydrolysis as a Function of pH:** | not provided |
| **Adsorption/Desorption:** | not provided |
| **Dissociation Constant:** | not provided |
| **Flash Point:** | 11°C (isopropanol) |
| **Flammability Limits:** | Upper Explosive Limit = 12 %<br>Lower Explosive Limit = 2% |
| **Autoignition Temperature:** | 399°C (isopropanol) |
| **Explosive Properties:** | not provided |
| **Reactivity/Stability:** | the polymer and its solution, primarily isopropanol, is stable but like other organic compounds should be segregated from strong oxidising agents |

### Comments on Physico-Chemical Properties

The notifier claims that by analogy with similar polymers, the notified polymer will not be volatile and will be insoluble in water. The polymer is only dispersible in water if neutralised with amine, organic cosolvents and other components in the paint formulation. Dispersion is not stable and separates into water and organic layers after several hours. Due to the acid functionalities of the polymer, the Environmental Protection Agency (EPA) believes that some water solubility may be possible and

expects it to be higher than that for normal polyacrylates.

No hydrolysis data were presented, even though the notified polymer contains one amide and a number of ester groupings. The notifier acknowledges that hydrolysis is the most likely means of abiotic degradation. However, hydrolysis in the environmental pH range would be precluded by its very low water solubility.

Partition co-efficient data was not supplied. This would be difficult to measure and the majority of the notified polymer is not anticipated to cross biological membranes because of its high molecular weight (1,2). As the solvent evaporates from the polymer solution it will become more viscous. It is expected that the polymer will readily bind to, or be associated with, soil and sediment.

Dissociation was not measured, although the notified polymer contains some strong acid functionalities.

Particle size was not determined as the polymer only exists as a solution in a mixture of solvents.

Omission of these data is acceptable as the notified polymer has a number-average molecular weight (NAMW) of greater than 1 000 and is considered to be of minimum reactivity and therefore of low concern.

## 4. USE, VOLUME AND FORMULATION

The notified polymer is never isolated but imported as a solution, Dispersing Resin RCP-17916 (polymer solution). The polymer solution is incorporated as a film forming component of an automotive coating, Dp687 Waterborne basecoat (basecoat). It is used to coat external primed steel of motor vehicle bodies.

The following is a schematic for the formulation procedure:

polymer solution and other ingredients ----------> blending batch in a mixer and testing --------> filtration and filling --------> warehouse for distribution

The basecoat will be applied at only one site by automatic electrostatic atomised spray and then heat cured. During the heat curing process, the new polymer reacts with other components in the paint formulation to form an integral part of the paint film. The notifier claims that transfer efficiencies will be approximately 75%. The following is a schematic for the application procedure:

stir ---------> add to circulation tank ----------> coat substrate with automatic equipment ----------> product heat cured

In the first year between 1 and 20 tonnes of Dispersing Resin RCP-17916 will be imported. In the next four years up to 20 tonnes per annum will be imported.

## 5. OCCUPATIONAL EXPOSURE

There is the potential for transport workers to be exposed to the polymer solution during transport from the docks to the Dulux site, but this would only occur in the unlikely event of an accidental spillage.

There are three main groups of workers at the Dulux site in laboratory development, paint manufacture and paint application, that may be exposed to the polymer solution. Manufacture and testing of paint will be conducted by workers in the laboratory working eight hours per day, 20 days per year. Basecoat will be made up by workers for three hours per day, 30 days per year. Quality control testing and drum filling will be carried out for eight hours per day for 30 days per year.

The notified polymer, as a blend with other basecoat ingredients, will be filtered and transferred into 1 000 L steel totes and transported by road to one customer. There is the potential for exposure to the basecoat, containing the notified polymer, during transport, in the unlikely event of spillage. When the polymer blend is added to the circulation tank at the customer's facility, dermal and ocular exposure may occur when hoses are connected and disconnected. This work is usually conducted by one worker and it takes approximately one hour per day, 20 days per year.

Workers will apply the basecoat using a hand spray for eight hours per day, 200 days per year and the spray equipment will be cleaned for one hour per day, 200 days per year. There is the potential for dermal and ocular exposure if spillage of basecoat occurs. Should a spill occur it would be contained within the plant through bunding. Good work practice however, will minimise the probability of spillage occurring.

The polymer solution contains solvents which may cause concern for occupational health. It has been classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (3) due to the presence of isopropanol (30-60%), 2-butoxyethanol (1-9%) and amino methyl propanol (1-9%). Amino methyl propanol and 2-butoxyethanol are listed on the Worksafe *List of Designated Hazardous Substances* (4) and have the potential to cause skin, eye and respiratory irritation. Two of the three solvents also have atmospheric occupational exposure standards assigned by Worksafe Australia (5). For 2-butoxyethanol a 25 ppm time-weighted average (TWA), and a skin notation that indicates it is readily absorbed by the skin. Isopropanol has a TWA of 400 ppm and a short term exposure limit of 500 ppm, which is assigned on the basis of acute effects including irritant potential.

The paint, Dp 687 Waterborne basecoat, also contains both solvents but they are present at concentrations below the threshold for classification as hazardous.

There is an increased likelihood of inhalation exposure to potentially hazardous solvent components during mixing and filling. To minimise exposure to potentially hazardous vapours, mixers and paint filling equipment are fitted with exhaust ventilation and volatiles are captured at source. In addition further steps should be

taken to minimise exposure by means of personal protective equipment, details are provided in the recommendations section of the report.

During spray painting, workers will be afforded protection as the main spray booth and assembly plant repair area have down draft ventilation. Paint application involves the use of automatic spray equipment in a spray booth with an effective fume extraction system thus exposure to the notified polymer and solvent components will be minimal. The notifier states that solvent vapour levels arising from use of mixtures containing the polymer (polymer solution and paint) are measured as a matter of routine. Personal monitoring will be conducted for solvent levels at the customer's site, to ensure engineering controls are operating satisfactory.

Material Safety Data Sheets (MSDS) will be available at both sites and training is supplied by Dulux and their customer for handling chemicals, including the use of personal protective equipment. The control measures and safety procedures described above are considered to be satisfactory in minimising worker exposure to the potentially hazardous solvents present in the polymer solution and paint.

## 6. PUBLIC EXPOSURE

No public exposure to the notified polymer is expected to occur during paint formulation operations or transport. However, if accidental spillage occurs the notified polymer will be contained and cleaned-up according to practices recommended in the MSDS. No public exposure to the notified polymer is expected to occur during application of the basecoat as it occurs in an automated controlled factory environment. Paints containing the notified polymer will not be sold to the public. The public will only come into contact with the notified polymer after it has been applied to and becomes an integral part of a hard durable coating on motor vehicles. However, in this form Polymer in Dispersing Resin RCP-17916 will not be bioavailable, its incorporation into the paint film and physico-chemical properties will be sufficient to preclude absorption across the skin or other biological membranes.

Public exposure to wastes containing Polymer in Dispersing Resin RCP-17916 is not anticipated given the methods of disposal and physico chemical properties of the notified polymer in solution.

## 7. ENVIRONMENTAL EXPOSURE

- **Release**

Paint formulation will be carried out under exhaust ventilation with the capture of volatiles. Spills at the formulation site will be contained by on site bunding. Dulux has developed a solvent recovery procedure (the 'Dusol' process) whereby waste resin and paint are processed to reclaim the solvent. Polymer residues (up to 250 kg per year) will be converted to an inert solid and will be disposed to landfill.

During application, up to 25% of the polymer may be lost through overspray (up to 5 tonnes per year of the polymer at maximum import volumes). However, release of the paint is contained within spray booths. The resultant overspray will be chemically treated with water scrubbing systems. The notifier claims that the efficiency of these systems is 99.6%. The paint material, which is removed by the scrubbers, is separated using flotation techniques. The sludge is then disposed of by a licensed waste contractor to landfill (as prescribed by the Victorian Environment Protection Authority).

Drums containing the notified polymer will be sent to a drum reconditioner. This involves incineration and washing of the drums, and then recycling for other uses.

**• Fate**

The majority of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix. The coating containing the polymer will share the fate of the substrate to which it is applied. As part of a polymerised coat, no hydrolysis, movement, biodegradation or bioaccumulation of the polymer is expected.

Incineration of the polymer is expected to produce water, and oxides of carbon, nitrogen and sulphur.

Any chips or flakes of the cured paint that occur (due to stone chips, accidents, wear and tear, etc) will be inert, diffuse and form part of the sediments.

## 8. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided for the notified polymer, which is acceptable for polymers with a NAMW of greater than 1 000.

The notified polymer has a high NAMW and this will restrict passage across biological membranes and limit the likelihood of systemic toxicity. The notified polymer contains low levels of residual monomers which are unlikely to present a toxicological hazard. However, there are moderate levels of low molecular weight species ( approximately 5% below 500 daltons) that have the potential to cross

biological membranes and may result in systemic toxicity. It is likely that the toxic properties of the solvents, present at higher concentrations in the polymer solution and basecoat, are more hazardous and the methods proposed by the notifier to reduce exposure to the solvents will also be sufficient to reduce exposure to the polymer.

## 9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided for the notified polymer, which is acceptable for polymers of NAMW of greater than 1 000 according to the Act.

## 10. ASSESSMENT OF ENVIRONMENTAL HAZARD

The main environmental exposure of the polymer arises from the landfill disposal of recovered dry waste paint from the formulation and application processes. The EPA estimates that 5 tonnes per year of the polymer may be consigned to landfill at maximum projected import volumes (due to 250 kg waste created through formulation and 25% overspray in application). However, such material will be cured, or bound to soil, and remain immobile in the environment. The environmental hazard from such disposal is expected to be low.

The main environmental hazard would arise through spillage in transport accidents that may release quantities of the uncured polymer to drains and waterways. However, the polymer would quickly become immobile on association with soil/sediment. As previously noted adequate control procedures are outlined in the MSDS.

The polymer is unlikely to present a hazard to the environment when it is incorporated into the paint and applied to the external primed steel of car bodies. Such painted panels will be consigned to landfill or recycled at the end of their life.

## 11. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

As transport workers are only likely to be exposed to the notified polymer in the unlikely event of an accident, the occupational health risk to these workers is low.

During blending, filtering and filling of totes for transport, workers may be exposed via dermal and ocular routes to the notified polymer. Due to the large NAMW of the polymer and its physico-chemical properties it is unlikely to cross biological membranes and therefore presents negligible risk to workers. Any risk due to the low molecular weight species will be minimised by the safety measures employed for the solvent components in the polymer solution.

There is however a health risk posed to workers handling the polymer solution and paint due to the solvent components. Workers should be aware that the solvents may cause skin, eye and respiratory irritation if exposure occurs. However, the engineering control measures and safety procedures at both the manufacturing and application sites are considered to be satisfactory in minimising worker exposure and result in low risk to occupational health when using the polymer solution or the paint.

Paints containing the notified polymer will not be sold to the public and no public exposure is likely to occur during plant manufacture and application. The public may be exposed to the polymer solution and basecoat in the event of accidental spillage during transport; adequate practices for clean-up and disposal are provided in the MSDS. The public will come into contact with the notified polymer as a component of heat cured, inert paint when it has been applied to motor vehicles. There will be negligible public health risk based on its physico-chemical properties and use pattern.

## 12. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Dispersing Resin RCP- 17916, the following guidelines and precautions should be observed. It should be noted that these recommendations take into account the form in which the notified polymer is imported (in solvent solution) and the fact that the polymer is never isolated.

- Safe practices for handling any chemical formulation, should be adhered to and include:

  - minimising spills and splashes:
  - practising good personal hygiene; and
  - practising good house keeping and maintenance including bunding of large spills which should be cleaned up promptly with absorbents and put into continuers for disposal;

- It is expected that in the industrial environment, protective clothing conforming to and used in accordance with Australian Standard (AS)2919 (6) and protective footwear conforming to Australian/New Zealand Standard (AS/NZS) 2210 (7) should be worn as a matter of course. In addition, it is advisable when handling the polymer solution or basecoat containing potentially hazardous solvents to wear chemical-type goggles (selected and fitted) according to AS 1336 (8) meeting requirements of AS/NZS 1337 (9), and impermeable gloves conforming to AS 2161-1978 (10) to protect against any unforseen circumstances.

- Exposure standards should be used to minimise exposure to hazardous components in polymer solutions and basecoat applications and appropriate personal protective equipment should be used.

- A copy of the MSDS should be easily accessible to employees.

## 13. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

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.

## 14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

## 15. REFERENCES


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2. Gobas F.A.P.C., Opperhuizen A. & Hutzinger O. 1986, 'Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation'. *Environmental Toxicology and Chemistry* Vol.5, pp 637-646.

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

4. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.

5. National Occupational Health and Safety Commission 1995, 'Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment', [NOHSC: 1003(1995)], in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*, Australian Government Publishing Service Publ., Canberra.

6. Standards Australia 1987, *Australian Standard 2919 - 1987 Industrial Clothing,* Standards Association of Australia Publ., Sydney, Australia.

7. Standards Australia, Standards New Zealand, 1994. *Australian/ New Zealand Standard 2210 - 1994 Occupational Protective Footwear, Part 1: Guide to Selection, Care and Use. Part 2: Specifications,* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

8. Standards Australia 1982, *Australian Standard 1336-1982*, *Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney.

9. Standards Australia 1984, *Australian Standard 1337-1984*, *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney,.

10. Standards Australia 1978, *Australian Standard 2161-1978*, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.

11. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Completion of a Material Safety Data Sheets*, [NOHSC:2011(1994)], AGPS, Canberra.